North Carolina Department and Agriculture & Consumer Services

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Project Title: Cotton stalks, a renewable alternative substrate for the nursery industry

A. Project Summary

The North Carolina nursery industry relies almost exclusively on pine bark as a substrate to grow nursery plants in pots. Pine bark is desirable because it is light in weight, well-drained, pathogen-free and disease suppressive. Changes in forestry practices and new markets for forestry products have threatened the availability of this vital component in nursery plant production. Alternative substrates including cotton stalks, cotton stalks plus animal manure (nitrogen source) and cotton gin trash with desirable horticultural characteristics and disease suppression were investigated to mitigate the potential impact loss of pine bark could have on the nursery industry in North Carolina.

The goal of the project was to provide the nursery industry in North Carolina with a new potting substrate based on renewable cotton stalks that will keep the industry competitive and continue demand for their products in the $886 million dollar nursery industry in N.C.

Shredded cotton stalks must be free of potential plant pathogens like *Rhizoctonia* and small enough in particle size to create appropriate growing substrate physical properties so that plant growth is comparable to traditional pine bark grown plants as determined in season-long growth studies. As a pilot project, cotton stalks were collected from a producer by the investigators and composted or left un-composted. Bioassay of both types of cotton stalks were negative for both *Rhizoctonia solani* and *Pythium* spp., two important damping-off pathogens, but germinating cotton seed from un-harvested portions of the crop collected with the stalks were unacceptable i.e. basically weeds. Thus, future use of cotton stalk substrates will require composting to eliminate un- germinated cotton seed.

Composted cotton stalks were used to replace a portion of either pine bark or experimental pine wood used in nursery potting mixes. *Rhododendron obtusum* ‘Sunglow’ (azalea) and *Juniperus conferta* ‘Blue Pacific’ (juniper) were grown in pots with two different irrigation/ground surface conditions - overhead, sprinkler irrigation with black weed fabric covering the ground or low volume, spray stake irrigation with gravel covering the ground, two of the most common ways nursery plants are produced in pots. Azalea shoot growth was larger with sprinkler irrigation for all substrates compared to low volume. With sprinkler irrigation, growth was greatest in azalea shoots in all the pine bark-based substrates and 100% pine bark and was lowest in all the pine wood based substrates. The 100% pine bark control and pine wood plus cotton stalk and animal manure mixes resulted in growth that was not significantly different than any of the other substrates. Thus for azalea, plant growth was comparable when a portion of the pine bark substrate was replaced with cotton stalks. Shoot growth for juniper was least in pine wood plus cotton stalk mix, however, growth in pine bark plus cotton stalks was comparable to pine bark alone.

For good plant growth in potting mix, the physical properties of the mix such as total porosity, air space, available water, unavailable water, container capacity and bulk density must fall with a specific range or the mix will be either too wet or too dry for optimal plant growth. Most of the pine bark based and pine wood based substrates amended with cotton stalks, cotton stalks plus animal manure or cotton gin trash maintained acceptable physical properties throughout the production period with some being slightly lower or higher than the recommended ranges. Another measure of a nursery potting mix is soluble salt and pH levels that arise from the natural consitituents of the potting mix and the fertilizer applied for plant growth. The 100% pine bark mix maintained the lowest soluble salt range (0.8 – 0.2 mS) and pH range (6.6 – 5.7) while the pine bark mix plus cotton stalks or cotton stalks with animal manure- were intermediate in soluble salts and pH levels (SS: 0.9 – 0.2 mS and pH: 6.3 – 6.0). The pine wood substrates with and without cotton stalks had the highest soluble salt and pH reading over the growing season. However, all substrates maintained pH and SS levels within recommended levels.

A subset of Sunglow azalea and Blue Pacific juniper along with Hinodegiri azalea were used to test the suppression of the pine bark and pine wood mixes along and amended with cotton stalks, or cotton stalks plus nitrogen (animal manure source), or cotton gin trash against Phytophthora root rot caused by *Phytophthora cinnamomi*. In both years, disease did develop in both types of nursery mixes but the severity of root rot was no greater in the cotton stalk amended mixes than in the traditional pine bark mix or the experimental pine wood mix.

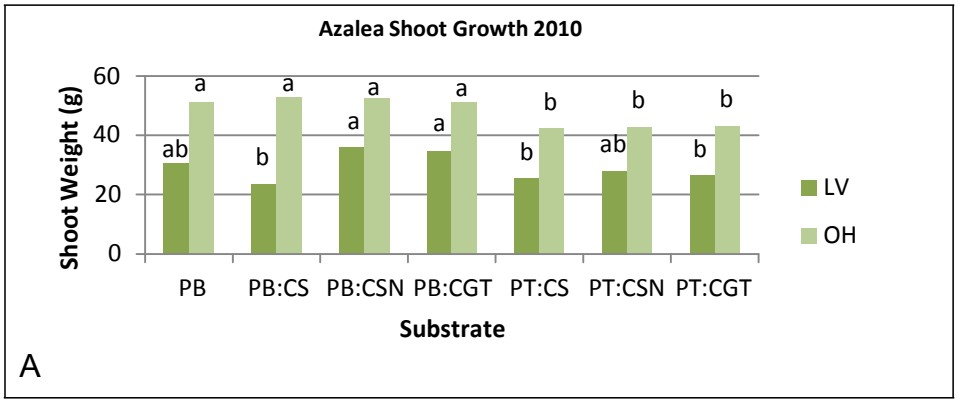
In summary, adding a nitrogen source to cotton stalks during composting produced a better substrate amendment for pine bark mix while aged cotton gin trash may be superior to cotton stalks as a pine bark amendment. Cotton stalks plus animal manure and cotton gin trash amended pine bark substrate produced as good or better plant growth than pine bark alone.

B. Project Approach

Composting of cotton stalks. One goal of this project was to develop a procedure for the composting of cotton stalks and demonstrate the usefulness of composted cotton stalks (CS) or cotton stalks plus added nitrogen in the form of dairy manure compost (CSN) and cotton gin trash (CGT) as substrate amendments in a nursery operation. The composting process was carried out on a concrete slab under a covered structure from 22 February 2010 through 7 June 2010. Throughout the composting process CS and CSN changed drastically. Both CS and CSN components went from having low moisture content, with large particle sizes and varying types of cotton debris in the piles to having a high moisture content and water holding ability, smaller, more uniform particles, and a spongy feel. Thus, the addition of N did enhance decomposition. No cotton seed germination from unharvested cotton on the cotton stalks was seen after composting.

Plant growth studies in cotton stalk amended potting mixes. Composted cotton stalks (CS), composted cotton stalks with nitrogen (CSN), and cotton gin trash (CGT) were amended to either pine bark (PB) or pine tree wood (PT) resulting in a total of six substrates in the the following ratios 4:1 PB : CS (PB:CS), 4:1 PB : CSN (PB:CSN), 9:1PB : CGT (PB:CGT), 1:1 PT : CS (PT:CS), 1:1 PT : CSN (PT:CSN), and 4:1 PT : CGT (PT:CGT) arranged in a randomized complete block design with eight replications on nursery pads at the NC State Horticultural Field Lab in Raleigh. A control of 100% PB was included for comparisons. *Rhododendron obtusum* 'Sunglow' (azalea) and *Juniperus conferta* 'Blue Pacific' (juniper) were grown in pots of the six substrates describe above with two different irrigation/ground surface conditions - overhead, sprinkler irrigation with black weed fabric covering the ground or low volume, spray stake irrigation with gravel covering the ground.

Azalea shoot growth was larger with sprinkler irrigation for all substrates compared to low volume. With sprinkler irrigation, growth was greatest in azalea shoots in all the pine bark-based substrates and 100% pine bark and was lowest in all the pine wood based substrates. The 100% pine bark control and pine wood plus cotton stalk and animal manure mixes resulted in growth that was not significantly different than any of the other substrates **(Fig 1A, B).** Thus for azalea, plant growth was comparable when a portion of the pine bark substrate was replaced with cotton stalks. Shoot growth for juniper was least in pine wood plus cotton stalk mix, however, growth in pine bark plus cotton stalks was comparable to pine bark alone **(Fig. 1C, D).**



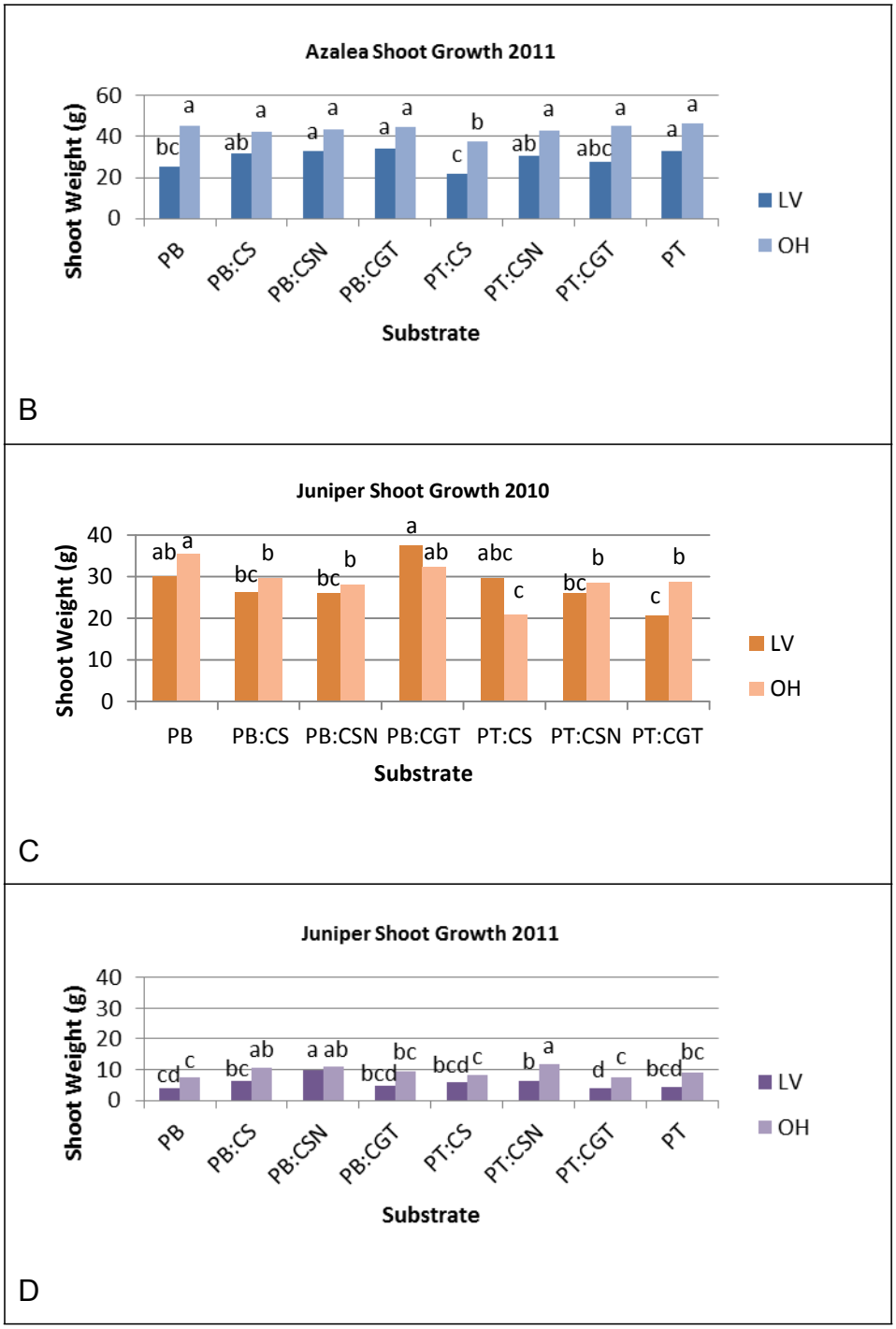


Fig. 1. Effect of substrate on azalea and juniper shoot growth grown with overhead sprinkler irrigation with black weed fabric covering the ground (OH) or low volume, spray stake irrigation with gravel covering the ground (LV) in 2010 (Fig 1 A, C) and 2011 (Fig 1 B, D). See text for substrate key. (E.D. Riley, 2011, MS thesis, NC State University)

Physical properties of potting mixes amended with composted cotton stalks. The physical properties of the six mixes were determined with core samples taken from fallow pots of the various mixes at 4 and 22 weeks during the growth season in both years. Samples were analyzed for total porosity (TP), airspace (AS), container capacity (CC), available water (AW), unavailable water (UW), bulk density (BD) and particle size distribution analyses in the Horticultural Substrates Laboratory, Department of Horticultural Science, NC State University. Most of the substrates including those with composted cotton stalks and the pine bark control were all within acceptable ranges for nursery crop production while some were slightly lower or slightly higher **(Table 1).**

Soluble salts are a measure of fertilizer release from both natural sources in the mix and added slow release fertilizer. The six mixes were adjusted at formulation to have approximately the same levels of N-P-K. Soluble salts were measured at five assessment dates over the 2010 growing season. The 100% pine bark mix maintained the lowest soluble salt range (0.8 – 0.2 mS) and pH range (6.6 – 5.7) while the pine bark mix plus cotton stalks or cotton stalks with animal manure were intermediate in soluble salts and pH levels (SS: 0.9 – 0.2 mS and pH: 6.3 – 6.0) **(Table 2)**. The pine wood substrates with and without cotton stalks had the highest soluble salt and pH reading over the growing season. However, all substrates maintained pH and SS levels within recommended levels.

Disease suppression of cotton stalk amended potting mix. Phytophthora root rot is a progressive disease on root systems of susceptible plants such as azaleas and junipers that begins with root tip infections leading to eventual colonization of the entire root system and plant death. The same set of six mixes as described under plant growth were planted with Sunglow azalea and Blue Pacific juniper along with Hinodegiri azalea then infested with six rice grains colonized by *Phytophthora cinnamomi* to test the suppression of the mixes. A second set of plants in each mix were left non-infested as a control. Neither Sunglow azalea nor Blue Pacific juniper developed severe symptoms of Phytophthora root rot in either year tested. However in both years, Phytophthora root rot did develop in the various nursery mixes in which Hinodegiri azalea was grown but the severity of root rot was no greater in the cotton stalk amended mixes than in the traditional pine bark mix or the experimental pine wood mix **(Table 3).**

Outreach project with commercial nursery. There were a total of four substrates evaluated: 4:1 pine bark (PB): CS (PB:CS), 4:1 PB : composted cotton stalks with a nitrogen source (CSN) (PB:CSN), 9:1PB : aged cotton gin trash (CGT) (PB:CGT), and an industry control of 100% PB. Sunglow azaleas potted in each substrate were arranged in a completely randomized design with eight replications and grown at Currin's Nursery (Willow Springs, NC) (longitude: 35°36'21.50"N; latitude: 78°41'7.42"W). Shoot dry weights were not affected by substrate. Growth results support data for the carbon:nitrogen (C:N) ratio and low percent nitrogen of the finalized CS composts. Nitrogen immobilization did not appear to have limited growth. Additionally, the low C:N and higher percent nitrogen of CGT did not enhance growth.

Table 1. Effect of pine bark (PB) based and whole pine tree (PT) based substrates amended with composted cotton stalks (CS), composted cotton stalks with a nitrogen source (CSN) and aged cotton gin trash (CGT) on total porosity (TP), air space (AS), container capacity (CC), available water (AW), unavailable water (UW), and bulk density (BD). (2010). (E.D. Riley, 2011, MS thesis, NC State University)

Substrate (v/v)[z]	TP (% vol.)		AS (% vol.)		CC (% vol.)		AW (% vol.)		UW (% vol.)		BD (g/cc^3)	
	4 wks[y]	22 wks	4 wks	22 wks	4 wks	22 wks	4 wks	22 wks	4 wks	22 wks	4 wks	22 wks
PB	91.3	76.9 d[x]	32.4 b	20.3 cd	55.6 c	56.5 a	16.9 c	29.2 a	38.7 ab	27.3 ab	0.23 b	0.26 ab
PB:CS	88.5	75.7 d	31.8 b	19.8 cd	56.7 bc	60.0 a	23.7 bc	29.0 a	36.4 bc	27.0 abc	0.23 b	0.26 ab
PB:CSN	88.8	75.3 d	29.4 bc	24.2 bc	59.4 ab	51.2 b	24.2 bc	21.7 b	35.3 c	29.5 a	0.24 b	0.24 b
PB:CGT	85.9	74.9 d	25.8 c	17.1 d	60.1 ab	57.9 a	21.0 bc	35.2 a	39.2 a	22.7 c	0.27 a	0.27 a
PT:CS	92.5	93.2 a	39.0 a	36.2 a	53.5 c	57.0 a	17.1 bc	33.7 a	28.5 de	23.4 bc	0.12 d	0.11 d
PT:CSN	93.0	80.3 c	37.6 a	37.0 a	55.4 c	43.3 c	24.6 b	18.4 b	30.8 d	24.8 bc	0.13 d	0.13 c
PT:CGT	91.8	85.6 b	31.2 b	27.5 b	60.6 a	58.1 a	33.9 a	34.7 a	26.7 e	23.4 bc	0.16 c	0.15 c
Substrate[w]	NS	<.0001	0.0002	<.0001	.0071	<.0001	.0049	0.0004	<.0001	.0402	<.0001	<.0001
BMP Guidelines[v]	50-85%		10-30%		45-65%		25-35%		25-35%		0.19-0.70 g/cc	

[z] The substrates consisted of: 100% PB, 4:1 PB:CS (PB:CS), 4:1 PB:CSN (PB:CSN), 9:1 PB:CGT (PB:CGT), 1:1 PT:CS (PT:CS), 1:1 PT:CSN (PT:CSN), and 4:1 PT:CGT (PT:CGT).

[y] Means within a column with different letters are significantly different from each other based on lsd mean separation procedures ($p \geq 0.05$). N=3.

[x] The substrates were sampled twice at for physical analysis at 4 weeks after planting, 7/6/2010 and again at 22 weeks after planting, 10/20/2010.

[w] ANOVA effect of substrate within each sample date. NS=$p \geq 0.05$, p-value given otherwise.

[v] BMP = Best Management Practices recommended ranges (in percentages) for substrates used in general nursery production (Yeager et al., 2000)

Table 2. Effect of pine bark (PB) based and whole pine tree (PT) based substrates amended with composted cotton stalks (CS), composted cotton stalks with a nitrogen source (CSN) and aged cotton gin trash (CGT) on pH and soluble salts (SS). (2010). (E.D. Riley, 2011, MS thesis, NC State University)

Low Volume[z]										
Azalea	pH	SSmS	pH	SSmS	pH	SSmS	pH	SSmS	pH	SSmS
Substrate[y]	5/19/2010		6/3/2010		7/2/2010		7/15/2010		8/10/2010	
PB	5.2 c[x]	0.25 c	6.1 cd	0.16 c	5.8 de	0.32 d	5.6 bcd	0.45	5.6 ab	0.41
PB:CS	5.3 c	0.34 bc	5.4 f	0.17 c	5.5 e	0.51 c	5.3 d	0.58	5.0 c	0.45
PB:CSN	5.4 c	0.42 b	5.5 ef	0.18 bc	5.9 bcd	0.46 cd	5.3 d	0.67	5.9 a	0.46
PB:CGT	5.3 c	0.40 bc	5.8 de	0.19 bc	5.9 cd	0.58 bc	5.5 cd	0.45	5.7 a	0.43
PT:CS	6.8 b	0.39 bc	6.4 ab	0.54 a	6.2 ab	0.84 a	5.8 abc	0.77	5.3 bc	0.69
PT:CSN	7.1 a	0.63 a	6.7 a	0.39 ab	6.4 a	0.63 bc	6.1 a	0.92	5.8 a	0.76
PT:CGT	7.0 ab	0.42 b	6.2 bc	0.40 ab	6.1 abc	0.70 ab	5.9 ab	0.78	5.7 a	0.74
Substrate[w]	<.0001	0.0066	<.0001	0.0112	0.0007	0.0012	0.0024	NS	0.0015	NS

Juniper	pH	SSmS	pH	SSmS	pH	SSmS	pH	SSmS	pH	SSmS
PB	5.4 cd	0.26 d	5.7 b	0.24	6.1	0.53 bc	5.5	0.78 bc	6.2	0.44
PB:CS	5.2 d	0.26 cd	5.9 b	0.20	5.9	0.38 c	5.3	0.61 c	5.3	0.32
PB:CSN	5.3 cd	0.41 b	5.8 b	0.29	6.2	0.40 c	5.7	0.47 c	6.1	0.37
PB:CGT	5.4 c	0.56 ab	5.9 b	0.18	5.9	0.61 bc	5.5	0.46 c	5.6	0.28
PT:CS	6.8 b	0.37 bc	6.4 a	0.37	5.9	1.10 a	5.4	0.99 ab	5.4	0.48
PT:CSN	7.0 a	0.39 b	6.4 a	0.35	6.3	0.95 ab	5.5	1.28 a	5.5	0.80
PT:CGT	6.9 ab	0.45 ab	6.4 a	0.67	6.3	1.27 a	5.9	1.13 ab	5.7	1.26
Substrate	<.0001	0.0007	0.0003	NS	NS	0.0038	NS	0.0020	NS	NS

Sprinklers										
Azalea	pH	SSmS	pH	SSmS	pH	SSmS	pH	SSmS	pH	SSmS
Substrate	5/19/2010		6/3/2010		6/29/2010		7/13/2010		7/28/2010	
PB	5.2 c	0.66 bc	5.9	0.21	6.0	0.27 b	5.8	0.36	5.9 a	0.36 c
PB:CS	5.1 c	0.57 c	5.6	0.18	5.9	0.20 b	5.6	0.29	5.8 ab	0.31 c

PB:CSN	5.3 c	0.67 bc	6.0	0.24	5.9	0.23 b	5.7	0.26	5.7 abc	0.36 c
PB:CGT	5.3 c	0.81 bc	6.0	0.22	6.0	0.27 b	5.7	0.33	5.6 bc	0.39 bc
PT:CS	6.6 b	1.40 a	6.0	0.46	6.0	0.45 a	5.9	0.44	5.6 c	0.74 ab
PT:CSN	6.9 a	0.97 b	6.2	0.34	6.1	0.55 a	6.0	0.50	5.7 abc	0.82 a
PT:CGT	6.7 ab	0.85 bc	6.1	0.29	6.0	0.50 a	5.8	0.45	5.9 a	0.59 abc
Substrate	<.0001	0.0070	NS	NS	NS	0.0019	NS	NS	0.0334	0.0428
PB	5.4 c	0.68	6.0	0.21	6.0	0.26 d	5.6	0.30 bc	5.8 a	0.28 c
PB:CS	5.2 c	0.89	6.0	0.22	5.9	0.26 d	5.4	0.26 c	5.2 c	0.29 bc
PB:CSN	5.4 c	0.71	5.8	0.17	5.8	0.30 bcd	5.4	0.29 c	5.5 abc	0.26 c
PB:CGT	5.3 c	0.81	6.0	0.15	5.8	0.29 cd	5.6	0.29 c	5.4 bc	0.24 c
PT:CS	6.6 b	1.28	6.0	0.22	5.9	0.44 ab	5.3	0.33 bc	5.5 abc	0.27 c
PT:CSN	6.8 a	1.13	6.3	0.29	6.1	0.51 a	5.4	0.42 a	5.7 ab	0.53 a
PT:CGT	6.8 a	1.12	6.1	0.32	6.1	0.44 abc	5.8	0.38 ab	5.8 a	0.42 ab
Substrate	<.0001	NS	NS	NS	NS	0.0144	NS	0.0095	0.0193	0.0042

[z] Plants were grown with overhead sprinkler irrigation black weed fabric covering the ground (OH), or low volume, volume spray stake irrigation and gravel covering the ground (LV).

[y] The substrates consisted of: 100% PB, 4:1 PB:CS (PB:CS), 4:1 PB:CSN (PB:CSN), 9:1 PB:CGT (PB:CGT), 1:1 PT:CS (PT:CS), 1:1 PT:CSN (PT:CSN), and 4:1 PT:CGT (PT:CGT).

[x] Means within a column with different letters are significantly different from each other based on lsd mean separation procedures ($p \geq 0.05$). N=3.

[w] ANOVA effect of substrate within each sample date. NS=$p \geq 0.05$, p-value given otherwise.

Table 3. Effect of potting mixes on disease suppression of 'Hino' azalea (highly susceptible), 'Sunglow' azalea, and 'Blue Pacific' juniper caused by *Phytophthora cinnamomi* as measured by linear contrast comparison of infested versus non-infested plants for each mix tested (2011). (E.D. Riley, 2011, MS thesis, NC State University)

Hino' Azalea		Foliar disease symptoms			
Substrate	14-Jul	2-Aug	16-Aug	30-Aug	Root Rot
PB	0.001	0.001	0.0007	0.0038	0.0001
PB:CS	0.001	0.001	0.0007	0.0038	0.0001
PB:CSN	0.001	0.001	0.0007	0.0038	0.0001
PB:CGT	0.001	0.001	0.0007	0.0038	0.0001
PT:CS	0.001	0.001	0.0007	0.0038	0.0001
PT:CSN	0.0229	0.005	0.0104	0.0244	0.0001
PT:CGT	0.001	0.001	0.0007	0.0038	0.0001
Sunglow' Azalea		Foliar disease symptoms			
Substrate	14-Jul	2-Aug	16-Aug	30-Aug	Root Rot
PB	NS	NS	NS	NS	NS
PB:CS	NS	NS	NS	NS	NS
PB:CSN	NS	NS	NS	NS	NS
PB:CGT	NS	NS	NS	NS	NS
PT:CS	NS	NS	NS	NS	NS
PT:CSN	NS	NS	NS	NS	NS
PT:CGT	NS	NS	NS	NS	NS
Juniper		Foliar disease symptoms			
Substrate	14-Jul	2-Aug	16-Aug	30-Aug	Root Rot
PB	0.0117	NS	NS	NS	NS
PB:CS	0.0117	NS	NS	NS	NS
PB:CSN	0.0117	NS	NS	NS	NS
PB:CGT	0.0117	NS	NS	NS	NS
PT:CS	0.0117	NS	NS	NS	NS
PT:CSN	0.0117	NS	NS	NS	0.0001
PT:CGT	0.0117	NS	NS	NS	NS

[z] The substrates consisted of: 100% PB, 4:1 PB:CS (PB:CS), 4:1 PB:CSN (PB:CSN), 9:1 PB:CGT (PB:CGT), 1:1 PT:CS (PT:CS), 1:1 PT:CSN (PT:CSN), and 4:1 PT:CGT (PT:CGT).

[y] Foliar disease symptoms were recorded on a disease rating scale where 1=no disease, 2=slight disease (slight chlorosis), 3= stunting, necrosis, 4=dead plant.

[x] At harvest root rot was assessed with a standard rating scale where 1= healthy, 2= fine roots necrotic, 3= coarse roots necrotic, 4= crown rot, and 5= dead plant.

[w] Linear contrasts testing rating of infested compared to control within each substrate. NS=$p \geq 0.05$, p-value given otherwise.

C. Goals and Outcomes Achieved

Activities completed

- Development of a successful process to compost shredded cotton stalks that allowed amendment of the composted cotton stalks into either pine bark mix or pine wood mix.
- Measured the effect of potting mixes amended with composted cotton stalks on plant growth and determined that azalea and juniper plants responded favorably to cotton stalk amended mixes.
- Compared the physical properties of potting mixes amended with cotton stalks with a standard pine bark and found that key physical properties were maintained in a favorable range for plant growth with cotton stalk amended mixes.
- Demonstrated that soluble salt and pH properties of potting mixes amended with cotton stalks were consistent with expected values found in the standard pine bark mix.
- Conducted a Phytophthora root rot study to demonstrate that disease severity in potting mixes amended with composted cotton stalks was no more conducive to disease than the standard pine bark mix.

Publications

- Bridges, E.D., H.T. Kraus, B.E. Jackson, and T.E. Bilderback. 2011. Cotton amended substrates: Wrinkle free? 56th Annual Southern Nurseryman's Association Research Conference. p. 6-10.
- Bridges, E.D., H.T. Kraus, B.E. Jackson, and T.E. Bilderback. 2011. Cotton waste amended substrates impact azalea and juniper growth. ASHS abstract.
- Riley, Elizabeth D., H.T. Kraus, T.E. Bilderback, and B.E. Jackson. 2012. Cotton Waste: a New Spin on Southeastern Substrates. 57th Annual Southern Nurseryman's Association Research Conference. p. 63-67.
- Bilderback, Ted, Elizabeth Bridges, Brian Jackson, Helen Kraus, and Bill Fonteno. "Pine Bark Alternatives: Could Cotton Stalks Be a Wrinkle Free Choice for Plants Having Birthdays in Pots?" *Nursery Notes* 45.2 (2011): 23-25.

Comparison of actual accomplishments with the goals established for the project

- The overall goal of the project was to determine if cotton stalks could be used to amend potting mixes and reduce the amount of pine bark or pine tree wood needed to grow plants.
    - In the case of pine bark, we found that 20% by volume of the mix could be replaced with composted cotton stalks and not affect growth of azalea or juniper.
    - In the case of pine tree wood, we found that 50% by of the mix could be replaced with composted cotton stalks. Growth was often better when the cotton stalks had been composted with added nitrogen (dairy composted manure) before amended to the potting mix.

    - Physical properties of the mixes amended with cotton stalks were not altered from those of the standard pine bark mix and important consideration for a grower adopting a new potting mix.
- The outreach component of the project included evaluation of plant growth in cotton stalk amended mixes with an independent nursery cooperator to see if the system could be adopted easily to standard nursery production practices.
    - Plant growth in the cotton stalk amended mixes at the commercial nursery was comparable to that observed at the Horticultural Field Lab.
- Another goal was to determine if cotton stalk amended mixes were more suppressive to root disease caused by *Phytophthora cinnamomi* than the standard pine bark mix.
    - Although Phytophthora root rot was not suppressed more in cotton stalk amended mixes, the severity of disease was no greater than that observed in the standard pine bark mix.

D Beneficiaries

- The prime group that benefits from the successful use of composted cotton stalk amendments in pine bark mixes is nurserymen in North Carolina and other states who need new alternatives to save production costs. Use of composted cotton stalks can save up to 20% of the pine bark use in potting mixes and thus lower production costs. For nurserymen who adopt pine tree wood potting mixes, amendment with composted cotton stalks can reduce use of pine tree wood by up to 50%.
- Cotton farmers also will benefit from adoption of cotton stalks in nursery mixes as a potential market for cotton stalk residue that could provide an economic solution to disposal of an unwanted crop residue.
- Since adding nitrogen in the form of dairy compost manure to cotton stalks during the composting process improved plant growth and physical properties of amended mixes in some substrate mixes, dairy compost producers could see additional demand for their product.

E Lessons Learned

- We expected that composting of cotton stalks might be required to eliminate potential damping-off pathogens like *Rhizoctonia* and *Pythium*. Although this concern proved unfounded based on bioassays of the cotton stalk residue, we were surprised by germination of cotton seed remaining in the cotton stalk residue making composting a requirement for preparation of cotton stalks.
- We also learned that adding nitrogen during the composting process improved physical property characteristics and plant growth once the composted cotton stalks were incorporated into the pine bark or pine tree wood substrate.
- The commercial grower who participated in the evaluation of the various potting mixes at his nursery was impressed enough with the benefit of adding cotton stalks to replace a portion of pine bark in his

mix, that he was looking for a commercial source of composted stalks to further evaluate.

- The rate of slow release fertilizer commonly used in nursery potting mixes must be adjusted to meet the nutrient requirements of the plant species grown. We found that addition of composted cotton stalks could replace a portion of the slow release fertilizer needed, thus saving production costs.

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PROJECT TITLE: Production testing and demonstration of Shiitake (*Lentinula edodes*) mushroom strains under intensive (indoor) production systems

A. PROJECT SUMMARY

The introduction of shiitake farming as specialty crop dates back to over thirty years in North Carolina. In the past ten years the Edible and Medicinal Mushroom Program at North Carolina A&T State University received several funding aimed at expanding mushroom farming as alternative to tobacco. The result is that at present over 400 small farmers are engaged in mushroom outdoor cultivation of shiitake mushrooms. The superior quality of shiitake produced by these farmers has earned its place in the consumers mind across the state. The net result is that, farmers have no problems selling their shiitake mushrooms at premium prices ($12-16/lbs), compared to what is available through food supply chains and groceries stores. However, the level of production and seasonal nature has limiting effect on the growth of the mushroom industry. According to the report to GoldenLeaf Foundation which was prepared by the International Trade Center at NC A&T State University, the projected supply of shiitake in NC using the current outdoor cultivation method is 77.3, 91.1 and 130.2 x 10^3 pounds for years 2009, 2010 and 2011 respectively. However the projected demand for NC grown shiitake in NC is 331.4, 338.1, 334.8 x 10^3 pounds for years 2009, 2010 and 2011 respectively.

The major problems facing the farmers are the lack of production systems that guarantees enough volume and quality product for sale to local buyers who need shiitake in much larger quantity than they can produce outdoors, and the ability to maintain supply of shiitake mushrooms year-round. Therefore, NC shiitake farmers are not able to achieve substantial market penetration, especially in not being able to enter supply contracts with restaurants and chain suppliers in the state and beyond. The limited production capacity that is negatively impacting the mushroom industry can be reversed through intensive, consistent and sustainable production practices.

In line with solving this problem, the Mushroom Biology and Fungal Biotechnology Laboratory (MBFBL) has collected several strains of shiitake and undertook a breeding and selection research to obtain 20 new shiitake strains under conditions simulated to weather conditions in North Carolina. In view of the expected need to introduce intensive production system, we have worked closely with the North Carolina Mushroom Growers Association (NCMGA) who has members that have indoor facilities suitable for use in intensive mushroom production. Furthermore, The North Carolina Coalition for Farms and Rural Families based in Rose Hill, Duplin County NC, has built an indoor mushroom fruiting facility for use in demonstration of exotic mushroom farming. We propose to conduct production trials in collaboration with NCCFRF and three members of NCMGA, using indoor production facilities to test a model for intensive shiitake production in different parts of North Carolina.

The objectives of the project were:

1. Screen 15 strains and 15 laboratory breeds of new shiitake strains for growth and yield parameters under intensive production system involving sawdust based substrate blocks

2. Test production capacities of selected strains in 4 different locations across NC

3. Determine production efficiency as well as disease and pest and incidence in intensive production system

4. Determine production and operational cost for small- to medium- size operation which can produce between 100 and 200 lbs per week

The expected outcomes of the project were:

1. Best-producing shiitake strains under indoor cultivation system will be determined and become available for use in the expansion of intensive year round shiitake production in North Carolina.
2.
2. Identification of the technical problems associated with the intensive production system as well as production and operations cost in a small farm setting.

3. Enterprise budgets for running a profitable shiitake farming business

4. Data and information obtained from the research, including suitable model for use in intensive production and enterprise budget will online at NC A&T Edible and Medicinal Mushroom Program Website as well as the NCMGA web site (www.ncmushrooms.org). Results will also be presented at a National or regional conference on related subject (e.g. Mycological Society of America Annual meeting, Agricultural Research directors, etc).

5. A report consisting of our findings and recommendations will constitute the deliverable from this project, which will be submitted to the funding agency.

This project is timely since it will form the basis for an enterprise budget that will benefit most members of NCMGA and other farmers who might want to going into intensive shiitake farming as part of the specialty crop production initiative.

This project was not funded by a previous grant from SCBGP or SCBGP-FB

B PROJECT APPROACH

The selected 30 shiitake strains were screened for suitability in indoor shiitake fruiting trials. This screening was performed in at fruiting house at

the University, as well as in four other fruiting houses of participating farmers across the state. The screening process involved the production of fruiting blocks from test shiitake strains at the Mushroom Biology and Research unit at the University school farm. Resulting shiitake blocks were used for fruiting experiments either at our facility at the University or with participating farmers' facility. The participating farmers were located in Rose Hill, Charlotte, Richard Davis' Farm near Charlotte and Marshall all in North Carolina. The overall yield of test strains were collected and used to rank the test strains and cost of production was versus yield was used to determine operational cost and enterprise budget. Regular farm visits and meetings with participating famers were also part of this project's effort to educate and monitor production at participating farms

The project benefitted no commodities other than specialty crops,

The partners in this project were the selected farms where fruiting trials were tested. They contributed immensely because, if not for their participation, the testing of the strains at different locations across the state would not have been completed. While they received significant technical support from us for fruiting house construction and management, the use of their fruiting houses were critical for the success of this project.

C GOALS AND OUTCOMES ACHIEVED

We have had an ongoing outdoor cultivation of shiitake mushroom program in North Carolina since 2002. We have over 400 farmers who are engaged in the seasonal outdoor cultivation. Among these, some farmers have indicated interest to start indoor year round cultivation. These farmers have indoor facilities that they use for fruiting shiitake blocks. From among this pool we selected those that were most capable of participating in this project. Some qualification was ability to use computers, to aid in data transmission to us as well as communication. One group comprising of minority farmers (10 in number) that are using a non-profit agency owned facility in Rose Hill, Duplin County, NC was also selected to participate. This allowed us to have 10 farmers at a time participate as one group in this project. Furthermore, this allowed us to have minority representative in this project.

Participating farmers were engaged and properly briefed on the fruiting tests and data collection. There were four meetings with participating farmers, which coincided with their coming to pick up substrate blocks that were produced at the University mushroom research facility. Site visits to farms were conducted at least twice to the farms in the western part of the state and more than 8 visits to the facility in Rose Hill located in eastern North Carolina.

23 out of the 30 shiitake strains indicated for this project were screened, while the remaining seven became contaminated and unsuitable for use in mass cultivation studies. The screening results indicated the following:

- Colonization and browning are critical measures for a strain's suitability for use in substrate block production; table below shows colonization and time to reach browning for tested strains, yield and the optimum temperature for fruit body production. Yield presented is an average of three flushes per block.

Strain #	Colonize*	Browning$^{\alpha}$	Total yield (lbs)	Temp (°C)$^{\mu}$
1	21 ± 3	65 ± 4	1.2 ± 0.6	25
2	19 ± 1	71 ± 0	1.4 ± 0.3	25
3	21 ± 4	60 ± 1	1.1 ± 0.4	25
4	17 ± 2	79 ± 3	1.3 ± 0.2	20
5	19 ± 0	66 ± 5	1.3 ± 0.5	25
6	19 ± 2	82 ± 0	1.2 ± 0.2	25
7	16 ± 3	69 ± 0	1.6 ± 0.3	20
8	22 ± 3	72 ± 3	2.1 ± 0.3	25
9	17 ± 4	65 ± 4	1.6 ± 0. 4	25
10	24 ± 1	80 ± 3	2.0 ± 0.1	20
11	16 ± 2	74 ± 6	1.2 ± 0.5	20
12	23 ± 3	61 ± 5	2.2 ± 0.1	25
13	18 ± 1	77 ± 7	1.9 ± 0.1	25
14	18 ± 3	69 ± 5	1.1 ± 0.5	25
15	21 ± 2	59 ± 5	1.6 ± 0.3	15
16	19 ± 2	73 ± 4	1.5 ± 0.2	25
17	19 ± 1	76 ± 5	1.4 ± 0.1	25
18	21 ± 4	63 ± 5	0.8 ± 0.7	20
19	22 ± 2	78 ± 4	1.9 ± 0.2	20
20	15 ± 1	71 ± 5	1.8 ± 0.7	25
21	18 ± 2	75 ± 3	1.6 ± 0.1	25
22	20 ± 3	81 ± 6	1.9 ± 0.6	25
23	21 ± 4	64 ± 5	1.9 ± 0.2	20

*This is the time it takes to observe total substrate colonization by the mycelia of the strain used.

$^{\alpha}$This is the number of days it takes to observe in-bag browning of the substrate block, which happens after colonization

$^{\mu}$This is the temperature at which maximum yield in a strain was observed.

Summary on strain performance:

Among the 23 strains screened, nine gave results that are significantly higher than their parent strains. Their yield ranged from 1.4-2.5 lbs per 5lbs shiitake block. Among the five strains, one strain had best yield at 15 ^{0}C in the fruiting room.

1. The strain number 15 which whose parents are strain 1 and 4 turned out to be the only strain with best performance at 15 °C.

2. Two strains (10 and 19) were best at 20 °C and they both shared the parent strain #4. The strain # 20 which also best performed at this temperature is a self cross.

3. The remaining strains (5) which had significant fruit body yield higher than their parents were at 25 °C Strain #15 could be a cold weather strain that

is suitable for use during winter months, when heating of the fruiting room will only be up to 15 °C, instead of 20-25 °C. That could mean energy cost saving for farmers. The three strains that are best at 20 °C are also good strains for early spring and late fall. The five strains that performed best at 25 are still a significant improvement due to higher fruit body yield. Under heavy stacking trial, the overall yield levels in these 9 strains were lower by about 10 to 15%. This was expected due mainly to the differences in the fruiting houses used for testing.

Enterprise budget

The levels of fruit body production compared with input cost were the basis for developing an enterprise budget. The fruiting houses used were compared with productivity and it was obvious that variability in yield existed between strains depending on the fruiting house used. The following costs were determined after taking into consideration the limitations of the fruiting houses that farmers' in the project had:

Year 1	Cost	Sales
Fruiting house construction (20L x 40W x	$33,000.00	
Fruiting racks	$2,000.00	
Cold storage	$6,000.00	
Production blocks (1000 x 12 month x $4)	$48,000.00	
Utilities (350 x 12 months)	$4,200.00	
Marketing and distribution ($300 x 12	$3,600.00	
Labor (80 hrs/month x $12 x 12 months)	$11,520.00	
Mushroom sales		$115,200.0
Total	$108,320.00	$115,200.0
Net		$6,880.00
Year 2		
Production blocks (350 per week)	$48,000.00	
Utilities	$4,200.00	
Marketing and distribution	$3,600.00	
Labor	$11,520.00	
Mushroom sales (1200 lbs x 12 months x		$115,200.0
Total	$67,320.00	$115,200.0
Net		**$47,880.00**

Year 3		
Production blocks (350 per week)	$48,000.00	
Utilities	$4,200.00	
Marketing and distribution	$3,600.00	
Labor	$11,520.00	
Mushroom sales (1200 lbs x 12 months x		$115,200.0
Total	$67,320.00	$115,200.0
Net		**$47,880.00**

From the above it is what level of investment is needed and the return on investment. However, it is necessary to note that no product liability insurance is included because it is assumed that the farmer would have that already for his/her farm. In case it is not available another $700 per annum is required.

Beyond the scope of this project, we worked with North Carolina Coalition to write a grant and a prototype building based on this enterprise budget was built. At present that is the most suitable mushroom production house in North Carolina and it is in use by the team of farmers that participated in this project. To the advantage of farmer or beneficiary in North Carolina, we actually have a fruiting house to show to them and the technicalities and resources for building such a building to share with interested farmers and individuals. This is one of the most stratifying results from this project.

The expected outcomes from this project were:

1. Best-producing shiitake strains under indoor cultivation system will be determined and become available for use in the expansion of intensive year round shiitake production in North Carolina.

   This expected outcome was achieved in the 9 strains that were found to outperform their parent strains in indoor cultivation.

2. Identification of the technical problems associated with the intensive production system as well as production and operations cost in a small farm setting.

   This expected outcome was also accomplished because through the interaction with farmers and the use of their fruiting houses for tests on our strains, we realized the low level of knowledge among the farmer on indoor fruiting house design. There were also not readily available local service providers that know exactly how to construct buildings for use as mushroom fruiting houses. However, we were able to put a local team together to build the mushroom fruiting house in Rose Hill and such service providers are now available to work on the construction of any such mushroom fruiting house in North Carolina.

   The production of shiitake or any other similar exotic mushroom in this sort of building is suitable for a small farm, because it does not take much space. A farming operation that is happening in a space that is 800 to 1000 sq ft generating income as shown in the enterprise budget is rare and it is quite profitable. The only constraint could be that it might be difficult for a small farmer to raise the initial cost as shown in the enterprise budget.

3. Enterprise budgets for running a profitable shiitake farming business
   This outcome was achieved. The enterprise budget presented is based on what we actually did to build the new fruiting house in Rose Hill and

the cost associated with building it and put it to use in mushroom production.

4. Data and information obtained from the research, including suitable model for use in intensive production and enterprise budget will be online at NC A&T Edible and Medicinal Mushroom Program Website as well as the NCMGA web site (www.ncmushrooms.org). Results will also be presented at a National or regional conference on related subject (e.g. Mycological Society of America Annual meeting, Agricultural Research directors, etc).

   This expected outcome was partially accomplished, because the PI attend a conference in Croatia and presented results based on some of the strains studied in this project. Results will also be presented at the upcoming (April, 2013) national meeting: Ag Research Directors Conference that will be Florida. An open house day was organized for farmers and visitors at the Rose Hill facility. At that occasion indoor fruiting of shiitake was on display and information from our studies were shares with over seventy visitors. However, the results are not yet part of the web site targeted due to the major overhaul of the University web site, which has not allowed anyone to update web sites at the faculty project level for almost two years. The North Carolina Mushroom Growers' Association has not been able to hold their annual meeting for us to share the results and updating their web site to include the results have been a challenge we are yet to overcome.

5. A report consisting of our findings and recommendations will constitute the deliverable from this project, which will be submitted to the funding agency.

This report is the expected outcome for here

Major successful outcomes of the project:
1. Nine improved strains of shiitake are selected and in use in production in North Carolina
2. Enterprise budget developed and available for any farmer to use
3. Local service providers for building mushroom houses are now available in North Carolina
4. Three independent farmers and one farmer group comprising of ten individual minority farmers have become trained in indoor shiitake production.

D. BENEFICIARIES

1. The north Carolina Coalition of Farms and Rural families has ten farmers that have become direct beneficiary of this project

2. Three other independent farmers have benefited as well.

3. The University has core farmers and farmer group with who similar file experiments can be conducted.

4. The success of this project will in time become the source of knowledge and information for new comers into indoor shiitake framing in North Carolina.

Participating farmers in the project have acquired knowledge that helped them increase shiitake production to all year round production system, in turn increased their mushroom production by 40 to 80 percent. This has resulted in 40, 50 and 60 lbs per week increase in mushroom production, which translates to $320, $400 and $480 per week by the three independent farmers. Also, the farmer group in Rose Hill now has a building that can enable them produce up to 200 lbs per week, i.e. $1600 per week income for the group.

E. LESSONS LEARNED

This was a very successful project in which most of the expected outcomes were met and in one case we have actually put in place a fruiting house model that could serve as an example that famer sin North Carolina can use for mushroom farming. The strains developed are a huge boost to overall production of shiitake mushroom within a unit space of fruiting house in North. The frame work for developing and testing new exotic mushroom strains in collaboration with farmers is demonstrated in this project. Project staff became accustomed with how to work with farmers in their own territories and capacities.

The results obtained from this project enabled the NCCFRF to write a grant proposal that was funded for them to build a new and modern fruiting house.

We did not know much of the unsuitable status of the mushroom houses we planned to use for the project. To get the farmers fruiting houses was a major delay in this project. Also, inefficiency in the substrate production facility at the University led to many losses of time and substrate blocks. The result was much higher spending than proposed on supplies. However, the possibility to extend the project time and the ease with which the NCDA office overseeing this project understood and gave use the flexibility to adjust time and budget led to the success of this project.

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G. ADDITIONAL INFORMATION

Pictures from this project are shown below

Figure 1. Testing different strains of shiitake at the University fruiting house

Figure 2. Shiitake fruiting in substrate blocks

Figure 3. Substrates pick up by farmers I

Figure 4. Substrates pick up by farmers II

Figure 5. In-bag browning of shiitake blocks

Figure 6. Shiitake blocks ready for fruiting induction

Figure 7. Working with Farmer group in Rose Hill during testing of strains in their old fruiting house

Figure 8. Old fruiting house in full view

Figure 9. Inside the old mushroom fruiting house

Figure 10. Preparing grant with farmer for the new fruiting house

Figure 11. The group of farmers were accompanied to defend their grant proposal for building the new growing house

Figure 12. Open House day at the new Fruiting house in Rose Hill

Figure 13. Fruiting trial at the new fruiting house in Rose Hill

Figure 14. Heavy stacking fruiting trial at the new fruiting house Rose Hill Facility

PROJECT TITLE: Creating and Organic Research Program for the WNC Research Stations

A. PROJECT SUMMARY

The organic industry is the fastest growing segment of agriculture (Greene et al., 2009). As production of burley tobacco has decreased in Western North Carolina (WNC), growers have found new ways to diversify their farms to keep them viable. Organic production and local foods have been among the most successful diversification strategies in WNC. Although there is some organic research in WNC by a small number of faculty at NC State University, there is no recognized organic research program or certified organic site in the region to support the existing producers or new farmers wanting to use organic production systems. NC State University is a leader in agricultural research and extension, including organic agriculture. NC State University already supports the Center for Environmental Farming Systems located in Goldsboro, 300 miles from WNC. However, the mountain climate, topography, and soils as well as the very small-scale nature of WNC farming contribute to unique agricultural systems (crops, livestock, marketing) and rural communities that are quite different from the rest of North Carolina. There is a significant need for a regionally specific program in the WNC mountains. The objective of this project was to develop a plan for and launch an organic research and extension unit on the Mountain Research Station in Waynesville. Community input was gathered through surveys, interviews, farm visits, and listening sessions. University organic programs around the country were visited and interviewed to learn how to run a successful program. Faculty at NC State University and Western Extension personnel were surveyed to determine how best to work together and meet their needs. The new Mountain Organic Research and Extension unit was launched in 2010 with the transition of 3.5 acres to organic production and 4 research projects. In 2011, outreach continued with 4 research projects and 1 demonstration project.

Figure 1. Workshop at the Mountain Organic Research and Extension Program at the Mountain Research Station in Waynesville, Aug. 2010.

B. PROJECT APPROACH

A coordinator, Emily Bernstein, was hired in June 2010 to develop and implement a plan for a new Mountain Organic Research and Extension Program. The unit was designed for organic research and demonstration activities for horticultural crops, mostly vegetables. The focus was on horticultural crops that local farmers could sell at farmers' markets, through CSAs, and to small regional wholesale markets. In the future, small fruits and herbs might also be included. The coordinator surveyed over 300 stakeholders interested in organic horticultural crop production, held listening sessions, and gathered feedback from community groups. Similar organic research programs at universities across the country were interviewed to develop recommendations. These inputs were used to develop a plan for implementation of the new program. Initial research projects were conducted on tomatoes, broccoli, and peppers in 2010 and expanded to include several ethnic pea crops in 2011. The program was promoted through field days, local media, the web and social media, and through presentations made to community groups and at local conferences.

C. GOALS AND OUTCOMES ACHIEVED

1. The goal was to hire and train a coordinator for the new organic unit being developed in Waynesville, NC. A dedicated coordinator was hired in May 2010, and began working on June 7, 2010. The coordinator was trained in June.
2. The goal was to obtain input from industry advisors and potential beneficiaries of the organic unit. Surveys and/or in-depth interviews were conducted of over 300 farmers, community members, Extension personnel, state agronomists, and non-profits to understand their needs.
3. The goal was to gain information and advice from similar university organic programs to develop recommendations. Thirteen university organic programs from around the country were interviewed to understand how best to build an organic program in western North Carolina. The organic unit at the University of Tennessee was visited in 2010, and the coordinator was hired from the organic unit at the University of Wisconsin.
4. The goal was to promote the program to potential users. Promotion of the program occurred through the website ncoganic.org, Facebook, Twitter, local listservs, and through media releases. The program was featured five times and mentioned twice in local newspapers, and the coordinator was interviewed on the regional radio station, WNCW.
5. The goal was to personally meet with people and organizations in the immediate region to tell them about the program and gain their input on what the program should look like. Presentations were conducted at a "Buy Haywood" (local non-profit) meeting (30 attendees) with WNC farmers and chefs in attendance and at

the Haywood County Master Gardeners meeting (two times; 40 attendees), West District County Extension Directors Meeting (12 attendees), Bethel Rural Community Organization (40 attendees), Beaver Dam Community Organization (20 attendees), Fairview Community Organization (10 attendees) the Big Ivy Community Organization (10 attendees), and the Upper Cartoogechaye Community Organization (15 attendees). Displays were set-up and staffed at the Haywood Historic Farmers Market in Waynesville (~200 attendees), the WNC Naturally event in Marshall (100 attendees), the Carolina Farm Stewardship Association's Sustainable Agriculture Conference in Winston-Salem (900 attendees), the North Carolina Tomato Growers Association's Winter Vegetable Conference in Asheville (200 attendees), the Marketing Opportunities for Farmers Conference in Asheville (400 attendees), and the Organic Growers School's Annual Spring Conference in Asheville (1000 attendees).

6. The goal was to initiate some specialty crop research on the new unit. Four field studies were established and maintained in 2010, two conducted by Dr. Jeanine Davis, and two by other NCSU faculty in Horticulture and Plant Pathology (Dr. Dilip Panthee and Dr. Frank Louws). The specialty crops included were bell peppers, broccoli, and tomatoes. In 2011, three of these studies were repeated in addition to a new study of cowpea and pigeonpea feasibility and insect management conducted by Dr. Jeanine Davis and Dr. Louis Jackei of the NC A&TSU Department of Natural Resources and Environmental Design.
7. The goal was to officially "launch" the new organic unit. An inaugural organic vegetable production workshop was held at the Mountain Research Station in August 2010, and was attended by over 115 farmers, home gardeners, agricultural extension agents, and agricultural professionals. The workshop program included an overview of the current research, a trade show, tomato variety taste test, lunch, and listening session where attendees were invited to provide feedback. In 2011, the organic unit was a stop on the Appalachian Sustainable Agriculture Project's Family Farm Tour in June, receiving 40 visitors. The organic unit was also a stop on the Mountain Research Station's field day held in July 2011, with approximately 30 visitors.
8. The goal was to talk with a large number of faculty, administrators, and research station staff to get their input on the development of the organic unit. Nineteen faculty (in addition to the 4 currently involved) across 13 departments and three colleges at NCSU (College of Agriculture and Life Sciences, the College of Natural Resources, and the College of Humanities and Social Science) responded to a survey that they are interested in conducting research and extension projects with this program, and indicated what infrastructure would be necessary.

9. The goal was to survey extension personnel to gain their recommendations for the organic unit. Agricultural extension agents were surveyed in the West and West Central Distrcits. Recommendations for research and extension projects were gained, and ideas for how the regional program can work best with county extension were gathered.
10. The goal was to develop a detailed plan for the organic unit. A plan has been created and presented to administration. Administrators at both NCSU and NCDA&CS spoke with the PI and coordinator about the development of a plan and budget for the program. The plan and budget is currently under review, given the current budget situation, the future funding stability of the program is unclear.

D. BENEFICIARIES

The primary beneficiaries of this project are western North Carolina farmers, future farmers, extension agents, NCDA agronomists, private crop advisors, and non-profits working with farmers. This project was focused on organic vegetable production and vegetable growers and advisors were the ones targeted by this project. We provided information for 35 county extension offices, four state agronomists, and one state marketing center to serve their clients. There are more than 19,000 farms in WNC that are potentially impacted by the research program developed through this project (USDA-NASS, 2009). The 2008 USDA-NASS (2010) Organic Production Survey reported 246 certified or exempt farms in the state of North Carolina, accounting for 9,600 acres and $53 million in sales with an average farm size of 44 acres.

Reliable figures on organic farms and acreage are not available for WNC, and this is complicated by the fact that many farms using organic practices are not certified organic, and as a result, are not counted in “organic acreage” figures. There are estimates of well over 300 organic farms, or farms using mostly organic practices in WNC (compiled from a variety of sources). There are 788 farms listed in the Local Food Guide of the Appalachian Sustainable Agriculture Project (2010). We consider these farms generally representative of the production practices of the region. Thirty-one percent (242) were listed as organic (certified and not certified), and many others were listed as low spray, biodynamic, using Integrated Pest Management, or other ‘alternative’ practices. Extrapolated to the 19,000 farms in western North Carolina, the number of “organic” (certified and not certified) farms would be almost 6,000.

Throughout this project, we reached over 3500 people. Over 300 community members and farmers were surveyed and interviewed. Presentations were delivered and feedback gathered at 8 meetings for a combined 220 attendees. Displays were made at 6 regional agricultural conferences with a combined total of 2800 attendees. The unit was featured at two field days and as part of a farm tour with 185 visitors, 115 of which participated in an in-depth listening session.

E. LESSONS LEARNED

All of the goals were achieved for this project, which resulted in a well-researched plan for implementation for the new organic unit, as well as two seasons of initial research projects. The difficulty in obtaining administrative financial support to sustain the implementation phase following the end of this granting period was an unforeseen challenge. This is due to the extreme budget difficulties faced by the state of North Carolina in 2010/2011. We are confident the organic unit will continue to exist in some form, but the extent of research, extension, and outreach will depend on future funding. A lesson learned from this experience is to plan for significant time for fundraising and grant seeking.

F. CONTACT PERSON

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G. ADDITIONAL INFORMATION:

Plan and Funding Proposal for Establishment of the Mountain Organic Research and Extension Program (M.O.R.E.) at the Mountain Research Station in Waynesville, NC

25 August 2011

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Introduction

The Bottom Line

This report outlines how to establish an organic research and extension program at the Mountain Research Station. Two levels of engagement with options are proposed.

Funding for year one

Lowest level:	$ 50,000
Full engagement:	$ 86,000

The organic industry is the fastest growing segment of agriculture (Greene et al., 2009). The USDA-ERS reports that there is a supply-squeeze in the organic sector. Organic food sales have more than quintupled since 1997, reaching $26 billion in 2010, but land under organic production has only doubled since that time. While domestic demand for more organic food products remains strong, many organic food products are imported from other countries. The USDA considers the amount of research and extension support as one of the limiting factors to the level of adoption of organic farming in the US relative to other countries.

As production of burley tobacco has decreased in Western North Carolina (WNC), growers have found new ways to diversify their farms to keep them viable. Organic production and local foods have been among the most successful diversification strategies in WNC. The region has a high concentration of organic farmers and a strong consumer base for their products. As with any agricultural production method, growers rely upon university-based research and extension support for unbiased information to help them be successful. Although there is some organic research in WNC by a small number of faculty at NC State University, there is no recognized organic research program or certified organic site in the region to support the existing producers or new farmers wanting to use organic production systems.

NC State University is a leader in agricultural research and extension, including organic agriculture. NC State University already supports the Center for Environmental Farming Systems located in Goldsboro, 300 miles from WNC. However, the mountain climate, topography, and soils as well as the very small-scale nature of WNC farming contribute to unique agricultural systems (crops, livestock, marketing) and rural communities that are quite different from the rest of North Carolina. There is a significant need for a regionally specific program in the WNC mountains.

Figure 1. Workshop at the Mountain Organic Research and Extension Program at the Mountain Research Station in Waynesville, Aug. 2010.

The objective of this program is to develop an organic research and extension unit on the Mountain Research Station in Waynesville. Our goals are to increase farm viability, profitability, and sustainability in WNC by increasing the technical support of organic agriculture

in the region. Cooperative extension agents, farmers, and crop advisors in WNC will have access to regionally appropriate, research based information on production of organic crops, resulting in increased farm income and expanded market opportunities. Research projects will aim to increase farm profitability, efficiency, and sustainability, and will be designed to meet growers' most critical needs. We will provide information for 35 county extension offices, four state agronomists, and one state marketing center to serve their clients. There are more than 19,000 farms in WNC that could potentially be impacted by the research program developed through this project, of which over 300 are estimated to be organic. This program will be a source of high quality research and extension programming on organic agriculture primarily for farmers in WNC, but also for the rest of the state, the southern Appalachian region, and the nation. The demand for information on organic agriculture goes beyond the normal research station clients of farmers, agriculture industry professionals, and extension agents. Thus, this program will be research based, but will also be designed to serve as a teaching tool for university, community college, and K-12 students.

Project Initiation

For many years, organic farmers, non-profits working with the organic community, and extension agents have requested that more organic research be conducted in WNC. Several NC State researchers have conducted some organic research in WNC. The studies have been limited in scope for many reasons, most notably because of a lack of certified organic land (which limits acquisition of grant funding), research station staff with little or no previous knowledge or experience with organic agriculture, and no equipment or supplies dedicated to organic work.

Several years ago, the College of Agriculture & Life Sciences (CALS) Administration at NC State asked Jeanine Davis to survey faculty in the College as to their interest in conducting organic research in WNC. The response was positive and included many comments indicating that researchers would conduct more organic research if they had certified organic research land to work on. In 2008, Jeanine Davis led two organic horticulture in-service training sessions for extension agents. The western agents requested more research, demonstrations, and educational opportunities in organic agriculture for their clients. In fall of 2008, Jeanine Davis queried local farmers through a listserv and at a special farmer session convened by the Organic Growers School. They also requested research dedicated to organic production and shared some of their most pressing needs. Finally, in the winter of 2008, during two public meetings held by the CALS administration and the research station administration (NCSU and NCDA&CS), local farmers expressed their support for the current researchers working in organic agriculture and requested that more be done.

The request by faculty for more meaningful organic research led to a series of discussions between NCSU researchers and administrators at NCSU and NCDA&CS. The researchers most involved in these discussions have been Jeanine Davis in Horticultural Science and Chris Reberg-Horton in Crop Science. Over the course of these discussions, it became clear that the Mountain Research Station in Waynesville would be an ideal place to locate an organic research program in western North Carolina. The station has experience with organic research, the horticulture crop manager is an experienced organic farmer, and there is a wide diversity of crops and animals (for manure and rotations) on the station. Because the demand for tobacco research has decreased at the station, the opportunity to develop part of the station into a certified organic horticulture unit is feasible. This station could serve as the hub for this research, with smaller areas dedicated to organic studies at other western research stations.

Jeanine Davis has been encouraged to take the lead on developing an organic research program at the Mountain Research Station. Her department heads, formerly Julia Kornegay and now John Dole, have given full support to the project. In a discussion on the subject on June 11, 2009 Eddie Pitzer, former Director of the Research Stations, Bill Teague, former Superintendent of the

Mountain Research Station, and Debbie Robertson, NCDA&CS Research Station Division, encouraged Chris Reberg-Horton and Jeanine Davis to move forward with these plans. In the summer of 2010, Jeanine received a USDA Specialty Crops Block Grant administered through the NCDA&CS to hire a coordinator, Emily Bernstein, to conduct a formal planning process.

The planning process included extensive surveying and interviewing of 300 farmers, community members, and extension personnel, to understand regional research, extension, and education needs. Managers of 13 similar university programs around the country were interviewed to understand how best to run the program. A workshop with over 115 attendees was held in August 2010 to launch the program and to hold a listening session. This process of gathering input has resulted in the subsequent plan, and details of the survey results can be found following the plan.

Plan for the Mountain Organic Research and Extension Program (M.O.R.E.)

Site

The organic unit will be located at the Mountain Research Station in Waynesville, NC, starting with 3.5 acres of bottom land near the intersection of Raccoon and Test Farm roads (Figures 2 and 3). Some of the benefits of this location are that buffers will be easily established, it is very visible from Raccoon Road, the weed pressure is moderate, and the soil is low in clay and high in organic matter. The predominant soil type is a Cullowhee-Nikwasi complex with 6.5% organic matter. The land is bordered by the Raccoon Creek to the West, farm roads to the North and South, and Raccoon Road to the East, so ditches and natural buffers already exist that may be sufficient for organic certification. Visibility from Raccoon Road has already increased community awareness of the program. Some farmers have found out about the program just from signage at the unit. The Cooperative Extension office in Haywood county, directly across the street, often receives questions about what is happening at the unit since the organic production practices (like row covers) look unusual and generate public interest.

Figure 2. The Mountain Research Station.

If needed, surrounding fields can be transitioned for a total of 7 acres (Figure 2B). However if more land is needed in the future, the Lake Junaluska site on the Mountain Research Station may be added. Benefits to this site are size (10-12 acres), soil type, easily established buffers, and access to irrigation water. The distance from the rest of the station, isolation, lack of infrastructure, and history of disease research all make this site overall less desirable than the current one.

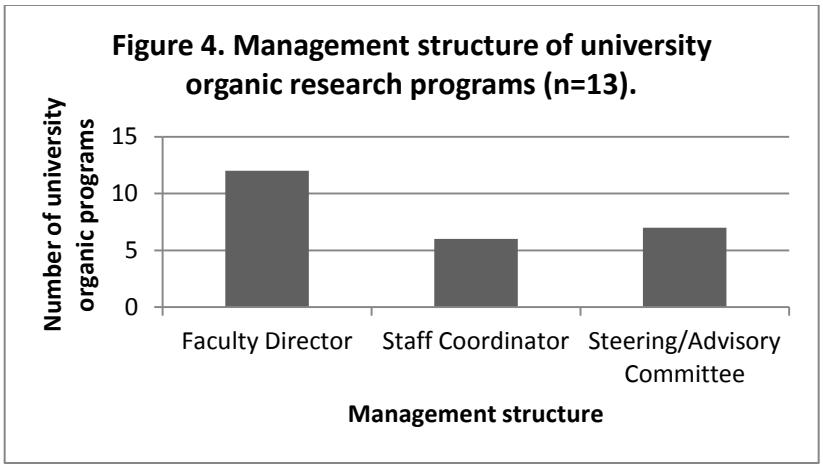
Figure 3. Map of (A) the Mountain Research Station, organic unit outlined in black; and (B) the organic unit, with current 3.5 acres

outlined in black and additional 3.5 acres outlined in blue that can be added to the organic unit if needed.

In order to receive federal and private foundation grants for organic research, the research often must be conducted on certified organic land or land under transition. Surveyed faculty at NCSU indicated that certified organic land is necessary for them to conduct research at this site. In addition, surveying of growers and extension personnel revealed that organic certification is an important educational topic for growers; so it would be beneficial for this site to undergo the certification process. Certifying conventional cropland as organic requires the usage of organic practices for three years prior to certification. The current site began transition in the fall of 2010, so certification will be pursued for the fall of 2013. The Mountain Research Station will be certified as a split operation with concurrent organic and conventional operations. GAP certification may also be pursued.

Management

A stakeholder advisory committee will be formed to set the overall vision and help guide the program. The committee will be a direct way for the community to provide input to programming. The committee can make recommendations that will help management prioritize and improve the relevancy of the program. Half of the university organic programs interviewed had an advisory committee, and this model was highly recommended (Figure 4). Board members will be selected to ensure that the broad range of the agricultural community of WNC is represented. We will invite farmers (organic and conventional, and representing different commodities), extension agents, university faculty, educators, and representatives from non-profits advocating local food, community organizations, environmental advocacy organizations, and faith-based community organizations. Ensuring that racial, gender, socio-economic status and other demographics of the board is representative of the WNC community will be an important factor in selection as well as inviting people with a broad set of skills, perspectives, and opinions.



Based on interviews of other university organic research programs, a program coordinator is an important investment for a program like this. Half of the other university organic programs interviewed had staff coordinators, responsible for communication, outreach, planning, and research or farm management (Figure 4). Having a staff coordinator was highly recommended by the other university organic programs. They indicated that this position should be a permanent position staffed with an individual who expects to stay with the program for enough years to build trusting relationships with researchers and the community and to develop the program based on the original vision and plan. Many of the innovative and highly successful programs are the ones with a staff coordinator, because they were able to not only facilitate high quality faculty research and ensure organic certification, but also to implement education and outreach programs. The interviews revealed that when faculty alone coordinate the programs, they tend towards more one-dimensional research programs and some faculty are overworked. In addition, NCSU faculty who are interested in conducting research and extension projects at the organic unit told us they need competent management who is knowledgeable about organic agriculture and able to maintain the certification as well as to organize field days. Other university organic research programs echoed this, that one of the key challenges can be the lack of management who is knowledgeable about organic agriculture. For these reasons, a staff coordinator is highly recommended to leverage and facilitate the program.

NCDA&CS has a horticulture specialist with many years of organic farming and research experience. The station is in the process of hiring another specialist who will probably also be involved with the unit. Nonetheless, to ensure certification, the coordinator will implement training on the National Organic Program (NOP) rules with the station staff and a guide will be created for researchers in order that everyone understands the requirements. The program coordinator (NCSU) will be responsible for the certification, and both the coordinator and research specialist (NCDA&CS) will cooperate on record keeping.

A faculty director, Dr. Jeanine M. Davis, will also be an important part of the management team. All university organic research programs interviewed except one had a faculty director, and the one which didn't cited that as their top challenge since it limited their ability to publish results and obtain grants. In addition, staff coordinators at other university organic programs recommended the faculty director as someone who can help generate new ideas with the coordinator. The faculty director will also supervise the coordinator. The superintendent of the Mountain Research Station, Kaleb Rathbone, is also highly involved with the development and implementation of the program, to ensure it fits within the overall mission and operations of the station. The faculty director and superintendent along with the coordinator and specialists will ultimately be responsible for all decision making for the organic program. The coordinator and specialists will work closely together to make day to day management decisions and to ensure compliance with organic certification. The faculty director and coordinator will be responsible for designing and implementing educational programs. Additional faculty, extension agents, farmers, or other experts will also be called upon as needed to help develop plans for fertility, weed management, or crop rotation.

Research and Extension Projects

Regional research and extension needs for WNC were identified using surveys, in depth farm visits and interviews, a listening session, and community outreach. Pest (disease, weed, and insect) and nutrient management were the top priorities for organic research in WNC (Table 1). There is a strong desire for the approach to the research to be holistic. The importance of a systems approach to agricultural research was also recognized recently by the Committee on Twenty-First Century Systems Agriculture of the National Research Council (2010). Farmers have needs for regionally-oriented research, from the best crops and cultivars for the mountains, to research on scale- and mountain-appropriate methods of management. Finally, there is a need for support of mid-scale commercial organic producers since marketing is difficult at this level.

Table 1. Research priorities of community members, extension agents, and farmers in WNC in 2010 (n=234).

Rank	Research Area
1	Disease Management
2	Nutrient Management
3	Insect Management
4	Weed Management
5	Season Extension
6	Cover Crops

In 2010, there were four research trials conducted by three NCSU faculty (Figure 5). Jeanine Davis conducted two studies, 'Comparing Weed Barrier Options for Organic Vegetable Growers in WNC' (Figure 6), and 'Opportunities and Challenges for Fall Production of Organic Broccoli in

Figure 5. First year's trials of the Mountain Organic Research and Extension Program.

WNC'. Dilip Panthee in the Horticultural Science Department studied the 'Performance of Heirloom and Heirloom-type Hybrid Tomatoes in an Organic Production System'. The final study 'Integrated Management of Diseases Using Grafted Tomatoes, Host Resistance and Other Tactics' was conducted by Frank Louws in the Plant Pathology Department and by Jeanine Davis. In 2011, the two tomato and the pepper studies were repeated and Dr. Davis added a cowpea and pigeonpea study in collaboration with Dr. Louis Jackai at NC A&T State Univeristy.

Figure 6. Study of weed management in bell peppers on the organic unit in summer 2010.

Faculty Interest and Needs

In addition to these faculty members, 19 more faculty across 13 departments and three colleges (College of Agriculture and Life Sciences, the College of Natural Resources, and the College of Humanities and Social Science) responded to a survey that they are interested in conducting research and extension projects with this program. Potential projects range from agritourism and economic studies to fertility and cover crops. Faculty indicated that they need labor and help with maintenance, supplies and equipment particular for organic, certified organic land, organization of field days, and competent management who is knowledgeable about organic agriculture and able to maintain the certification. Now that they are aware of the program, many have indicated that they will begin writing grants to fund future projects. The USDA National Institute for Food and Agriculture has recently initiated an Organic Agriculture Research and Extension Initiative competitive grant program of more than $18 million each year, as well as a $4 million per year Organic Transition Program. In order to receive these federal grants and smaller foundation grants, research must be conducted on certified organic land or land under transition. Having a coordinator able to ensure the organic certification of land on the research station, able to train research station staff on organic production practices so the integrity of the research is maintained, and able to organize field days will provide the necessary support for faculty to increase the number of projects conducted.

These faculty want to be research and/or extension cooperators on the organic unit:
Michael Roberts and Laura Taylor, Agricultural and Resource Economics
Deyu Xi, Plant Biology
Fred Hain and Steve Frank, Entomology
Mike Williams, Animal Science
David Marshall and Frank Louws*, Plant Pathology
Julie Grossman, Soil Science

Lisa Dean, Food, Bioprocessing, and Nutrition Sciences
Ron Heiniger, Crop Science
Chris Gunter, Dilip Panthee*, Jeanine Davis*, and Penny Perkins-Veazie, Horticultural Science
Kenneth Anderson, Poultry Science
Jill Sidebottom and Jeff Owen, Forestry and Environmental Resources
Jack Thigpen, NC Sea Grant and Sociology and Anthropology
Stacey Tomas, Parks, Recreation and Tourism Management
*These faculty are already research cooperators.

In addition, Dr. Louis Jackai of the Department of Natural Resources and Environmental Design at NC A&T is cooperating on a study with the program in 2011.

Educational Projects

Figure 7. Workshop participants removing row cover from broccoli at the Organic Vegetable Production Workshop, August, 2010.

Educational and demonstration type projects targeted at both farmers and the general public will be undertaken to supplement the research (Figure 7). Many ideas have been submitted through the surveys, interviews, and listening sessions, and the stakeholder advisory committee will help us prioritize them. Composting is clearly one of the top research and demonstration interests among growers. One of our goals is to increase basic knowledge of agriculture among the general public and also the important role of agricultural research. We have a strong interest in working with community college, university, and K-12 students to conduct research projects. Several other university organic programs have found innovative ways to involve students in agricultural research.

Extension

County extension personnel in the Western and West Central regions told us that the most useful functions of a new Mountain Organic Research and Extension program would be to provide field days and workshops for farmers, organic training for Extension personnel, and workshops for home gardeners. County extension personnel want to directly collaborate with the program by developing educational materials, workshops, and demonstration plots. The biggest needs identified for research and demonstrations are projects focused on pest control,

soil fertility, and marketing. They recommend we work with the community through community gardens, and reach our audience through tailgate markets, county extension, and email.

Partnerships

Partnerships with local non-profits, community colleges, County Extension, and Soil and Water Conservation Districts are also being developed as opportunities for educational programming are growing. Community support and interest has been strong. Over 115 farmers and community members attended the opening Organic Vegetable Production Workshop held in late August, 2010; and over 82 members of the community have indicated an active interest in participating in the activities or steering of the unit on our surveys.

The unique mountain characteristics of WNC also provide opportunities for the program to collaborate with organic research programs in the nearby states of Kentucky, Virginia, Tennessee, Georgia, and South Carolina to provide the organic growers in southern Appalachia increased research and Extension support. Partnerships with these states are already being developed.

Project Impact

Accomplishments of this project will include the establishment of three new demonstration projects (if this plan is fully funded) to demonstrate widely applicable techniques for farmers and gardeners in the first year. In the second year, three new organic research and extension projects focused on the most pressing needs of WNC organic farmers will be established. Workshops and field days will be held to provide educational opportunities for farmers. Extension agents will be trained to better serve farmers. A stakeholder advisory committee will provide guidance to the program and ensure the community is engaged, and the program is relevant to community needs. There will be outreach and collaboration with local community groups and K-12 students. Extension publications will be created on organic topics for WNC. Presentations/Exhibitions will be made at regional and national conferences.

The primary beneficiaries of this project will be western North Carolina farmers, future farmers, extension agents, NCDA agronomists, private crop advisors, and non-profits working with farmers. We will provide information for 35 county extension offices, four state agronomists, and one state marketing center to serve their clients. There are more than 19,000 farms in WNC that could potentially be impacted by the research program developed through this project (USDA-NASS, 2009). The 2008 USDA-NASS (2010) Organic Production Survey reported 246 certified or exempt farms in the state of North Carolina, accounting for 9,600 acres and $53 million in sales with an average farm size of 44 acres.

Reliable figures on organic farms and acreage are not available for WNC, and this is complicated by the fact that many farms using organic practices are not certified organic, and as a result, are not counted in "organic acreage" figures. There are estimates of well over 300 organic farms, or farms using mostly organic practices in WNC (compiled from a variety of sources). There are 788 farms listed in the Local Food Guide of the Appalachian Sustainable Agriculture Project (2010). We consider these farms generally representative of the production practices of the region. Thirty-one percent (242) were listed as organic (certified and not certified), and many others were listed as low spray, biodynamic, using Integrated Pest Management, or other 'alternative' practices. Extrapolated to the 19,000 farms in western North Carolina, the number of "organic" (certified and not certified) farms would be almost 6,000.

The short term impacts of these accomplishments will be increased regionally-appropriate research based knowledge and education on organic agriculture available to WNC. This new research will respond to the most critical needs of WNC farmers and help them make decisions on their farms. The community will know more about what organic means, the value of fresh produce, and how purchasing locally grown food impacts their local economy. In the long term this will result in increased farm viability, profitability, labor and other efficiencies, sustainability, and increased community support for local food.

The resulting increase in profit for farmers in western NC who transition to organic would be difficult to estimate, but the Appalachian Sustainable Agriculture Project estimates that the farmers in western North Carolina produce $945 million of food (average 1990-2003), and the region's consumers spend $2 billion each year on food with only 0.6% being bought locally in 2006 (Meter, 2003). We were not able to find any figures for the economics of transitioning from conventional to organic production of horticultural crops in North Carolina, or even the Southeast. We did our own estimates using actual enterprise budgets for tomatoes from organic farms in North Carolina (Estes et al. 2003) and the 2002 enterprise budget for conventional tomato production in western North Carolina (Estes et al. 2002). The average net returns for three organic tomato growers were $68,300 per acre. The 2002 conventional tomato budget estimated a net return of $2,007 per acre. Estimated net returns for a theoretical conventional farmer with 10 acres of tomatoes would be $20,100. If this farmer transitioned 0.5 acres to organic, after the three-year transition period, he would make $19,100 from the 9.5 acres of conventional tomatoes and $34,100 from the 0.5 acre of organic tomatoes. Transitioning 0.5 acres to organic would increase the farmer's net returns by 265%, to $53,200 over the 10 acres. The theoretical increase in profitability due to transitioning some tomato acreage to organic would not only be due to increased price premiums, but a change towards direct marketing of high value heirloom tomatoes. The community-wide economic impact of increased profitability of organic production in Iowa was estimated to also result in more value

added, more labor income, and more jobs when compared to a conventional field crop rotation (Swenson et al., 2007).

Two Budget Scenarios to Support the Program

Basic funding for the core of this program, primarily funding the annual salary for the coordinator, will allow the program to be leveraged and help to guarantee success of the program in the future. The majority of other university organic programs interviewed received university and/or state Department of Agriculture funding for their core coordinator, budget, and some staff (Figure 8). Several programs, however, did not receive institutional support for a coordinator or operating budget. These programs responded by developing CSA operations to generate funding, and tended to conduct very limited research, focusing more on student curriculum. Along with lack of personnel, funding was identified by these programs as the top challenge they faced limiting success (Figure 9). For these reasons, NCSU funding of the staff coordinator and an operating budget will be critical. The NCDA&CS has already dedicated part of a Research Specialist, land, office space, and use of equipment for the research.

The identified funding in this plan will guarantee the stability of the program, with additional funding coming from grants. Extramural funding will be sought for any extra research or educational projects beyond those which are faculty initiated. Currently, a proposal is being reviewed by the NC Tobacco Trust Fund Commission that, if funded, would support this program for the first three years. Eventually, faculty will be expected to write money into their grants to support the coordinator and core operating budget, potentially a 5% overhead. Receipts from programs, produce, or products may be generated if it is clear that there is not a risk of competition with local growers. The local community has indicated that they do not want us to run a CSA; however, they also provided many innovative ideas of how we can use our produce for educational purposes that also generate receipts. In light of the current economic situation and decrease in state and public funding, a new effort is being focused on fundraising. The coordinator and director are starting a sponsorship program, under the guidance of the NC Agricultural Foundation office, to raise donations and endowments, and are exploring other creative ways to raise funds to help the program weather the state budget crisis. For example, in January, we met with a private company who expressed interest in sponsoring part of the program. They will talk to us further once they know this program is here to stay. In the short term we are also considering a fee requirement for our board members. In the long term we plan on developing a membership program, once we have the resources to run it. We are confident with the amount of support already provided by NCSU and NCDA&CS that this program is permanent, the only question will be the level of activity that occurs.

In light of the current economic situation, we have prepared two budget scenarios for the program: an Economy and full Budget.

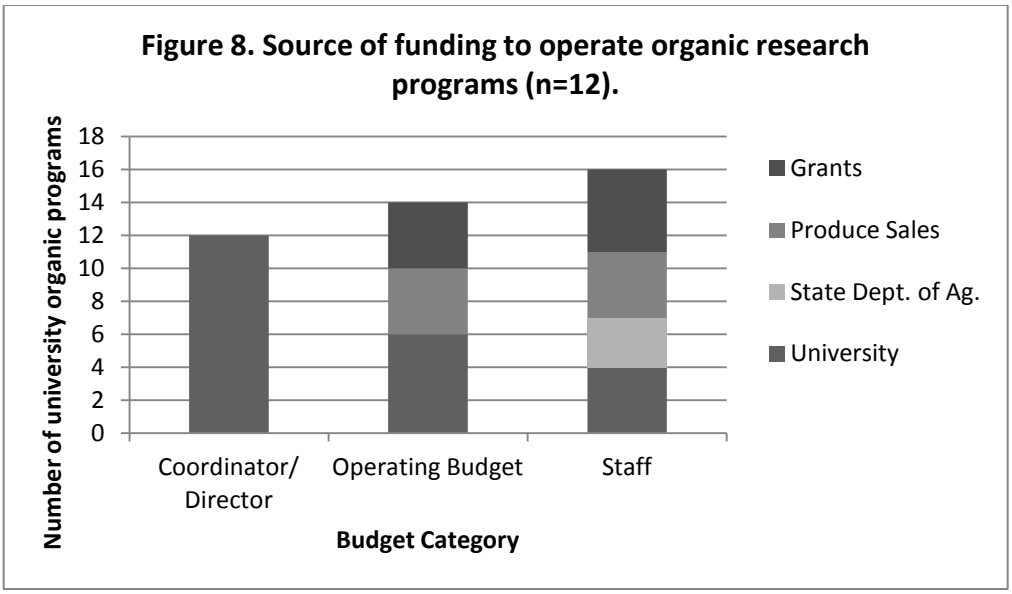


Figure 8. Source of funding to operate organic research programs (n=12).
Number of university organic programs
18
16
14
12
10
8
6
4
2
0
Coordinator/ Director
Operating Budget
Staff
Budget Category
Grants
Produce Sales
State Dept. of Ag.
University

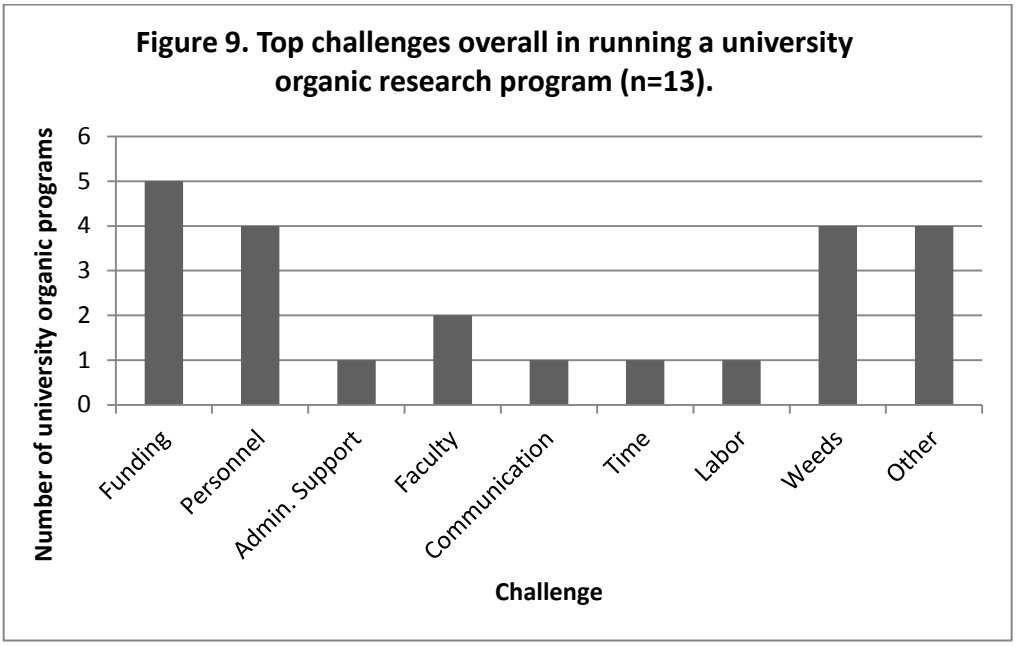


Figure 9. Top challenges overall in running a university organic research program (n=13).
Number of university organic programs
6
5
4
3
2
1
0
Funding
Personnel
Admin. Support
Faculty
Communication
Time
Labor
Weeds
Other
Challenge

Full Budget

This budget will fully fund the program, enabling it to successfully facilitate research and extension by NCSU faculty, as well as implement program directed research, extension, outreach, and demonstration projects.

	Year 1 2012	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016
Personnel					
Salary/Wage	$ 48,200	$ 49,646	$ 51,135	$ 52,669	$ 54,250
Fringe Benefits	$ 10,955	$ 11,284	$ 11,622	$ 11,971	$ 12,330
Total Personnel	**$ 59,155**	**$ 60,930**	**$ 62,758**	**$ 64,640**	**$ 66,579**
Travel	$ 11,817	$ 12,408	$ 13,028	$ 13,679	$ 14,363
Total Travel	**$ 11,817**	**$ 12,408**	**$ 13,028**	**$ 13,679**	**$ 14,363**
Supplies	$ 9,315	$ 9,781	$ 10,270	$ 10,783	$ 11,322
Total Supplies	**$ 9,315**	**$ 9,781**	**$ 10,270**	**$ 10,783**	**$ 11,322**
Current Services					
Telephone	$ 1,250	$ 1,313	$ 1,378	$ 1,447	$ 1,519
Organic Certification	$ 770	$ 809	$ 849	$ 891	$ 936
Event Meals	$ 3,131	$ 3,288	$ 3,452	$ 3,625	$ 3,806
Total Current Expenses	**$ 5,151**	**$ 5,409**	**$ 5,679**	**$ 5,963**	**$ 6,261**
Fixed Charges	$ 100	$ 105	$ 110	$ 116	$ 122
Total Fixed Charges	**$ 100**	**$ 105**	**$ 110**	**$ 116**	**$ 122**
Total Budget	**$ 85,538**	**$ 88,632**	**$ 91,845**	**$ 95,182**	**$ 98,648**

Full Budget Justification

Personnel
Program Coordinator: Responsible for communication with NCSU researchers, and NCDA&CS staff, outreach, planning, organic certification, and demonstrations projects.(100%, FT, $35,000 starting salary, 3% inflation rate per year, 28% fringe benefit rate).

Temporary field labor (NCSU): To work in the field research plots (100%, FT, April-October, 30 weeks at 40 hours per week, $11/hour, 3% inflation rate per year).

Travel
Including, but not limited to, mileage, motel, per diem, registrations, reimbursement for rental car, and airfare for the Principal Investigator, Project Coordinator, and other employees on the

project to travel to field sites, local farms, meetings, and to present/exhibit at organic agriculture conferences. (5% inflation rate per year).

Supplies and Materials
Including, but not limited to, paper and ink cartridges for printing project brochures and flyers "in-house"; a computer and printer dedicated to the project; flash drives for sharing project resources electronically for trainings with extension agents, and growers; memory cards, batteries, and a camera dedicated to the project; name tags for meetings; markers and other office supplies for the employees on this project; growing media, pots, flats, fertilizers, soil amendments, pest control products, picking containers, boxes, bags, containers, seeds, plant material, and small and large hand tools for weeding and pest control; fuel for the truck to drive to field plots; software for creating educational online materials for the project; beverages, snacks, food products and utensils for in-house educational meetings. (5% inflation rate per year).

Current Services
Including, but not limited to, postage for mass mailing materials for the project; catering for day long meetings where eateries are not convenient or programming continues through the mealtime; mass printing at photo copy centers; teleconference charges; internet file sharing services; long-distance phone charges for which a log will be kept; a dedicated cell phone for this project for employee who will often be in the field and operating between two offices, and organic certification fees. (5% inflation rate per year).

Fixed Charges
Included, but not limited to, domain name registration and renewals for the website NCOrganic.org, room rentals for meetings, and exhibit space at organic agriculture conferences. (5% inflation rate per year).

Optional Additions to Full Budget

Option 1: Full budget plus an education coordinator, added in 2014

This addition will allow an expansion of the education and outreach components of the program, beginning in 2014.

	Year 1 2012	**Year 2 2013**	**Year 3 2014**	**Year 4 2015**	**Year 5 2016**
Personnel (Option 1 only)					
Salary Wage	$ -	$ -	$ 37,132	$ 38,245	$ 39,393
Fringe Benefits	$ -	$ -	$ 10,397	$ 10,709	$ 11,030

Total Personnel (Option 1)	$ -	$ -	$ 47,528	$ 48,954	$ 50,423
Full Budget + Option 1	**$ 85,538**	**$ 88,632**	**$ 128,976**	**$ 133,427**	**$ 138,041**

Option 1 Justification

Personnel
Education Coordinator: Responsible for educational outreach and demonstrations projects with farmers, Cooperative Extension, and the community, especially students. (100%, FT, $37,132 starting salary, 3% inflation rate per year, 28% fringe benefit rate).

Option 2: Full budget plus additional temporary labor, added in 2014

This addition will provide additional temporary labor support to the program as it expands to continue to facilitate research and extension projects conducted by NCSU faculty, and also takes on new program directed research, extension, outreach, and demonstration projects, beginning in 2014.

	Year 1 2012	**Year 2 2013**	**Year 3 2014**	**Year 4 2015**	**Year 5 2016**
Personnel (Option 2 only)					
Salary Wage	$ -	$ -	$ 14,004	$ 14,424	$ 14,857
Fringe Benefits	$ -	$ -	$ 1,225	$ 1,262	$ 1,300
Total Personnel (Option 2)	$ -	$ -	$ 15,229	$ 15,686	$ 16,157
Full Budget + Option 2	**$ 85,538**	**$ 88,632**	**$ 93,070**	**$ 96,444**	**$ 99,948**

Option 2 Justification

Personnel
Temporary field labor: To work in the field research plots (100%, FT, April-October, 30 weeks at 40 hours per week, $11/hour, 3% inflation rate per year).

Option 3: Full budget plus education coordinator and additional temporary labor, added in 2014

This addition will allow an expansion of the education and outreach components of the program, and also will provide additional temporary labor support to the program as it expands to continue to facilitate research and extension projects conducted by NCSU faculty, and also takes on new program directed research, extension, outreach, and demonstration projects, all beginning in 2014.

	Year 1 2012	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016
Personnel (Option 3 only)					
Salary Wage	$ -	$ -	$ 51,135	$ 52,669	$ 54,250
Fringe Benefits	$ -	$ -	$ 11,622	$ 11,971	$ 12,330
Total Personnel (Option 3)	$ -	$ -	$ 62,758	$ 64,640	$ 66,579
Full Budget + Option 3	**$ 85,538**	**$ 88,632**	**$ 154,602**	**$ 159,822**	**$ 165,227**

Option 3 Justification

Personnel
Education Coordinator: Responsible for educational outreach and demonstrations projects with farmers, Cooperative Extension, and the community, especially students. (100%, FT, $37,132 starting salary, 3% inflation rate per year, 28% fringe benefit rate).

Temporary field labor: To work in the field research plots (100%, FT, April-October, 30 weeks at 40 hours per week, $11/hour, 3% inflation rate per year).

Economy Budget

This is a basic budget with reduced labor, travel, and supplies to keep the program operating to facilitate research and extension by NCSU faculty, but with a minimal amount of program directed research, extension, outreach, and demonstration projects.

	Year 1 2012	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016
Personnel					
Salary/Wage	$ 35,000	$ 36,050	$ 37,132	$ 38,245	$ 39,393
Fringe Benefits	$ 9,800	$ 10,094	$ 10,397	$ 10,709	$ 11,030
Total Personnel	**$ 44,800**	**$ 46,144**	**$ 47,528**	**$ 48,954**	**$ 50,423**
Travel	$ 3,000	$ 3,150	$ 3,308	$ 3,473	$ 3,647
Total Travel	**$ 3,000**	**$ 3,150**	**$ 3,308**	**$ 3,473**	**$ 3,647**
Supplies	$ 930	$ 977	$ 1,025	$ 1,077	$ 1,130
Total Supplies	**$ 930**	**$ 977**	**$ 1,025**	**$ 1,077**	**$ 1,130**
Current Services					
Telephone	$ 500	$ 525	$ 551	$ 579	$ 608
Organic Certification	$ 770	$ 809	$ 849	$ 891	$ 936
Total Current Expenses	**$ 1,270**	**$ 1,334**	**$ 1,400**	**$ 1,470**	**$ 1,544**
Fixed Charges					
Total Fixed Charges	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Budget	**$ 50,000**	**$ 51,604**	**$ 53,261**	**$ 54,974**	**$ 56,743**

Economy Budget Justification

Personnel
Program Coordinator: Responsible for communication with NCSU researchers, and NCDA&CS staff, outreach, planning, organic certification, and demonstrations projects. (100%, FT, $35,000 starting salary, 3% inflation rate per year, 28% fringe benefit rate).

Travel
Including, but not limited to, mileage, motel, per diem, registrations, reimbursement for rental car, and airfare for the Principal Investigator, Project Coordinator, and other employees on the project to travel to field sites, local farms, meetings, and to present/exhibit at organic agriculture conferences. (5% inflation rate per year).

Supplies and Materials
Including, but not limited to, paper and ink cartridges for printing project brochures and flyers "in-house"; a computer and printer dedicated to the project; flash drives for sharing project resources electronically for trainings with extension agents, and growers; memory cards, batteries, and a camera dedicated to the project; name tags for meetings; markers and other office supplies for the employees on this project; growing media, pots, flats, fertilizers, soil amendments, pest control products, picking containers, boxes, bags, containers, seeds, plant material, and small and large hand tools for weeding and pest control; fuel for the truck to drive to field plots; software for creating educational online materials for the project; beverages, snacks, food products and utensils for in-house educational meetings. (5% inflation rate per year).

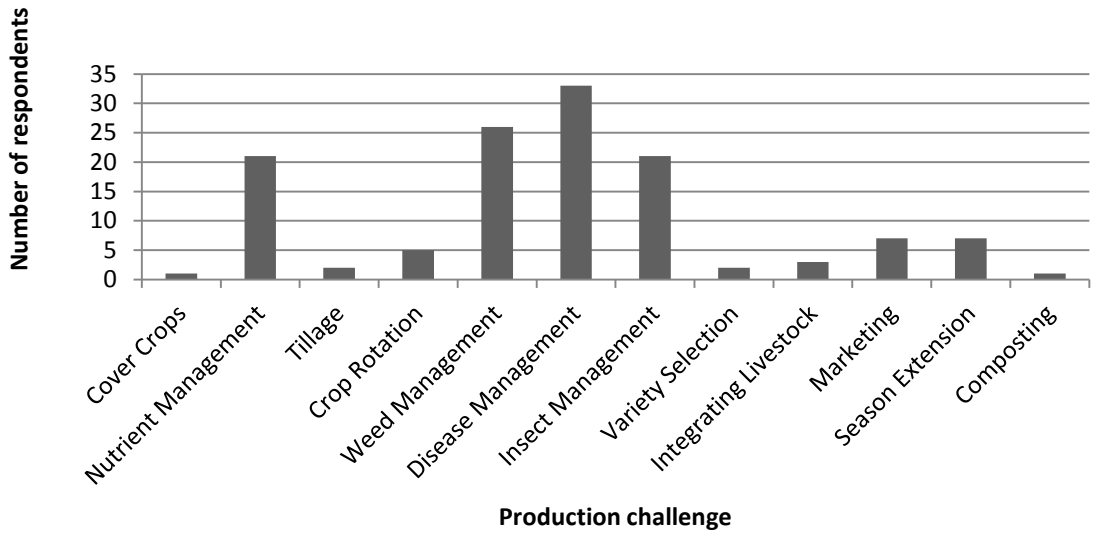
Current Services
Including, but not limited to, postage for mass mailing materials for the project; catering for day long meetings where eateries are not convenient or programming continues through the mealtime; mass printing at photo copy centers; teleconference charges; internet file sharing services; long-distance phone charges for which a log will be kept; a dedicated cell phone for this project for employee who will often be in the field and operating between two offices, and organic certification fees. (5% inflation rate per year).

Planning Process Results

Community Surveys and Interviews

Surveys were completed by 234 respondents at field days, workshops, meetings, and online. Of those surveyed, 53% were farmers (organic or conventional). Pest and nutrient management emerged as the top priorities for organic research in WNC (Table 1). When gardeners and farmers were asked online about the top production challenges they faced, pest and nutrient management were again the top issues, although marketing also ranked in the top five (Figure 10). The lack of available research was identified as one of the barriers growers face in transitioning to organic.

Figure 10. Top production challenges facing farmers and gardeners in western NC in 2010 (Online survey, n=142).



Responses to open-ended questions about research and extension projects ranged widely, but several messages emerged. Overall, there was a desire for a holistic approach to research. For example, farmers are very interested in cover crop management, no-tillage organic production using cover crops, fertility potential of green manures, beneficial insects, and the soil food web. There are also several regional research needs of organic farmers. Farmers want to know the best crops, cultivars, and cover crops particularly adapted for WNC. Organic farmers in southern Appalachia desire an appropriate management resource (akin to the Southern U.S. Vegetable Handbook or Northeastern Resource Guide for Organic Insect and Disease Management). Another strong message was the need for more information on scale- and mountain-appropriate

methods and machinery for weed and cover crop management. Farms in the area tend to be small, and face particular challenges with sloping land and rocky soil.

Respondents had many ideas for educational projects. People requested that we hold farm visits/tours, workshops, field days, and demonstrations on various production topics geared towards farmers, in addition to topics geared towards eaters like cooking, seasonal eating, and how food is grown. Respondents think we should work with 4H clubs, school children, Master Gardeners, Extension, and grassroots community groups to accomplish our goal of community outreach. Many suggested that we work with farm-to-school and farm-to-chef efforts, one coining the term 'dirt-to-table' for the need for more education on how food is grown.

Approximately 26 farmers in WNC were interviewed, including 16 in-depth farm visits during the summer of 2010. In addition meetings were held with 9 extension agents and 16 community organizations, and 4 presentations were made to gather input at community and grower association meetings (120 people estimated). Information gained through these meetings and interviews largely mirrored that of the surveys. A new common need which emerged was the need for markets and support of mid-scale commercial organic production. Several mid-sized organic farmers have out-grown the CSA model and are moving towards grocery retail, internet, or restaurant sales.

Community Listening Session

A listening session was held at our inaugural organic vegetable production workshop on August 31, 2010 at the Mountain Research Station (Figure 6). Over 115 farmers, home gardeners, agricultural extension agents, and agricultural professionals attended the workshop and feedback was overwhelmingly positive.

Attendees considered weather, topography, land prices, labor, and unreasonable food safety regulations as top limitations facing farmers in WNC. Networking challenges, old ideas, and lack of research were also described as limitations. A whole systems approach to research was recommended as a way to make the site organic, for example including flowers in a tomato variety trial, crop rotation, and making the site more like a real farm. Composting was

Figure 6. Listening Session for new Mountain Organic Research and Extension Program at the Organic Vegetable Production Workshop, Aug. 2010.

also included as an important aspect to include.

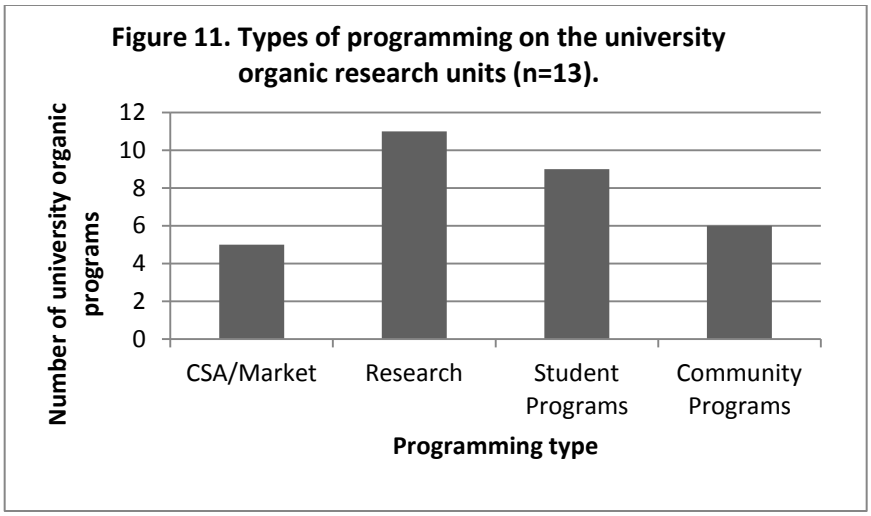
It was recommended to have staff devoted to educational projects with local schools and 4H programs. There was interest in us assisting local schools with research projects and school gardens. The group requested that we make easily accessible fact sheets available to the public. Important educational topics included: what does organic food mean, and also how to cook or preserve local food as well as preserving family farms. It was recommended to keep the community informed through blogs, listservs, email, as well as the local press. We also received several ideas for a name.

Interviews of other University Organic Programs

Thirteen university organic programs from around the country were contacted for interviews on the design and management of their program (Table 2). The goal of these interviews was to understand the development, design, programming, and management of organic research farms around the country in order to inform our planning process with the recommendations of these programs. Two of the farms raised primarily agronomic crops, but the rest focused on horticultural crops. Three of the 13 stations only did research, while three did none or very limited research, focusing on student programming and market farming demonstrations (Figure 11).

Table 2. University organic programs interviewed summer 2010.

University	Program
Clemson University	Calhoun Fields Lab
Cornell	Organic at Cornell
Kentucky State University	Organic Ag Working Group
Michigan State University	Student Organic Farm
NC State University	CEFS Organic Research Unit
NC State University	CEFS Small Farm Unit
University of California – Davis	Agricultural Sustainability Institute
University of Florida	Center for Organic Agriculture
University of Georgia	UGA Sustainable Agriculture
University of Kentucky	Organic Farming Research and Education Unit
University of Minnesota	Organic Ecology
University of Tennessee	UT Organic Farm
Washington State University	Washington State University Organic Farm

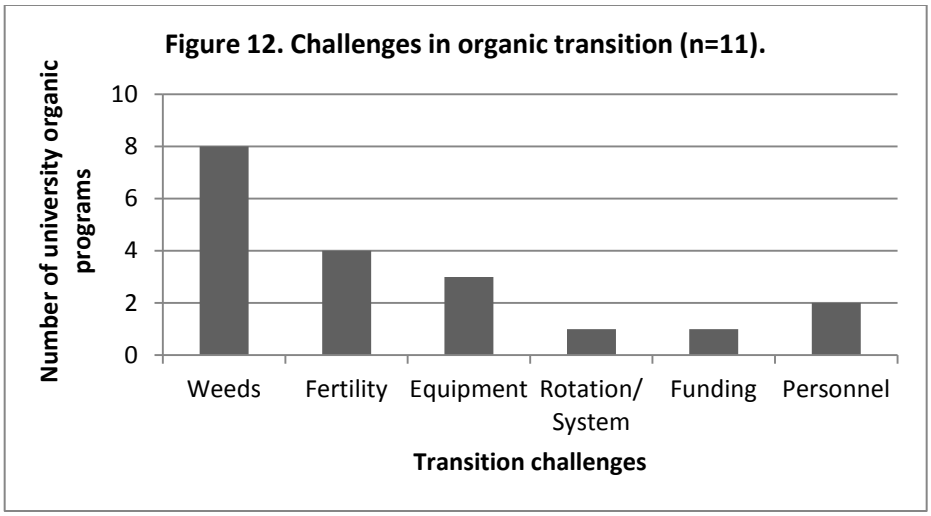


The average size of the farms was 58 acres with a range of 4 to 300 acres, and the average size of the horticultural farms was 20 acres. Most units started smaller and then grew as faculty interest grew. For example, WSU started with 1 acre in 2004 and now is limited to 4 acres but would expand if they could. UT certified 9 acres in 2010, with 14 in transition, and 90 acres total. Over the last 10 years, Cornell's organic research area at Freeville farm has grown from 7 to 35 acres. The six programs which responded that they had enough land had an average size of 93 acres. Faculty interest, funding, water, and labor were cited as the main limitations to expansion. The other four programs that responded that they did not have enough land had an average size of 14 acres. Space wars among faculty developed on one of the stations. One respondent recommended that we start small to get used to organic weed management and keep morale up whereas others recommended starting bigger than you expect since faculty interest will grow.

Half of the stations placed all organic land in a single place on the farm, and the other half had multiple fields. One of the programs indicated that having all the different types of research together did sometimes result in lost experiments, but from a management standpoint they still recommended citing it on one spot. Of those programs that certified multiple fields, one reason was to separate research fields from market/CSA fields.

Transition strategy

Each unit had a unique history and development which affected the ease of transition to organic. The use of cover crops, manure, and compost to build soil fertility and reduce weed pressure was highly recommended. Weeds, followed by fertility and equipment availability were the most commonly cited challenges in transitioning land for organic research (Figure 12).



Crop Rotation

Sixty percent of the programs had a set crop rotation on all or part of their organic research land. Of these, two grew agronomic crops and the rest only had rotations on land used as a CSA or market garden. Land used primarily for horticultural research did not have a set cash crop rotation on any of the farms due to labor limitations. Unless a horticultural crop was grown for research or for market it was not planted simply to maintain a 'typical' organic rotation. Seven of the eleven stations also had a plan to maintain uniformity between research projects using one to three years of hay, fallow, or cover crops. Several considered rotating research challenging, and emphasized the importance of early communication with project leaders.

Management

Almost all programs (92%) had a faculty director (Figure 4). The only program without a faculty director considered it their main challenge since it limited their ability to seek grant funding and to publish research. Half (46%) had a staff coordinator, often responsible for some combination of communication, outreach, and research or farm management. Half (54%) also had some form of a steering or advisory committee. Most of these committees included farmers, community members, extension, and faculty, but a few were just faculty committees.

Use of produce

Majority (73%) of the programs marketed their produce in some fashion. Three of these programs ran community supported agriculture (CSA) operations, two had farm stands, and three sold commodity crops. Many programs (63%) also donated their produce to food banks. Three sold their produce to campus dining, and two used the produce for their own events. One

used gleaners, and another program did so previously but had problems associated with gleaning so stopped.

Funding

Overall 2/3 of programs received university or Department of Agriculture funding for their core coordinator, budget and some staff and then often used extramural grant money or produce sales for special projects and to hire extra staff (Figure 8). All programs received university funding for the staff coordinator or faculty director and a technician. Funding for operating budgets came from the university for half of the programs, and from grants and sale of produce for the other half. Often, staff was funded with a combination of hard and soft money depending on the type of position. In a few cases other faculty who used the program would eventually write some of the core labor and budgets into their grants.

Three programs had almost no university funding besides basic infrastructure and a faculty director's salary. All three of these programs developed CSA's in order to generate funding for farm managers, an operating budget, and staff. The fourth CSA received core university funding for a coordinator and equipment, but not an operating budget. All four university CSA operations described developing the CSA in response to a lack of institutional support. Most recommended the CSA as a good outreach tool with the community and a good way to generate practical research questions in a 'real farm setting'. Most relied a lot upon volunteer and student apprentice or intern labor and were very student oriented. Only one of these university CSA operations still maintained a strong research focus.

Challenges

Funding, followed by personnel issues and weed management were the top challenge's facing the university organic programs (Figure 9). Funding was commonly cited as a challenge, especially by the programs which lacked guaranteed core funding for a handful of programs. Some personnel issues were due to non-cooperative research farm managers whose negative attitude towards organic impacted the level of priority of the organic projects. Lack of knowledge about organic was another personnel issue. Coordinators had trouble with both farm staff and university researchers not understanding the rules and risking noncompliance with organic certification. One described the role as babysitting and indicated they would not certify if they didn't have to for grant funding. Weed management was a final challenge cited often. Many programs however cited this as an initial challenge that they had since overcome by developing the appropriate crop rotation/weed management system.

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Project Title: Integrated approach for the improvement and promotion of tomato in North Carolina

A. Project Summary:

The public tomato breeding program for North Carolina has released a number of hybrid varieties and breeding lines in past three decades that have been well received by growers in and outside North Carolina. To remain competitive in the marketplace, NC growers must increase the marginal rate of return and be known for a high quality product that can command a consistent consumer demand. Food safety and good agricultural practice mandates for tomato harvest and handling now add yet another layer of management, cost containment, and market necessity, and no specific protocols designed for small acreage tomato growers currently exist. Value added attributes, such as sweetness, lycopene, flavonoid, and vitamin C content have not been measured and would help consumers identify NC tomatoes as nutrient-dense, flavorful, and safe. Incorporation of food safety, molecular markers for virus resistance, fruit composition of tomato breeding lines was done to integrate the NC tomato program to better focus research and breeding efforts and meet grower needs.

B Project Approach:

To address food safety concerns with fresh packed tomatoes, a survey to assess tomato priorities in food safety and breeding was conducted at the annual NC tomato growers meeting and electronic survey, with 53 responses. The greatest percentage of growers had small acreage, were over 50 years old with 20 years of farming. 86% indicated they had a moderate to high knowledge of fresh produce safety. Major concerns about food safety on farm and at packing house were water, worker hygiene and training, traceability, GAPs certification, and handling a food food safety crisis or outbreak. Additional fresh produce safety education opportunities were provided across the state for food safety crisis training and a website was created for collection of fresh produce safety data. Packing shed microbiological testing was done at a large tomato grower site to determine most likely sites for contamination. Highest risk areas were found to be areas with product contact surfaces (Zone 1).

A protocol for live plant screening for TMV was developed and tested against DNA molecular markers and found to highly correlate with the markers. Confirmation was made and two markers were identified for use in screening future tomato crosses.

About 175 lines were tested for lycopene and soluble solids content in 2009 and 2010 and sorted for potential parents to improve lycopene content. Lycopene content of these lines ranged from 0 for yellow and orange types to 3-15 mg/100 g tomato for red types. Prolycopene was identified in 12 parental lines using high performance liquid chromatography.

C. Goals and Outcomes Achieved:

Objective 1-Goal 1a

A summary of risk assessment surveys of NC tomato growers indicated a lack of a Good Agricultural Practices (GAPs) plan in 78% of 73 growers responding. To address this problem, food safety training programs were initiated. In parallel with this information, on farm risk assessments were done to identify most likely sources of possible tomato contamination. One unexpected outcome of testing was that most of the commercially available bacterial tests were not suitable for on farm evaluation, requiring the need for additional trained personnel or an off farm contracted service (an additional expense for growers). We created a website to place all this data that is password protected. Areas that will be represented on this website include and not limited to: NC Tomato Production Data, Crisis Communication, Tomato Outbreak Data, Factsheets, and Microbial Sampling protocols at: (http://ncsu.edu/enterprises/ncfreshproducesafety).

Investigation of farm practices and compilation of low-cost guidance was undertaken in the area of risk management tools microbial validation for tomato growers. While efforts have improved fresh produce safety awareness, there is a lack of understanding on the implementation of risk management and validation tools. Microbial testing offers many ways to monitor the effectiveness and to validate aspects of this program. There are many methods and products on the market with varying degrees of efficacy. The time and economic requirements of microbial sampling is such that growers need more practical experience to be able to incorporate these practices. In order to comply within the risk assessment framework, growers need more information about cleaning and sanitation practices, postharvest testing parameters, and water testing. A notebook and training curriculum was developed with resources to address these needs and include the following documents:

- Tab 5
  - Water Testing
    - Amounts of hypochlorite to add
    - Chlorine

        - Chlorine testing resources
        - Collecting water samples
        - Water testing results (6 examples)
- Tab 6
    - Standard Operating Procedures
        - A SOP
        - SSOP checklist
        - Cleaning and sanitizing food contact surfaces
        - Guidance for preparing an SOP
        - Guidance for SOPs
        - Handling a food recall
        - How to write an SOP
        - SOP writing guide
        - Personal hygiene
        - Sample SOP
        - SSOP
        - SOP checklist
        - SSOP example
        - Washing fruits and vegetables
- Tab 7
    - Resources
        - 3M aerobic count plates
        - Cantaloupe Info sheet
        - External testing lab quotes
        - Food testing labs
        - Incubator resources
        - Leafy greens info sheet
        - NSF Davis Fresh harvest microbial tests
        - Primus applicability chart
        - Primus audit scoring guidelines microbial tests
        - Sample microbial test kits

All these resources can be found on the website: http://ncfreshproducesafety.ncsu.edu/agent-resources/good-agricultural-practices-gaps-training-curriculum/gaps-training-curriculum-tier-2

Objective 1b-Goal 2

Results: Two documents were created; building upon the survey data, to assist NC tomato growers with individual risk assessments as well as possible costs associated with food safety measures. (both can be found on the web: http://ncfreshproducesafety.ncsu.edu/tomatoes?preview=true&preview_id=2599&preview_nonce=6fcc3bff33)

To continue the assistance to the NC Tomato growers, all resources were places on a password protected website (created new) of: http://nctomato.wordpress.com/. Information can be viewed by inputting the following (reference passwords can be obtained by request).

Framework for Risk Assessment: A survey entitled "An Assessment on Fresh Produce Safety and Breeding Research Prioritization for the Tomato Industry." A paper survey was distributed and data collected at the NC Tomato Growers 42nd Annual Meeting and "Winter Vegetable Conference and Trade Show" (February 17 & 18, 2010). The project summary was distributed to the board at the October 2009 meeting. Survey was collected and door prizes awarded at the lunch banquet. Electronic surveys were distributed utilizing four area listserves (ASAP, Growing Small Farms, Local Foods Action Plan, and Sustagchatham) from May 10 – June 15, 2010.

- Survey and results: http://ncfreshproducesafety.ncsu.edu/featured-resources/tomato-survey-reflects-food-safety-knowledge-among-growers
- Survey Result Summary: The results indicated a perceived moderate (44 percent) to high (43 percent) level of knowledge, indicating that participants felt that they knew something about the subject but there was an opportunity to learn more. Irrigation Waters: Forty-seven percent of participants drew their water from wells, while 41 percent used surface water during field operations. During harvest and packing activities, 63 percent of the farmers surveyed drew water from wells, 20 percent drew water from municipal water systems and 16 percent drew water from surface water. The majority of the farmers (97 percent) had their agricultural waters tested for generic E. coli. Eighty-seven percent of the farmers did not perform any other type of microbial testing for their products, water or environmental surfaces. The farmers relied predominantly on E. coli testing as their only verification practice.
  Worker Health and Hygiene: In addressing their knowledge of worker health and hygiene, farmers were asked about their behaviors on having hand-washing and bathroom facilities available for workers. Seventy-seven percent of the farmers reported having the facilities available for their workers. The farmers were pretty evenly matched when asked about training for their workers. Forty-seven percent of the participants conducted trainings with their workers on proper hand-washing, bathroom use, illness and injuries, break areas and worker hygiene practices. Fifty-three percent of the farmers did not offer such annual trainings.
  Traceability: In addressing the traceability practices of the participants, they were asked if they had performed a mock recall on any of their products. Ninety-percent had not. Sixty-seven percent did not have a traceability program/system that uniquely identified their product to the field and date of harvest. Over half of the participants reported storing their traceability information in forms other than "electronic" and "paper." In looking at the individual responses, the majority of the participants reported the question not being applicable or that there was no storage of information.

Transportation: When addressing the transportation of produce, 98 percent of participants reported not having concerns with the shipment of their produce to packinghouses or retail/wholesale outlets.
Good Agricultural Practices: In the final section of the survey, Good Agricultural Practices (GAPs) were addressed along with crisis communication and recall. Seventy-eight percent of the participants did not have a GAPs food safety plan, which holds supporting documentation for an operation. Twenty-three percent of the farms had such a food safety plan. Ninety-four percent of the farmers had not been third-party audited for GAPs certification. Eighty-six percent of participants had not developed or implemented a recall plan on their farms. When asked about crisis communication statements, 82 percent reported not having a statement or plan for their farm in the event of a crisis such as a foodborne illness outbreak, pesticide contamination or injured worker. Ninety-five percent of the farmers reported receiving less than five inquires a week about their food safety practices from their brokers or end markets.
Implications for project: This survey represents baseline information on food safety practices for fresh-market tomato growers in NC. Based on these results, educational efforts and resources development should be centered on GAPs, water quality, microbial testing, worker health and hygiene, recall programs, and crisis communication.

Educational Incentives: Three Educational development workshops were held in 2010 to assist with the education of tomato growers and also to gather information for additional resource development:

March 17 & 18, 2010. Are you prepared for a Crisis? Intensive Crisis Preparedness Training with crisis plan development and intense on-camera training.

April 13, 2010. It Can Happen Here! Managing a Food Safety Outbreak. This interactive workshop will take you through a simulated food safety outbreak scenario related to tomatoes, so that you can understand the impacts on your farm and the industry as a whole and begin to plan ways to prepare and protect your farming operations.

April 20-22, 2010. Carver+Shock Training. This 2 ½ day course is designed to assist communities and industry to assess risk, prevent and deter terrorist and criminal acts that target the food industry. This is a tool can be utilized for the tomato industry in setting priorities in the food safety arena. The training program is structured with realistic hands-on training that incorporates the videos of actual facilities and interactive case studies with practical exercises.

Results: From recent crisis communication training, the NC Tomato Growers Association developed a mission statement and set priority concerns (triggers) for their crisis communication plans to include: food safety, farm safety,

transportation, labor issues, and water quality. Additionally, six (6) factsheets were developed to assist with crisis communication and education of pathogens that could affect the tomato industry. All of the documents provide information on speaking with the media, who to contact, talking points, economic implications, documents specific to the pathogen and tomatoes, as well as additional resources.

Salmonella-Tomatoes

E. Coli-Tomatoes

- Norovirus-Tomatoes
- Hepatitis A Virus-Tomatoes
- Tomato Nutrients (from USDA)
- Tomato talking points- Here is a document dedicated to tomato talking points concerning the health benefits, economics, consumption, production, breeding, fun facts, and lycopene information of tomatoes.

To continue the assistance to the NC Tomato growers, all resources were places on a password protected website (created new) of: http://nctomato.wordpress.com/. Information can be viewed upon request:

- **NC Tomato Risk Assessment with High Priorities** This is a risk assessment checklist for tomato growers to use to identify high-risk practices that can lead to food contamination events. It is intended to assist growers in identifying and implementing changes to production practices.
- **Budgeting for Food Safety- High-Risk Priorities** The costs of food safety vary greatly. This document attempts to outline the possible costs associated with food safety measures incorporating the NC tomato industry's identified high-risk practices, and not the additional costs associated with the third party GAPs audits for certification.

Goal 2

Fruit composition of 407 tomato lines grown in field and greenhouse was done. Carotenoids, sugars, and pH were similar between field or greenhouse grown fruit. Twelve parental lines were found to contain prolycopene, a type of lycopene thought to be more readily bioavailable in humans. A range of sugars and lycopene were found among parental lines, from 4 to 7 % soluble sugars and 3 to 15 mg/100 g lycopene, indicating strong inherent germplasm to enhance the sugar and lycopene content of new tomato selections. This work, together with TMV markers, allows for strongly focused breeding to rapidly tailor tomatoes suitable for North Carolina growers. Fruit compositional analysis is summarized in an accepted paper, to be published in June 2013 in the International Journal of Vegetable Science ("Lycopene content profiling in tomato lines derived from diverse genetic background using colorimetry and infra-red absorbance methods")

Results on composition presented in "Tomato Breeding Update", Dr. Dilip Panthee at NC Tomato Growers Conference 2012

Also presented at: National Meeting of American Society for Horticultural Science, 2012 “Lycopene Content Profiling in Tomato Lines Derived from Diverse Genetic Background.”

Goal 3.

Two molecular markers for tobacco mosaic virus were identified and confirmed in parent tomato lines. This will allow rapid screening of seedlings at cotyledon or first leaf stage. Use of these markers avoids delays inherent in waiting for suitable field incidence of TMV for screening of genetic material, and permits rapid material screening that avoids both virus exposure and expensive plant establishment.

D. Beneficiaries:

Growers, especially tomato growers; consumers, national tomato breeding programs

Economic impact of project is projected to be in new varieties with improved virus resistance, adaptation of GAPs to maintain/sustain current tomato producers.

Consumers are expected to benefit from access to new varieties with higher lycopene levels for health, plus consistent soluble solids content (sugars) for improved sensory experience (and more intake of tomato as part of a vegetable rich diet).

Producer emphasis on GAPs will reduce consumer risks from fresh tomato contamination by human pathogens.

As measured from 2010-2012, traffic to fresh produce safety website is 9,730 visitors and 15,618 visits.

E. Lessons Learned:

In this project, coordination and collaboration of efforts from basic molecular biology and biochemistry to disseminate of results and training of growers in food safety risk was overly ambitious for the time period projected despite heroic efforts of the team. Our (team) lesson learned is one common to those new in the grant funding arena: focus on fewer objectives. Also, a positive lesson learned is the value of strong support from the tomato industry in their interest for research and survey results. And, information gathered in this grant was highly useful in achieving participation in

an FDA funded cooperative agreement on tomato and associated means to reduce food safety risks.

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Additional Information:

Information from the risk assessment portion, under fresh produce safety, can be found at: NC Tomato Growers Portal,

http://www.ncsu.edu/enterprises/tomatoes

Information on gaps and food safety training can be found at:

http://ncsu.edu/enterprises/ncfreshproducesafety

Publication:

Panthee, D.L. P. Perkins-Veazie, D. Randall, A. Brown. 2013. Lycopene content profiling in tomato lines derived from diverse genetic background using colorimetry and infra-red absorbance methods. Intl. J. Vegetable Science (In Press).

Project Title: Increasing Profitability and Sustainability for NC Apple and Peach Growers

A. Project Summary

In NC, the peach and apple industries are under increasing pressures that threaten their profitability and sustainability. Many orchards are replanted shortly after tree removal due to land limitations which are partially due to urbanization. In replanted peach orchards there is significant potential for sudden tree death in the first 3-5 years from peach tree short life (PTSL) and in apple replant sites there is a high probability that trees will have reduced growth and productivity. Both situations negatively impact yield causing NC growers to lose money over the life of the orchard. One of the methods for minimizing replant problems has been to use soil fumigants. Although current soil fumigants may be effective at least initially, they are an expensive input and their benefits may be relatively short lived in long term perennial fruit crops. Therefore additional management strategies must be explored, such as the use of new, improved rootstocks.

There is much promise and interest in newer rootstocks that can be used to minimize or eliminate the need for soil fumigants. Peach tree short life (PTSL), which results in premature tree death, has been one of the limiting factors to profitable peach production in the southeast and is related to ring nematode populations in the soil. There is a relatively new peach rootstock that is resistant to PTSL, Guardian, that does reduce the incidence of PTSL, but fumigation is still required. There are several new rootstock selections that may be superior to Guardian that need to be evaluated in NC. In addition to evaluating rootstocks for minimizing peach tree short life, another part of this project was to evaluate the impact of a native soil fungus known as mycorrhizae, which are known to have many beneficial effects on plant health and performance. However, it is unknown how the mycorrhizae are impacted in the peach orchard by standard practices such as use of different rootstocks, preplant fumigation, irrigation, and herbicide sprays for maintenance of a weed-free strip under the trees.

The need for this project has been identified by both apple and peach growers who are requesting information on rootstock recommendations and preplant strategies to maximize tree productivity and profitably. The projects in this proposal are located in

the commercial region of tree fruit production in NC on Research Stations or in commercial growers' orchards. However, developing reliable and accurate replant strategies for tree fruit crops require long-term studies that in most cases are difficult to fund. The scope of this project is long-term in nature with on-going research aimed at generating new information to assist apple and peach growers in NC as well as establishing new plantings to further address this issue.

Specific objectives of this proposal were to:

-- To identify rootstocks for profitable and sustainable use in NC apple orchards while minimizing pesticide inputs.

--To evaluate peach rootstocks and soil management strategies to minimize the potential for peach tree short life.

--To begin to develop commercial recommendations for growers of apples and peaches on rootstock selection and preplant strategies to optimize orchard productivity and sustainability and to educate NC growers and county extension agents on peach and apple replant issues and how to minimize the potential for replant problems through rootstock selection and preplant soil management.

B. Project Approach

An apple replant trial was planted in 2005 at the Mountain Horticultural Crops Research Station in Mills River evaluating 13 rootstocks as well as preplant soil fumigation as is designed for 10 year duration. Up through 2011, trees on G.935 and G.41 had the greatest yield and trees on B.9 the smallest which reflected on tree size. The benefit of preplant soil treatment with Telone C-35 on tree growth seems very limited and the effect on fruit production is questionable at this time with trees on G.41 and M.26 having a greater cumulative yield in the treated soil. Data being collected is used to begin to formulate grower recommendations and advanced trials to be planted on replant sites which will be presented at educational programs, in newsletter articles and on grower tours.

A similar apple replant trial to the described above was established with Wade Edney, a commercial apple grower in Henderson County, in 2006 with support from an NCSU IPM grant evaluating 12 rootstocks and preplant fumigation. Up through 2011, the dwarf trees on G.935 had the greatest cumulative yield with trees on B.9 having the smallest. For the semi-dwarf trees, trees on G. 30 and G.6210 had greater cumulative yields than trees grown on M.7 or M.26. The fruit crop in 2012 was eliminated by a freeze event in April 2012. Data collected here will be used to formulate grower recommendations for replant sites which will be presented at educational programs, in newsletter articles and on grower tours

A trial to evaluate preplant soil fumigants was established with Greg Nix, a leading and progressive grower in Henderson County. Mr. Nix contacted NCSU in mid-2007 requesting recommendations for preplant soil fumigants in apple. However, there was no current research-based information on which to make a recommendation. A cooperative project was established with NCSU field and campus (Horticultural Science and Plant Pathology) faculty to evaluate preplant soil fumigants on his farm. In October 2007 three preplant fumigants (Telone C-35, Chloropicrin, and Basamid G) plus an untreated control were applied in a replicated trial in a replant site. Mr. Nix provided the trees which were planted in March 2008. Initial measurements were taken and tree growth has been evaluated in subsequent years and in September 2012 the first significant harvest will be made. To date very little difference in tree growth has been observed.

A second generation apple rootstock trial was established in 2010 at the Mountain Horticultural Crops Research Station, Mills River with 31 dwarf rootstocks being evaluated. The trees looked very good upon arrival, were refrigerated and planted shortly after receiving according to the planting protocol. However, it was learned that the trees suffered freezing injury in the nursery prior to harvest. To date, 35 trees have died, presumably as a result of injury prior to planting. Trees that had the greatest numerical loss were on G.41N, PiAu 51-11, Bud 70-20-21 and PiAu 9-90. The first significant crop will be harvested in late September 2012.

This project also examined the mycorrhizal association and other soil microbes in the peach root zone twice each year (June and October) for two years in a vegetation-free width study at the Sandhills Research Station. Increasing the width of the

vegetation-free area and utilizing irrigation resulted in increased tree growth and fruit production. Initial data indicate that irrigation will increase the mycorrhizal infection with the width of vegetation-free strip area having little impact.

A peach rootstock trial to evaluate the newest rootstocks available from across the globe was established at the Sandhills Research Station in Jackson Springs, NC and consists of 17 rootstocks with Redhaven as the scion cultivar. Soil was preplant fumigated in October 2008 with Telone II. The trees were planted in March 2009. There seemed to be quite a bit of variability in tree size and quality at planting, however, in October tree size was quite uniform and vigorous across the planting with no tree loss. Trees on Fortuna began to turn color much sooner than trees on all other rootstocks and there is also an overgrowth of the scion for all trees on Fortuna. In the spring of 2010 there was a significant amount of terminal dieback and tree death on several of the selections resulting from bacterial canker (*Pseudomonas syringae* pv. *syringae* van Hall). Trees with the greatest mortality were on Krymsk 1, Bright's Hybrid 5 and *Prunus americana*. The largest trees are on Microbac with the smallest on HBOK 32. The trees were allowed to crop in 2011 and the trees on Bright's Hybrid 5 had the largest yield and trees on Imperial California the smallest. In the Spring of 2011 there was a significant amount of blossom blast resulting from *Pseudomonas syringae* that resulted in blossom death and blind wood which may have impacted total yield. Although significant differences do appear, this rating will continue in future years to see if there is a rootstock trend.

Activities Completed	**Who**	**Timeline**
Collect harvest data from peach plantings at the Sandhills Research Station (SRS)	Parker and SRS personnel	July 2009 July 2010 July 2011
Collect and analyze peach roots for mycorrhizae	Fisk	June and October 2009 June and October 2010
Collect harvest data from 2005 replant planting at the	Parker and MHCRS	September 2009

Mountain Horticultural Crops Research Station (MHCRS)	personnel	September 2010 September 2011
Collect harvest data from the 2006 replant planting at Wade Edney's	Parker	September 2009 September 2010 September 2011
Collect harvest data from 2007 fumigation trial at Greg Nix's	Parker	September 2010 September 2011
Presentation to the SE Apple Growers Meeting on alleviation of replant issues	Parker	January 2010 January 2011
Measure tree survival and growth on peach plantings at SRS	Parker	January 2010 January 2011 January 2012
Measure tree survival and growth on apple plantings at the MHCRS, Wade Edney 2006 replant trial and 2007 Greg Nix fumigation	Parker	January 2010 January 2011 January 2012
Install irrigation in peach rootstock planting	Sandhills Research Station	November 2009
Presentation at the NC Peach Growers Meeting on replant issues	Parker	January 2010 January 2011
Establish a 2010 apple rootstock planting at the MHCRS	Parker	March 2010

Measure tree survival in the 2010 rootstock planting at the MHCRS	Parker	January 2011 January 2012
Maintenance of apple replant trials at the MHCRS	MHCRS Personnel	January – December 2010 January – December 2011 January-May 31, 2012
Maintenance of apple replant trials at Edneys	Parker	January – December 2010 January – Decembe, 2011 January – May 31, 2012
Maintenance of peach groundcover trial at the Sandhills Research Station (SRS)	SRS Personnel	January – December 2010 January – December 2011 January-May 31, 2012
Maintenance of peach rootstock trial at the SRS	SRS Personnel	January – December, 2010 January – December, 2011 January-May 31, 2012
Present findings at the 2012 Southeastern Apple Growers Meeting	NCSU Personnel	January 2012

Outcomes Measured - The outcomes of the projects in this proposal are all long-term in nature requiring a minimum of 10 years of data for each trial. During this proposal we have identified several peach rootstocks that will not be suitable for the Sandhills region of NC, specifically Krymsk 1, Brights Hybrid 5, Fortuna and *Prunus Americana*. In addition, we have demonstrated that for peaches growing in the

Sandhills region, that increasing the area of the vegetation-free strip and the use of micro-sprinkler irrigation will increase fruit production and ultimately profitability early in the life of this study.

For the apple studies we are starting to see a trend for some of the better performing apple rootstocks such as G.935 and G.41 for the dwarf rootstocks and G.30 and G.210 for the semi-dwarf rootstocks. However, we still need several more years of cropping information on which to base accurate recommendations. The benefit of pre-plant soil treatment is still a question that we have not been able to address due to a lack of data. However, the studies currently in place will address this question in the next 4-5 years.

C. Beneficiaries

The direct beneficiaries of the impact of this project are the apple and peach growers in NC, and in some aspects the southeast. Results of this project were disseminated to growers using a variety of media and presentation types. Both the apple (200+) and peach growers (110+) that represent the commercial industries in NC, and strongly supported this project and the interim results were, and will be, presented during their annual association meetings and other regional meetings. An additional audience was the commercial growers from the surrounding southeastern states who also attend the NC meetings and will be impacted as well. Attendance at the grower meetings was in excess of 500 people annually. In addition, county extension agents were also educated and informed on the status and results of this project which they use to educate growers in their counties. Articles were published in meeting proceedings, association and county extension newsletters with a distribution of more than 500 to inform the growers about advances in increasing the profitability and sustainability of their businesses. Articles and information will also be posted to various web sites for open access which has a national and international audience. Field days at the research stations were also hosted in which results from this proposal were presented, discussed and visibly illustrated. These various methods of communication did, for the most part, inform all of the commercial apple and peach growers in NC and their employees, county extension agents, and field personnel

and a large number of others in the surrounding states that attend NC meetings and/or receive newsletters from NC.

D. Potential Economic Impact

There will be significant financial benefits to the 330+ growers referenced above as well as social benefits from increasing the sustainability of the production systems as well. The combined value of these two industries is in excess of $32 million annually. Assuming a modest production increase of 10% from using newer rootstocks to increase yield could result in a $3.2 million benefit annually. This is a very real benefit assuming that production of orchards could be increased in addition to increasing tree survival and increasing the profitable life of the orchard. The additional benefit of increasing tree and orchard survival, although difficult to measure, could result in a multiple of the 10% estimated above. If fumigation can be eliminated with an appropriate rootstock there would be a significant increase in profitability by reducing a significant financial input at planting. In addition, there would be an increase in worker safety during application as well as eliminate any environmental concerns. The projects included in this proposal have both short-term and long-term (10+ years) benefits and goals. Data on tree growth and survival was collected in the initial years and then survival and productivity in subsequent years. Information on the rootstocks with the greatest survival is being determined and the most productive rootstocks from yield data collected annually will be used to formulate recommendations. In addition, soil and preplant management strategies such as soil fumigation are being evaluated with the new rootstocks to see if there is an added benefit to the use of the fumigants. A desired goal of this project is to identify rootstocks that can be used in replant sites without the need of soil fumigation. The increased tree survival and productivity will greatly enhance the economic return to the growers as well as the economic growth of their communities.

E. Lessons Learned

Although this project is composed of many individual components, they are part of a long-term study. It is exciting to see many of these trials in place and we are looking forward to the information that will be generated over the next 4-5 years. All of the goals of this project were achieved. Although, the results of this study are preliminary at this point, it is interesting to see commercial growers adopting some of the rootstocks and strategies being investigated.

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PROJECT TITLE: Raspberries: Development of varieties adapted to the southern U.S. for local sales and commercial shipping

A. PROJECT SUMMARY

Fresh raspberries are available year round in the U.S., yet there are no major producers on the east coast despite the proximity to major markets. In the southeastern U.S., the major limiting factor to production of raspberries is the lack of adapted cultivars that have flavorful fruit, high yields, and good shelf life. The raspberry breeding program at NC State University (NCSU) is designed to develop cultivars adapted to warm humid environments and fluctuating winter temperatures. Recently, the program has been expanded in response to grower/industry interest that has necessitated the addition of more labor, land and resources from the NCDA & CS Research Stations across the state. Further, a molecular component was added to develop molecular "tags" for heat tolerance, and important horticultural traits, that will shorten time for the release of a new cultivar. And, in order to assure the success of a new cultivar, postharvest evaluations of flavor and shelf life are planned in cooperation with the Plants for Human Health Institute (PHHI) in Kannapolis. With the recent addition of faculty at PHHI, we (NCSU/PHHI/NCDA &CS) are well positioned to develop.

This project is important and timely because: 1) major small fruit suppliers are interested in producing raspberries on the east coast in order to reduce transportation costs and to have a reduced carbon footprint, 2) consumers are buying more raspberries, 3) raspberries have great health benefits, 4) raspberries are highly perishable and therefore need to be close to markets, 5) acreage is low 6) raspberries can grow in high elevation regions of NC and last but not least, 7) we need raspberry cultivars that are adapted to high elevations as well as those that can grow in piedmont and coastal plain regions that are high yielding, great tasting, and have extended shelf life are needed.

B. PROJECT APPROACH

Traditional Breeding (PI Gina Fernandez):

- PI and her assistant made crosses were made in spring and summer of 2010-extracted seeds and planted seedlings in the spring of 2011 and 2012. Seedlings planted in 2011-2012 were evaluated at the Sandhills, Piedmont and Upper Mountain Research Stations. Seedlings were evaluated each year and selections were made each at the end of the fruiting season.

Molecular Breeding (PI Bryon Sosinski):

- PI guided student work on a mapping population segregating for the primocane fruiting trait was completed during this funding period. Work included phenotyping of the population in the field and extensive laboratory and statistical analysis.

Improved flavor components and shelf life (PI Penny Perkins Veazie):

- PI guided graduate students (Christine Bradish and Jessica Spencer) in measuring level of several bioactive compounds in raspberries grown at two research station locations.
- Perkins-Veazie determined suitable cultivars for NC and conducted a small study with unripe (pink) to fully ripe (red) berries and determined some raspberry varieties can be picked pink to help prolong shelf life.

The roles of the P's are listed above. In addition, labor for harvest was provided by the NCSU and NCDA & CS Research Stations. Part of the funds from this grant was allocated to the research stations to help with harvest and plant maintenance labor.

C. GOALS AND OUTCOMES ACHIEVED

Traditional Breeding (PI Gina Fernandez):

- During the summer of 2011, 28 selections were made. These are currently being propagated and was placed in single plot trials in the Sandhills Research Station (SHRS) in Jackson Springs NC and Piedmont Research Station (PRS) in Salisbury NC.
- Replicated trials were conducted at the Mountain Hort. Crops Research Station (MHCRS) in Mills River NC and Upper Mountain Research Station in Laurel Springs (UMRS) during 2011.
- There were 29 populations planted in 2010 with approx. 2362 seedlings planted in SHRS, UMRS, and PRS.
- There were 21 populations planted in 2011 with approx. 1922 seedlings planted in SHRS and PRS.
- Replicated trial data from these trials was complete and posted to Blackberry and Raspberry Portal in early 2012. http://rubus.ces.ncsu.edu/rubus-latest-research/
- A floricane-fruiting red raspberry, NC 344, was slated be released in 2012. It was licensed to propagate at North American Plants in 2012. However, a new insect pest Spotted Wing Drosophila (SWD) was found in NC in fall of 2010. In 2011 and 2012, SWD was not well controlled by recommended chemical insecticides. We are waiting for better chemical control methods to be tested in the upcoming years. NC 344 will be released at the end of 2013 if SWD is adequately controlled.

Molecular Breeding (PI Bryon Sosinski):

- Graduate student (Jessica Spencer) has completed her MS degree. Ms. Spencer identified a loci on linkage group 7 (LG) for primocane fruiting trait. And separate loci appeared on LGs 5 and 7, for tip and lateral fruiting. This suggests that there are three genes for the primocane fruiting trait. One, which controls the primocane fruiting ability, and two, which control whether fruit appear on the tips and/or lateral branches of the canes. Additional traits of vigor, growth habit, and cane spread were also measured and loci were found on LG's 1 for spread and vigor, and LG 3 for spread and growth habit. Ms.

Spencer's MS degree can be found at, thesis can be found at: http://www2.lib.ncsu.edu/catalog/record/NCSU2667732

- In addition, former graduate student, Dr. Ramon Molina-Bravo had part of his dissertation published with the NQ population. Molina-Bravo, R., B.R. Sosinski, C. Arellano, and G.E. Fernandez. 2011. A Protocol to Assess Heat Tolerance in a Segregating Population of Raspberry Using Chlorophyll Fluorescence. Scientia Hort. 130: 524-530.

Improved flavor components and shelf life (PI Penny Perkins Veazie):

- The storage life of raspberries in NC was found to be limited by color change (darkening) and softening. Darkening is highly related to cultivar selection and slightly related to ripeness. Softening is also related to cultivar, with firmer cultivars holding up better in storage. Picking fruit at the pink stage helps with both softening and darkening of raspberry, and does not adversely affect flavor. However, picking at the pink stage requires more detachment force so can cause tearing or bruising of raspberries. The article can be- seen at: http://www.smallfruits.org/Newsletter/Vol11-Issue4.pdf. And can be found at the North American Raspberry and Blackberry website: http://www.raspberryblackberry.org/webdocs/narba11-09news.pdf
- Publication on suitable blackberries and raspberries for NC Cooperative Extension Portal: http://rubus.ces.ncsu.edu/rubus-postharvest-handling-and-storage-of-blackberries-and-raspberies/.
- Flavor components of sweetness (soluble solids), pH, and acidity were done on 9-15 cultivars at multiple harvest dates in 2009-2011. Nantahala had the highest ssc/ta; a ratio that indicates relative flavor perception to consumers. Total phytochemical activity assays (total phenolics, ferric reducing antioxidant potential, total anthocyanin's) were completed in December 2011. Data is in student thesis and publications.
- Graduate student (Christine Bradish) determined that warm temperatures and location were shown to effect levels of anthocyanin compounds and antioxidant capacity in three genotypes, including 'Nantahala', a NCSU cultivar. Bradish, C., P. Perkins-Veazie, G. Fernandez, G. Xie, and W. Jia. 2012. Comparison of flavonoid composition of red raspberries (Rubus idaeus L.) grown in the southern United States. Journal of Agricultural and Food Chemistry.
- Perkins-Veazie has developed a video for determination of post harvest shelf life evaluations. This can be used for commercial growers and researchers. This can be found at the NC Cooperative Extension Web portal: http://ncsu.edu/enterprises/other/embedded_videos/rating-blackberries-raspberries-for-postharvest-quality/index.html

Proposed and completed activities and goals:

Project Activity	Who	Proposed	Completed

Traditional breeding	NCSU Breeder (Fernandez)	Year 1. Crossing in spring in greenhouse. Remainder of field activities ongoing throughout year. Peak field activities in June and July.	All proposed achieved.
Traditional breeding	NCSU Breeder (Fernandez)	Year 2. Crossing spring in greenhouse. Remainder of field activities ongoing throughout year. Peak field activities in June and July.	All proposed achieved. One selection, NC 344, based on data collected in these years will be released in 2012.
Marker assisted breeding	NCSU Molecular Geneticist (Sosinski)	Year 1 – we will continue to place markers on the NQ map and begin work on the NCh map. Work to transfer markers to promising germplasm will commence.	The NCh map was in progress.
Marker assisted breeding	NCSU Molecular Geneticist (Sosinski)	Year 2 – we will finalize the NQ and NCh maps, and continue to test promising markers in other germplasm.	Maps completed. Marker transfer will continue for many more years.
Improved flavor components and shelf life	PHHI/NCSU Post Harvest Physiologist (Perkins-	Year 1. Evaluate raspberry germplasm (named	All activities underway.

	Veazie)	varieties, selections, and/or seedlings of interest) for shelf life, subjective flavor, and phytochemical content. Peak activity is June/July with phytochemical assays complete in November. Flavor component analysis to start in September and continue to December. Extension publication on best varieties for shelf life to be completed in December 2010.	
Improved flavor components and shelf life	PHHI/NCSU Post Harvest Physiologist (Perkins-Veazie)	Year 2. Evaluate raspberry germplasm (named varieties, selections, and/or seedlings of interest) for shelf life, subjective flavor, and phytochemical content. Peak activity is June/July with phytochemical assays complete in November. Flavor	All proposed activities are completed. Additional evaluation of germplasm will continue using the methods developed in this project.

		component analysis to start in September and continue to December of 2011. Data summary and preparation of publication on shelf life from January to April of 2011.	
Field work	*NCDA & CS and NCSU Research Stations*	Year 1. Harvest, pruning and training, pest sprays will take place throughout the year.	All harvest completed and plant maintenance performed adequately.
Field work	*NCDA & CS and NCSU Research Stations*	Year 2. Harvest, pruning and training, pest sprays will take place throughout the year.	All harvest completed and plant maintenance performed adequately.

D. BENEFICIARIES

Directly from this project funds:

- Part time employees were funded at the 4 research stations.
- Three graduate students were provided with fruit samples for data analysis.

Approximately 85 commercial growers and 250 small scale growers or homeowners were presented data from this project at the following meetings:

2010:

- Brambles for Warren County. November 2010. Approximately 15 small acreage farmers attended.
- Brambles. Small Fruit Field Day. Sandhills RS. June 22, 2010. Approximately 75 attendees, 4 commercial growers.
- NC Commercial Blackberry and Raspberry Growers Field day. Lincolnton, NC. Sept. 2010. Approximately 20 commercial farmers attended.
- Caneberries and Tunnels. What works and what does not work in our research trials. 25th Annual SE Vegetable and Fruit Expo. December 1, 2010. Myrtle Beach, SC. Approximately 35 farmers attended, 10 from NC.

2011:

- NC Blackberry and Raspberry Grower Meeting, Feb. 22, 2011. Association were presented with data collected during this project at their annual meeting on promising new selections, including NC 344 and NC 430. Approx. 30 farmers in attendance.
- Blackberry pruning workshop. 9-12. CEFS, March 9, 2011. Approx. 24 small farmers or homeowners, 2 Commercial growers.
- SE Regional Fruit and Vegetable Conference, Savannah GA, Jan 6, 2011. Approx. 150 farmers, 15 from NC.
- Growing caneberries in NE NC. Currituck Co. WEBINAR. March 22, 2011. Approx. 25 farmers, 2 commercial.
- Two growers are trialing NC 344, including, Patsy Lineberger, Ervin Lineberger.

Other related beneficiaries:

- One large shipper, Norton Creek Farms had several raspberry cultivars planted for shipping in 2011. This year, only they are growing the NC release, 'Nantahala'. This is the largest single planting in the state, approximately 10 acres. Based on a price of $8.00-$9.00/flat, gross sales were approximately $16,000 to $27,000 acre.
- In 2011, 'Nantahala' was the fourth most popular raspberry cultivar sold in the US, with total sales exceeding 33,000 plants. Plants are being sold to commercial operations, small local growers and to homeowners. Commercial sales of Nantahala in Western NC was strong, although competition from a large commercial marketer limited price to $8.00-$9.00/flat, resulting in gross sales of $16,000 to $27,000 acre. In addition, two homeowner catalogs are promoting it as Sweet Repeat™, a cultivar with superior, excellent flavor. A single plant sells for $8.99-$12.99/plant

E. LESSONS LEARNED

- Traditional breeding can make slow but steady progress. The labor that is required to harvest the fruit in replicated trials costly and much more than what was provided by this grant.
- Our molecular output although steady is still only useful in the laboratory setting. We have teamed up with other Universities and the USDA in order to pool our efforts. Larger scale mapping and identification of markers is part of RoseBREED (http://www.rosbreed.org/)
- We estimate that at least 5 years will be needed to make the molecular marker work integrated in the year to year breeding process.
- We are working with larger parallel projects (RosBREED) and a black raspberry project sponsored by NIFA (proposal # 2010-01112) that will help develop tools that can be used in the NCSU raspberry breeding program.

Unexpected outcomes or results that were an effect of implementing this project.

- NC 344 will be released if SWD can be controlled. It is a floricane-fruiting red raspberry.

F. CONTACT PERSON

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Project Title: Investigating the Mechanisms of Host Resistance to the Balsam Woolly Adelgid as part of an IPM Strategy for Christmas Trees

A. Project Summary:

The balsam woolly adelgid (*Adelges piceae* Ratz.) is a major pest in Fraser fir (*Abies fraseri* [Pursh] Poiret) Christmas tree plantations. Fraser fir is one of the most popular Christmas trees in North America and the industry provides an important economic resource for rural Appalachian areas. In North Carolina alone, there are 50 million Fraser fir trees growing on over 25,000 acres, providing annual cash receipts of $134 million for trees (USDA ERS 2007) and another $12 million for wreaths, ropes, and greenery. There are approximately 1600 growers, with the majority being small operations under 10 acres. Virtually all Fraser fir Christmas trees require treatment for balsam woolly adelgid (BWA) one or more times during the 5- to 10-year production cycle. The threshold for treatment is a single infested tree and chemical insecticides are currently the only effective means for controlling this pest. The very steep terrain of most plantations complicates the process. Treatments for BWA cost the Christmas tree industry over $1.5 million per year.

Our specific objectives are as follows: (1) Examine probing and settling behavior of the adelgid both on and beneath the surface of several fir species, focusing on salivary secretions ("wandering sheaths") and identify behavioral differences in relation to resistance. (2) Determine the role of extra-oral digestion and identify the activity and role of various enzymes in the salivary secretions in relation to resistance of fir species. (3) Develop bioassays which can be used to assess the adelgid's behavioral response to surface chemistry and structure. (4) Investigate the potential resistance of Fraser fir to BWA by evaluating concentrations of juvabione-related compounds and bark texture in fir seedlings exposed to BWA.

(1) We recorded settling behavior on seedlings by counting the number of settled adelgids based on location. Our data show that most BWA prefer to settle near or on the bud of a Fraser fir branch. We are investigating wandering sheaths as a potential indicator of host resistance. In order to observe branching patterns of stylet sheath material in Fraser and Turkish fir we infested seedlings of both species in a greenhouse. In March (2013) we will complete this experiment by clearing and staining the one-year infested material using methods modified from Berlyn and Mikshe[2], Brennan et al[3], and Pointaeu[4].

(2) We tested for the existence of two enzymes in BWA; amylase, protease, and peroxidase. Protease activity was not present in whole ground BWA (figure 1), however we did observe peroxidase activity (figure 2) and amylase activity in wholly ground BWA. Peroxidase may be involved in the disrupting plant defense pathways involved in isolating contaminants.

(3) A common garden has been established at the NCDA Upper Mountain Research Station in western NC near Laurel Springs. We added 18 Turkish fir (*Abies bornmuelleriana*) to this plantation in September 2012. We conducted trials comparing infestation rates of cut branches to live Fraser fir saplings at three different temperatures. Cuttings and saplings were infested using the hanging bolt technique[1] in temperature controlled incubators. We observed

similar infestation rates for cuttings and saplings. Although no significant differences were observed between cut branches and whole trees at any of the temperatures we did observe differences in development of BWA, and differences in settling rates for the three different temperatures. More adelgids settled on branches and cuttings at lower temperatures. We only saw development of BWA into adults on whole trees. This is a significant observation because using cut branches for screening fir for resistance/tolerance to BWA requires that the cut branch behave similarly to the whole tree. In observing similar rates of infestation between cuttings and trees we can conclude that cuttings will provide a less destructive method for determining BWA host preference. However, we cannot determine whether a tree contains resistance factors related to BWA development based on how they develop on a cutting. We will continue to explore the nutritional factors and physiological differences between cuttings and whole trees in order to better understand this phenomenon and develop a less destructive means of screening Fraser fir for host plant resistance to BWA.

We plan to investigate the potential resistance of Fraser fir to BWA by evaluating differences in metabolic compounds present in healthy fir seedlings compared to those exposed to BWA. We obtained preliminary results testing three Fraser fir trees in order to observe metabolite differences between different parts of a tree, and to determine variation between trees. There was no variation between different trees but differences were observed between tissue type and location. Based on these results we need to take into account these factors when observing metabolic profiles.

(4) Juvabione was present in juvenile wood and mature wood in both infested and uninfested samples. There was nine times more Juvabione present in infested juvenile wood compared to healthy juvenile wood, while infested mature wood samples contained 29 times more Juvabione than healthy samples. There was more Juvabione present in juvenile wood than mature wood among infested and healthy samples. Bark did not contain any Juvabione, but did contain other related defense compounds including three that were differentially abundant between healthy and infested samples. Juvabione also inhibited molting from pupa to adult in mealworms. Freshly molted pupae were treated on the 4th and normal controls molt to adults by the 16th except where inhibited by juvenizing agents like methoprene or juvabione.

B. Project Approach

<u>Develop a precise understanding of BWA feeding/settling behavior:</u>

We are investigating wandering sheaths as a potential indicator of host resistance. In order to observe branching patterns of stylet sheath material in Fraser and Turkish fir we infested seedlings of both species in a greenhouse. Seedlings were transplanted from a nursery bed in Boone, NC to greenhouse pots Five-year-old Turkish (n=80) and Fraser fir (n=80) were grown in

a shaded greenhouse, held between 10°C and 27°C in Raleigh, NC. Saplings (n=20/species) were infested with BWA using the hanging bolt technique in March of 2012. Bolt sections (3.5m) of heavily infested Fraser fir were freshly collected from a ca. 30 year old stand near the upper mountain research center at Laurel Springs, NC.

In March (2013) we will complete this experiment by clearing and staining the one-year infested material using methods modified from Berlyn and Mikshe[2], Brennan et al[3], and Pointaeu[4]. We will compare these results with newly infested material in order to observe changes in wood anatomy as well.

We recorded settling behavior on seedlings by counting the number of settled adelgids based on location. Counts were taken after five months of infestation whereby a 10cm subsample from infested trees (n=30) were evaluated. BWA counts included the location of settled BWA. Locations were divided into four categories; 1) stem, pertaining to any part of the branch that was not the 2) bud, bud scales, or base of the bud, 3) needle cushion, where any part of the adelgid was touching any part of the cushion area, or 4) needle. Our data show that most BWA prefer to settle near or on the bud of a Fraser fir branch (table 2).

Table 2. Number of adelgids per location (n=30 trees)

Location	Total Adelgids
Needle Cushion	233
Bud	417
Needle	54
Stem	153

Extra-oral Digestion by Balsam Woolly Adelgids:

When liquid feeding insects infest plants they often introduce digestive enzymes to facilitate digestion, or combat plant defenses. We tested for the existence of two enzymes in BWA; amylase, protease, and peroxidase. Protease activity was not present in whole ground

BWA (figure 1), however we did observe peroxidase activity (figure 2) and amylase activity in wholly ground BWA. Peroxidase may be involved in the disrupting plant defense pathways involved in isolating contaminants. When fungi infect fir trees they defend themselves by producing a layer of dead cells around the infection in order to wall it off from the rest of the nutritive tissue within the tree. This hypersensensitive response is regulated by reactive oxygen species like hydrogen peroxide. BWA may produce peroxidase in order to disrupt this defense mechanism. Amylase is a common digestive enzyme used to dissolve starch molecules and is probably used by BWA to dissolve storage starches found in parenchyma cells where they feed. In studying BWA phenology and tree physiology throughout the year we have decided to examine these enzymes, as well as others, throughout the year, in order to determine if BWA adjust the amount of enzymes produced throughout the year in response to tree growth and physiological changes throughout the year.

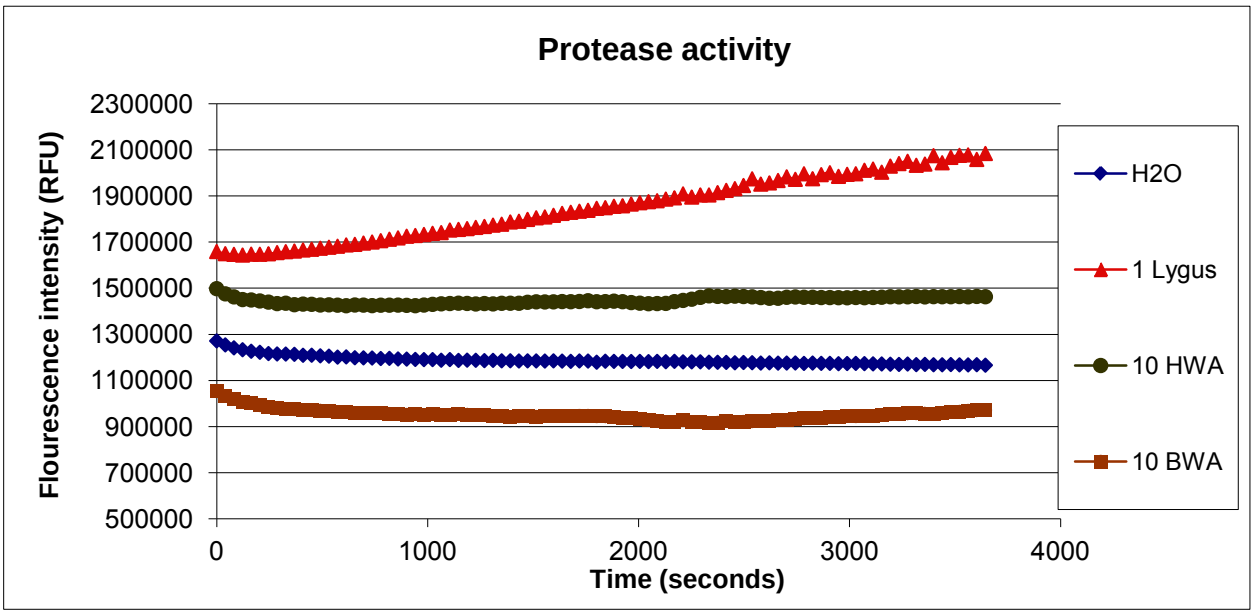


Figure 1. Relative fluorescence (RFU) of protease in BWA, HWA, lygus, and water (H_2O).

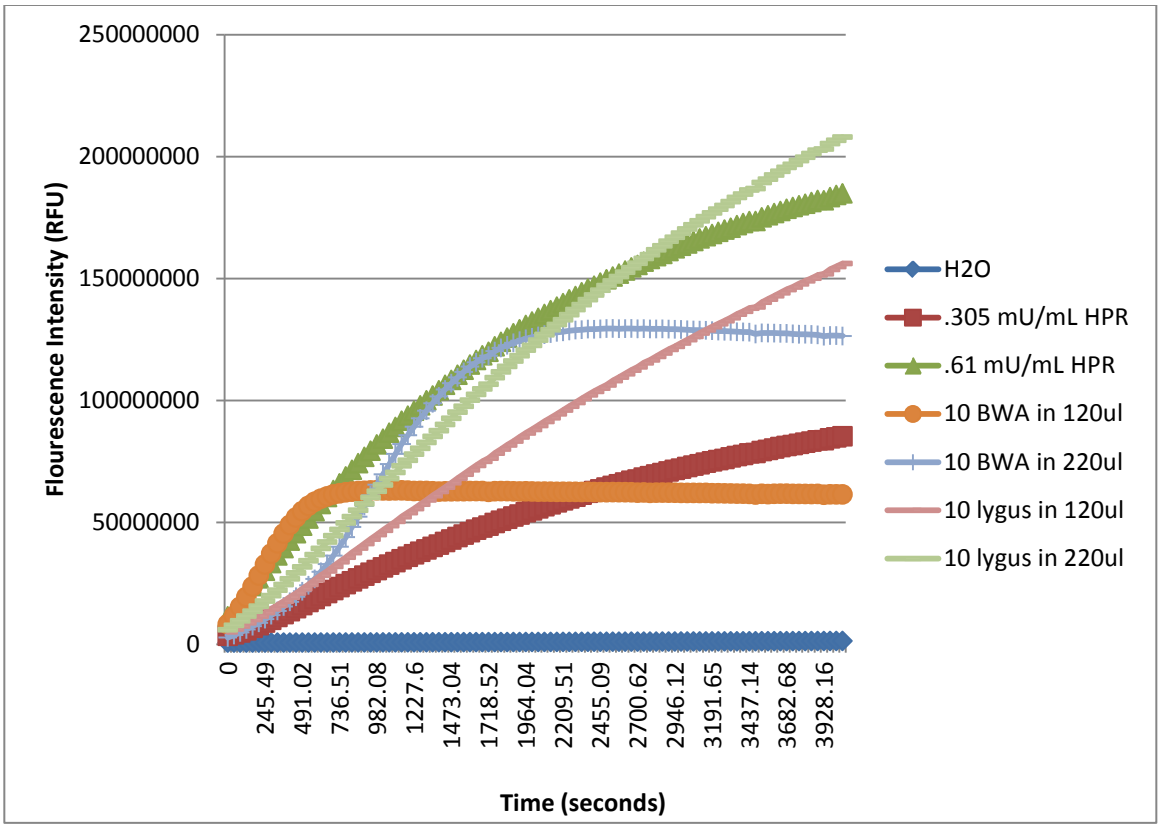


Figure 2. Relative fluorescence of peroxidase in BWA, lygus, and horseradish peroxidase (HPR).

Metabolic profiling:

We plan to investigate the potential resistance of Fraser fir to BWA by evaluating differences in metabolic compounds present in healthy fir seedlings compared to those exposed to BWA. We hypothesized that metabolic profiles would differ between Fraser and Turkish fir species, while pathways of defensive compounds will also vary. We collected samples from Fraser (n=40) and Turkish (n=40) fir prior to infestation with BWA in the Spring of 2012. However, this proved to be an overwhelming number of samples to adequately process before degradation of the samples. We still have enough material to attempt these experiments again in the spring of 2013. Fraser and Turkish fir 4-year-old saplings were housed in a greenhouse for one year in order to acclimate. Trees were kept in a shaded, air-conditioned room set to 20°C in rows with alternating species. We collected samples by removing all needles from a tertiary branch on the top whorl, cutting it, and quickly placing it in a 2mL prechilled microcentrifuge tube which was immediately capped and placed in liquid nitrogen. Samples were then stored in -80°C until they were processed further. Each sample was collected in less than 30s to prevent any accumulation of defense compounds (Morris et al. 2004). We then processed samples similar to methods described in Fiehn et al and Morris (2004; 2000) except samples were ground in liquid nitrogen chilled mortar and pestle. Briefly, frozen samples are extracted in methanol and water (MeOH/water) to stop metabolic activity. This activity took several months and samples were not

processed further.

We obtained preliminary results testing three Fraser fir trees in order to observe metabolite differences between different parts of a tree, and to determine variation between trees. We used a PCA to measure variation between profiles and compared the variation between tree number, tissue type, and sample location (figure 3) using an ANOVA. There was no variation between different trees but differences were observed between tissue type and location. Based on these results we need to take into account these factors when observing metabolic profiles.

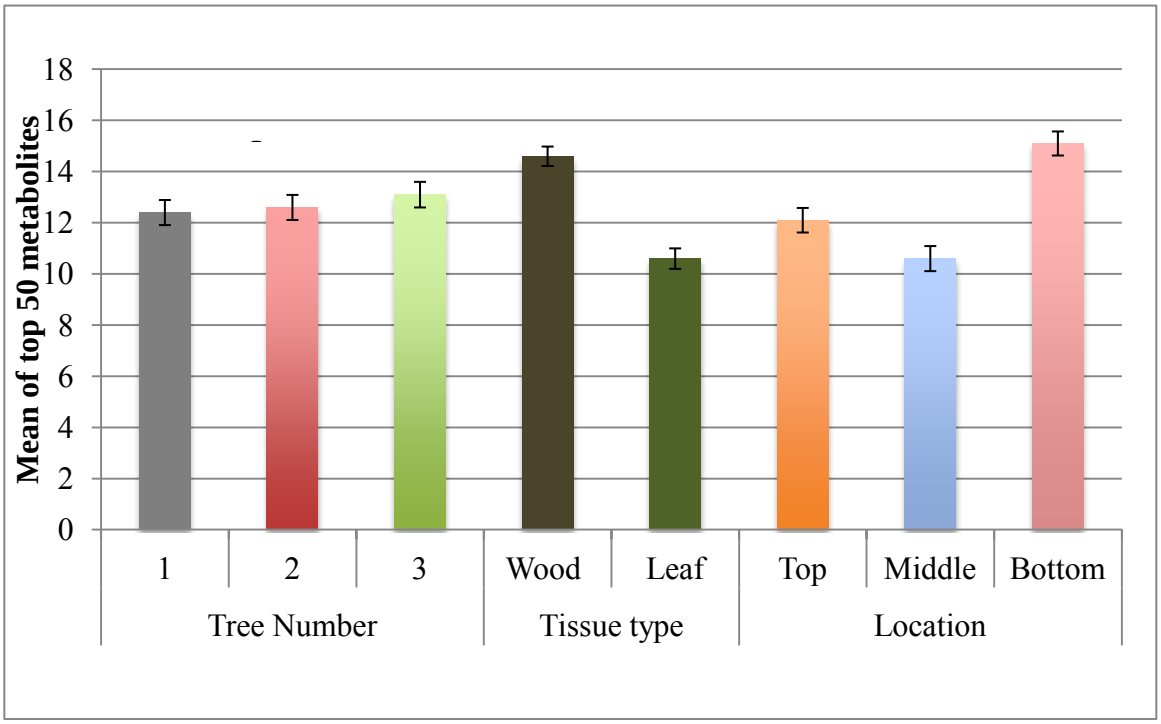


Figure 3. Mean value for the top 50 metabolites analyzed using GC/MS with standard error bars.

We will establish a metabolic profile of healthy and infested Fraser and Turkish fir by using a subsample of those taken previously and take new samples this spring. Next we will add internal standards (ribitol, and nonadecanoic acid methyl ester). The polar (upper) and lipophilic phases will be separated and fractionated after desiccation. The lipids are transmethylated with H2SO4. The dried polar phase is treated with methoxyamine hydrochloride. Pyridine and MSTFA are added to both phases before injection on the GC/MS.

Metabolic profiling is a new tool used in evaluating conifer phenotypes. Metabolic changes occur in response to changes in gene expression coupled with environmental stresses. Evaluating the changes in a plants metabolites under controlled conditions indicate phenotype and genotype. Genotype data can be useful in determining which trees are resistant, once the mechanism for resistance is understood. We will create metabolic profiles for healthy Turkish, Fraser, and Veitch firs using GC/MS extracting leaf and wood material using protocols developed by Feihn (2000). A group of each of these species will be innoculated with BWA crawlers, while another group remains uninfested.

Extraction with MeOH/water dissolves primary metabolites such as sugars and amino acids. Larger proteins, starches, and secondary metabolites are not dissolved. An assay involving an enzyme digest would be required to liberate these compounds from the sample. Complimentary to metabolic profiles are foliar amino acid signatures. Amino acids are the proteins produced from

genes and therefore directly regulated. In hemlocks certain amino acids have been shown to increase in response to hemlock woolly adelgid feeding. These amino acids are associated with certain defensive pathways within the plant. Coupled with metabolic profiling these signatures will help explain the differences between physiological responses in the three fir species tested.

Screening for host resistance:

A common garden has been established at the NCDA Upper Mountain Research Station in western NC near Laurel Springs. We added 18 Turkish fir (*Abies bornmuelleriana*) to this plantation in September 2012. We assessed the health of the other species present in order to plan experiments for the spring (2013).

Only one bioassay was available for testing resistance in Fraser fir, which involved infestation of the whole tree. We conducted trials comparing infestation rates of cut branches to live Fraser fir saplings at three different temperatures. Cuttings and saplings were infested using the hanging bolt technique[1] in temperature controlled incubators. We observed similar infestation rates for cuttings and saplings (table 1). Although no significant differences were observed between cut branches and whole trees at any of the temperatures we did observe differences in development of BWA, and differences in settling rates for the three different temperatures. More adelgids settled on branches and cuttings at lower temperatures. We only saw development of BWA into adults on whole trees. This is a significant observation because using cut branches for screening fir for resistance/tolerance to BWA requires that the cut branch behave similarly to the whole tree. In observing similar rates of infestation between cuttings and trees we can conclude that cuttings will provide a less destructive method for determining BWA host preference. However, we cannot determine whether a tree contains resistance factors related to BWA development based on how they develop on a cutting. We will continue to explore the nutritional factors and physiological differences between cuttings and whole trees in order to better understand this phenomenon and develop a less destructive means of screening Fraser fir for host plant resistance to BWA.

Table 1. Number of settled adelgids on Fraser fir cut branches and whole saplings

Sample	Temperature	Average # Adelgids	Average length	Total adelgids/cm	stdev
Cutting	25	0.5	3.4375	0.133333333	0.153960072
Tree	25	2.75	4.5	0.595833333	0.594476894
Cutting	20	42.5	2.975	13.88596491	12.40160684
Tree	20	84	5	17.04876374	15.84391549
Cutting	17	1.75	4.1	0.442583732	0.407050228
Tree	17	100.5	5.625	19.99220779	22.11539748

Analysis of Juvabione-related compounds:

Juvabione is a possible resistance factor in fir species, preventing BWA from developing normally. Juvabione is present in the juvenile and mature wood of Fraser fir, but pure forms have not been shown to exist in the bark where BWA interact with its host. We tested the wood and bark of Fraser fir for juvabione-like activity using a mealworm assay. We used GC/MS to identify and quantify compounds extracted from the bark and their relation to juvabione.

The pith and first three rings were considered juvenile wood, identified by poor differentiation between early and latewood. Rings 4-6 were discarded. Rings 6-9, 10, 11 were identified as mature wood, as there were clear distinctions between early and latewood growth.

Bark was separated from the outside ring and care was taken not to include any wood in the bark sample (and visa versa). We used a chisel to chop each section into $3mm^3$ chunks. Tree 10 and 4 were used in the green peach aphid assay and were processed differently. We did not separate juvenile wood from the mature wood of these trees, but left them together.

Extraction:

We adapted methods from Puritch and Nijholt (1974) except we ran the extraction for 24 hours and did not methylate the petroleum ether extract or wash it. Briefly, we weighed 3-8g for each sample and placed them in 25mmx80mm single thickness cellulose extraction thimbles. We then used a soxhlet apparatus to extract the petroleum ether soluble compounds for 24 hours. We placed 150mL petroleum ether in a 250mL round bottom flask with glass beads. All glassware was cleaned with warm soapy water and rinsed three times in acetone between uses. Soxhlet cycles occurred every 15 minutes and were run continuously for a 24 hour period. Petroleum ether and extract were transferred to beakers where petroleum ether was allowed to evaporate for 48 hours under a fume hood leaving a clear or yellow oil resin. Extracts were dissolved in 20mL acetone for transfer to pre-weighed 40mL vials with teflon screw caps. Acetone was evaporated for 48 hours under the fume hood and dried in a gravity convection incubator (45ºC) with anhydrous calcium sulfate (Drierite) for 48 hours before weighing.

GC-MS analysis:

All calibration standards and samples were run in triplicate. We created a calibration curve for juvabione using five concentrations of an external juvabione standard. Curves showed strong linear correlations between peak area and concentration (r^2=0.99-1.0). Concentrations of juvabione standard included 15.01, 30.02, 60.04, 90.06, and 120.08 $ng \cdot \mu L^{-1}$.

We used a gas chromatograph (HP 6899) with mass spectrometer (HP 5973) using Chemstation software. We injected 1 µL using an autosampler with helium carrier gas over a 30m column (HP-5MS, I.D. 25mm). The GC oven was programmed to run from 80-200°C at 5°C·min-1, 200-230°C at 1°C·min-1, and 230-300°C at 30°C·min-1 between samples temperature was ramped down from 300°C to 80°C at 30°C·min-1 and held at 80°C for 4 minutes before the next sample was run.

We created a calibration curve for juvabione using five concentrations of an external juvabione standard. Curves showed strong linear correlations between peak area and concentration (r^2=0.98-1.0). Concentrations of juvabione standard included 15.01, 30.02, 60.04, 90.06, and 120.08 ng·µL-1. Concentrations of injected samples varied to keep and peak area/height within the range of our standard curve. All calibration standards and samples were run in triplicate.

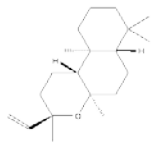
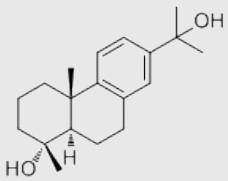
Identification of compounds within samples was performed after integrating the curves and using the NIST (Wiley v.7) library of ion spectra to compare our samples to those of the library. Juvabione peaks had retention times around 25 minutes for all samples where it was present, and contributed to most of the peak area for the area we examined on each chromatogram between 24 and 30 minutes for juvenile and mature wood samples. Other compounds are listed in the results.

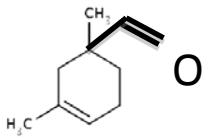
Juvabione was present in juvenile wood and mature wood in both infested and uninfested samples. There was nine times more Juvabione present in infested juvenile wood compared to healthy juvenile wood, while infested mature wood samples contained 29 times more Juvabione than healthy samples. There was more Juvabione present in juvenile wood than mature wood among infested and healthy samples. Bark did not contain any Juvabione, but did contain other

related defense compounds including three that were differentially abundant between healthy and infested samples (table 3). Juvabione also inhibited molting from pupa to adult in mealworms. Freshly molted pupae were treated on the 4th and normal controls molt to adults by the 16th except where inhibited by juvenizing agents like methoprene or juvabione (figure 4).

Figure 4. freshly molted pupae were treated with 10ul of 1.25% methoprene (M), infested juvenile wood extract (IJW), infested mature wood extract (IMW), infested bark extract (IB), or acetone.

Table 3. Defense compounds differentially abundant in the Bark of infested and Healthy Fraser fir.

Chemical name	Chemical Structure	Compound function
Diterpene resin acid (abieta diene)		Tree defense against insects and microbial pathogens
18-Norabieta-8,11,13-triene		Diterpenoid resin, defense against insects, predominant component of oleoresin

1,5- dimethylcyclohexene- 5-carboxaldehyde		precursor to monoterpenes, dienes, and sesquiterpenes

C. Goals and Outcomes Achieved:

Our long-term objective is to minimize chemical inputs for BWA control into Christmas tree plantations by developing genetically resistant planting stock. Therefore, one expected measurable outcome would be the reduction in cost for Christmas tree growers to treat for BWA from the current $1.5 million per year (Potter et al. 2005). Another measurable outcome will be the number of resistant fir families that are made available to the Christmas tree industry. Both of these outcomes are long-term (exceed the grant period) and can only be met once we have established that resistant fir trees can be produced.

Short-term measurable outcomes are related to the specific objectives of this proposal, and can be measured by the quality and quantity of peer-reviewed publications that demonstrate the credibility of the results. We plan to publish three to four manuscripts based on results obtained here and within the next year. We have established that cut branches are viable options for determining BWA preference for infesting fir trees and can be used in initial screening trials, but inhibition of BWA development is an important part of host-plant resistance that will require further research. We have also shown that BWA prefer to settle on the bud of Fraser fir and will continue to explore internal structures that make these feeding sites more desirable. There are two enzymes present within BWA involved in feeding and defense. It is likely these enzymes fluctuate throughout the year as they pertain to BWA development and tree physiology. Metabolic profiling is a powerful tool that provides copious amounts of data. We will continue to use these methods to determine specific changes between healthy and infested firs in hopes of elucidating mechanisms of resistance. Juvabione is a juvenizing compound present in fir trees and production of this compound is increased in response to BWA infestation, however it is not present in the bark of the tree where it would contact the insect.

Development of metabolic profiles is an arduous process which took longer than expected because of the number of samples taken. We were too ambitious and based on preliminary results it is clear that we do not need as many replicates as we tested. We will continue to pursue these methods with fewer replicates.

While the goals of this project have not been completed at this time, we expect to fulfill all of the objectives during the next year. Continued financial support for the project has been acquired from other sources.

Objective 1 (feeding behavior): We have developed methods for viewing stylets of first instar adelgids after they have inserted into artificial media. This is a part of several steps required for developing diets for BWA in order to rear and observe the adelgid throughout its entire life cycle. We collected wood disks from infested and uninfested Fraser fir trees of approximate harvest age (7-13 years old). Disks were separated into juvenile wood, mature wood, and bark sections and each section was ground in a cyclone mill through a 3mm screen. Two treatments were applied to the ground sections; extracted, and not extracted. Ground wood was extracted with petroleum ether in a soxholet apparatus for 24 hours to remove juvabione and other petroleum ether soluble compounds. Ground wood from both treatments was then placed in a homogenized agarose solution to create a gel. Each wood section and treatment were replicated 3 times including a negative control with agarose only and a positive control with a 1.5% sucrose solution. Five BWA crawlers were placed on $1cm^2$ cutouts of either hardwood biofilm or parafilm with three squares of each substrate placed in each agarose dish. A similar experiment was performed last year where we had limited success in getting crawlers to insert and eggs to hatch. Our hypothesis being that, BWA sheaths will be more highly branched in less favorable host trees, thus providing us with a possible screening method for host resistance. Here our hypotheses are similar in that we expect more branching and higher insertion rates in the extracted wood sections than unextracted. In 2011 the highest insertion rate was ca.25% in the positive control (agarose containing 1.5% sucrose (Figure1)). We are in the process of counting inserted adelgid crawlers in the new agarose media, but preliminary observations suggest insertion rates are higher overall.

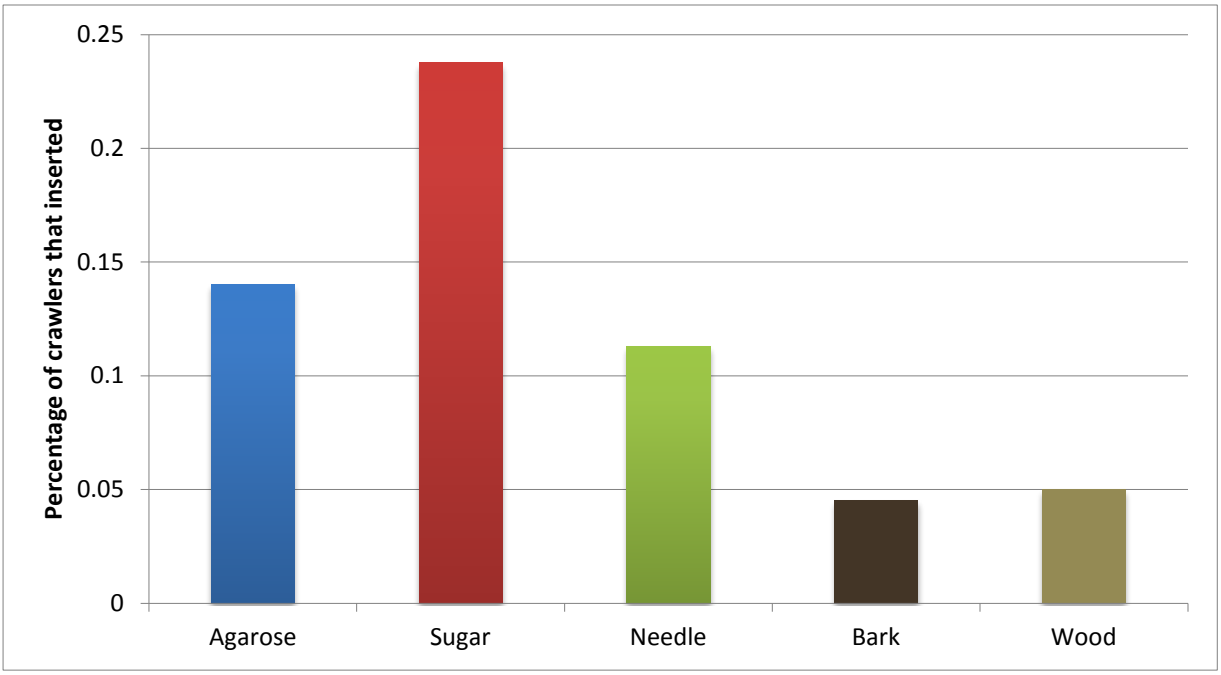


Figure 1. Percentage of crawlers that inserted (out of 10 crawlers + 10 eggs) through parafilm into agarose containing nothing, 1.5% sugar, 0.96% ground needle, 1.2% ground bark, or 0.8% ground wood tissues.

As with the experiment performed in 2011 there was a high incidence of mold during this experiment even though we took precautions to autoclave everything. We will perform this trial again with the addition of antimicrobials. We have been hesitant to use these because their effect on feeding behavior is unknown. The next experiment will also include samples from veitch and Turkish fir; our hypothesis being that branching patterns will be higher in these tree species.

In conjunction with artificial methods we will be clearing and staining sapling trees that have been infested with BWA for 1 year. We infested Turkish and Fraser fir in a greenhouse last year and will begin processing these trees to count settled adelgids and view subsurface stylet tracks.

We have been able to view the inserted stylets of BWA crawlers in the gels. We are currently staining these gels in order to create images which allow us to analyze the wandering sheaths in the various media. Developing an artificial diet is paramount in our ability to observe BWA feeding and settling behavior.

Objective 2 (extra-oral digestion): When insects or pathogens attack plants they often introduce effector proteins to combat plant defenses. We tested for the existence of two proteins in BWA; protease, and peroxidase. Protease activity was not present in whole ground BWA (figure 2), however we did observe peroxidase activity (figure 3). We are in the process of collecting BWA to repeat these experiments using both crawlers that have not inserted and feeding adults to ensure there is no contamination from plant material which may affect peroxidase levels. We will test for the presence of amylase, protease, peroxidase, polyphenol oxidase, and pectinase in both crawlers and adults. Peroxidase may be involved in the disrupting the defense pathway leading to hypersensensitive response in plants ultimately causing runaway cell death. We will look for other enzymes present in BWA, and try to ascertain the location of peroxidase activity as well as its role in plant defense pathways in Fraser fir.

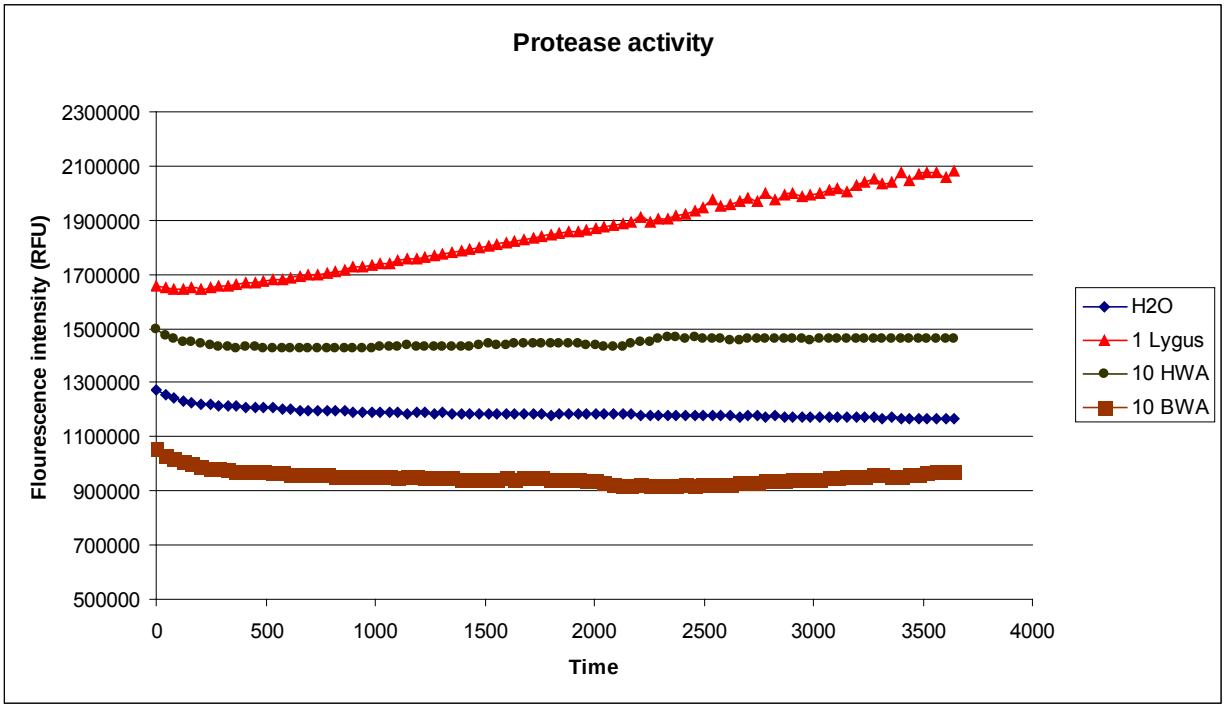


Figure 2. . Relative fluorescence (RFU) of protease in BWA, HWA, lygus, and water (H_2O).

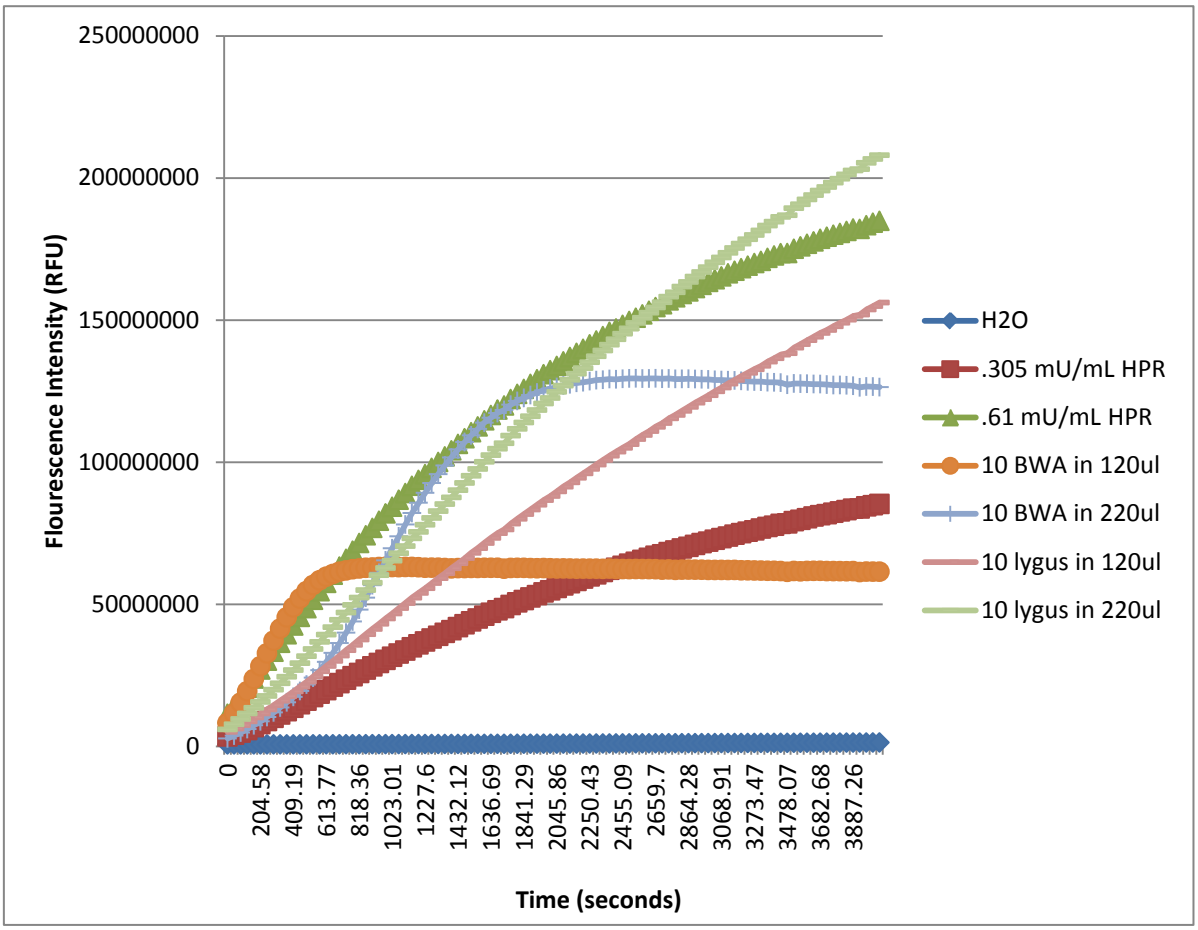


Figure 3. Relative fluorescence of peroxidase in BWA, lygus, and horseradish peroxidase (HPR).

Objective 3 (bioassays): We have collected samples from Fraser and Turkish fir saplings. We collected the 4 year old trees from a nursery near Boone, NC and transplanted them to individual containers in the greenhouses at NCSU. They were acclimated to greenhouse conditions and arranged in two experimental treatment blocks. Forty-two Fraser and 42 Turkish firs were arranged alternately in rows for a total of 84 trees per treatment. One treatment was inoculated with BWA using the hanging bolt technique while the other was left as the control. Before inoculation with BWA, needle and bark samples were collected from each tree. We have started prepping the 226 samples for analysis with gc-ms. After collection of samples we inoculated the trees with BWA and are in the process of collecting samples ca. 1 year after the infestation, as well as tissue samples to observe cell changes in response to the infestation, and wandering sheaths as mentioned in objective 1. Once we process

and identify the compounds present in healthy compared to infested Turkish and Fraser fir we will be able to determine which metabolic processes allow Turkish fir to sustain an infestation with low mortality. These compounds may be present in Fraser fir as well and we can use this assay to determine which compounds might be present and select for them in a resistance breeding program to improve BWA resistance in Fraser fir. We have also made progress in inoculating excised branches to compare infestation rates between different trees. We have found preliminarily that these methods are best performed at 20˚C. We have been able to rear two generations of BWA on cut bolts at this temperature.

Objective 4 (juvabione-related compounds): We have found that juvabione is present at higher levels in infested wood than healthy Fraser fir trees. As methods described in objective one, briefly, we extracted juvabione and related compounds in a soxholet apparatus with petroleum ether. We have been running those samples through a GC-MS and have identified the main compound in JW (juvenile wood) to be juvabione with levels increased in IJW (infested juvenile wood, figure 4). Juvabione is also present in MW (mature wood), but is ca. 30 times more abundant in IMW (infested mature wood, figure 5). Juvabione is not present in the bark but several other compounds related to juvabione are present and up-regulation and down-regulation of these compounds occur between infested bark and bark (figure 6). Abbreviations: JW= juvenile wood, IJW=infested juvenile wood, MW=mature wood, IMW=infested mature wood, B=bark, IB=infested bark.

We have tested these compounds dissolved in acetone on mealworms in a bioassay. We applied 10µl of the extract dissolved in acetone to larvae on 2/16/2012 and tracked their progression to adulthood. Most of the treatments spent more days as larvae than the controls with the longest larval stages occurring in the B, IB, and IMW treatments, these treatments also experienced longer pupation times (Table 1). None of the beetles molted abnormally as expected, but we applied the treatment once early in development. Bowers (1966, 1968, and 1969) applied juvabione only to newly molted pupae causing abnormal molting.

We are currently testing the effects of fecundity on the *T. molitar* beetles used in above experiment to see if the one time application has any long term effects on reproduction. We are also repeating the study with extracts from more trees on both *T. molitar* and a Hemipteran, the milkweed bug (*Oncopeltus fasciatus*). We will be applying the compounds only to newly molted pupae and final instars and will include a positive control group treated with a known disruption factor.

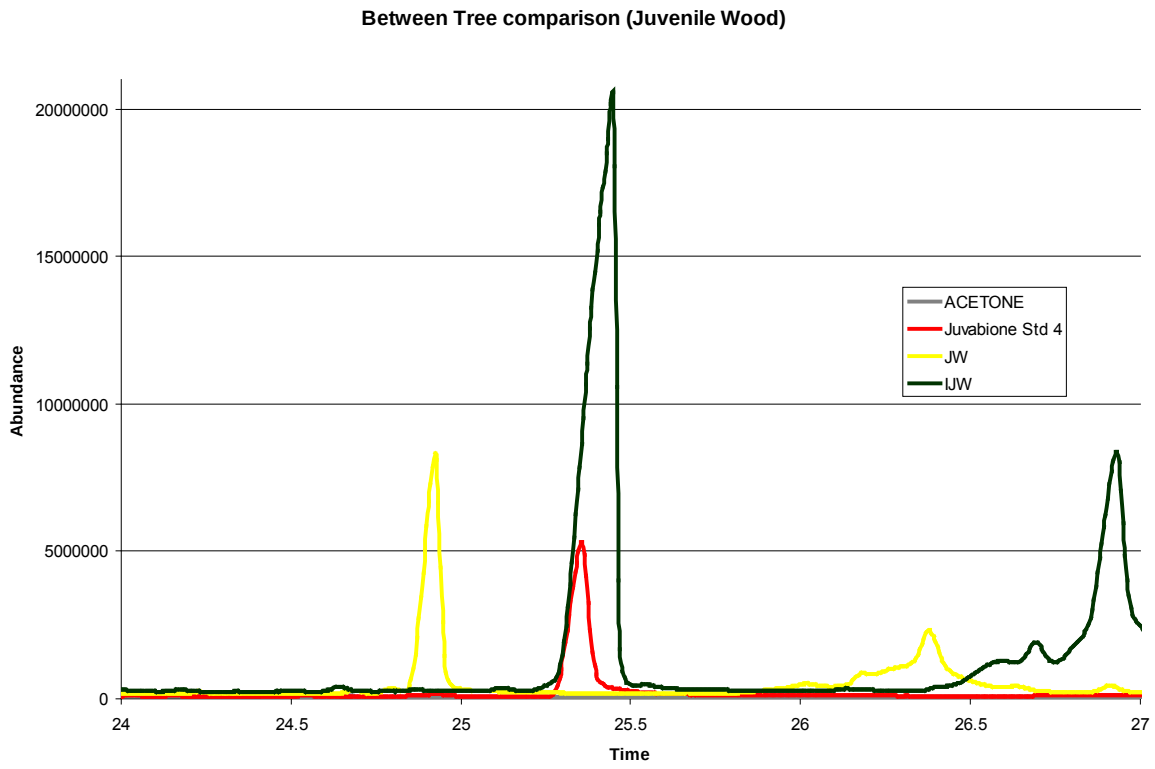


Figure 4. Chromatogram depicting peaks of relative abundance between the juvabione standard (red), JW (yellow), and IJW (green).

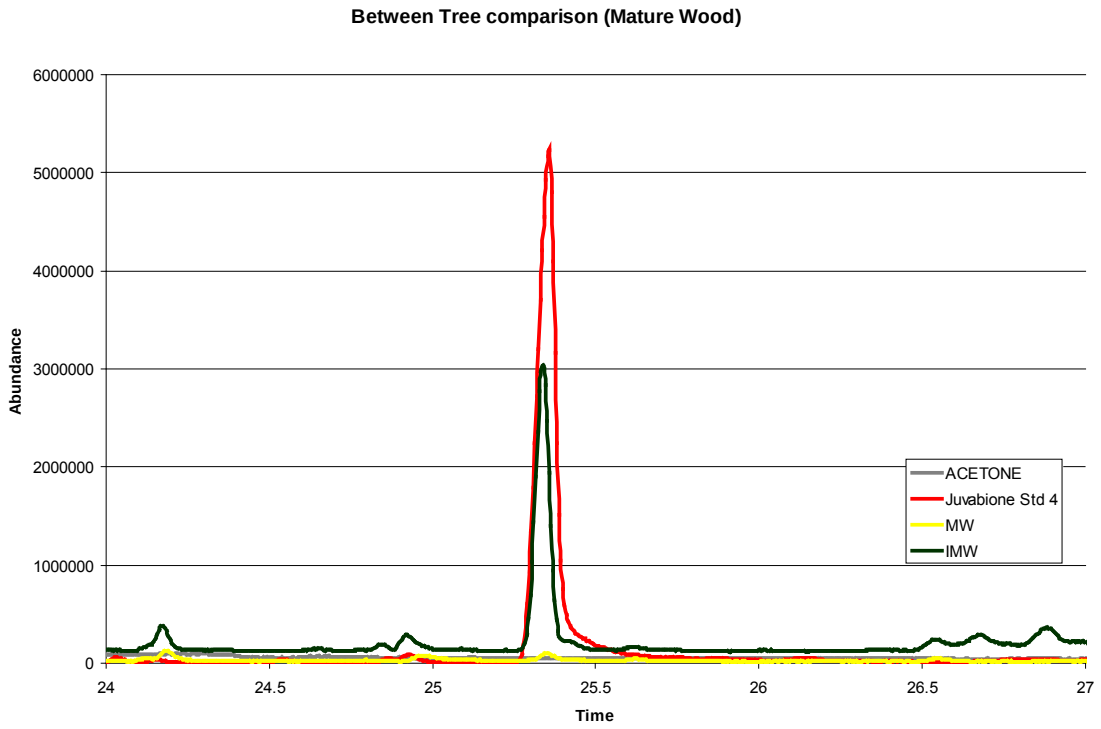


Figure 5. Chromatogram depicting peaks of relative abundance between the juvabione standard (red), MW (yellow), and IMW (green).

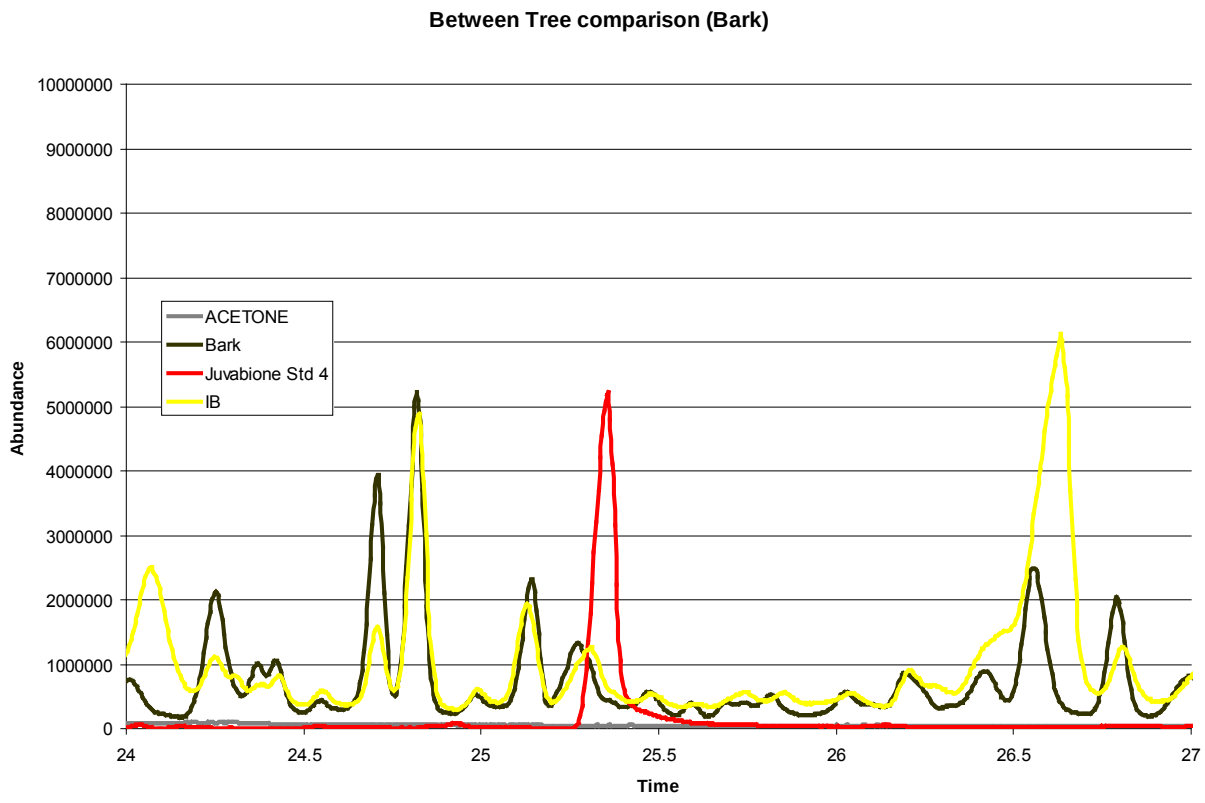


Figure 6. Chromatogram depicting peaks of relative abundance between the juvabione standard (red), B (green), and IB (yellow).

Table 1. Average days spent in each life stage by *Tenebrio molitar* treated with various compounds extracted from the wood of Fraser fir. *as of 5/2/2012, most are still alive 5/30/2012

	Days as larvae	Days as pupae	Days as adults*
JW average	36.2	6.3	30.5
IJW average	38.7	6.9	27.4
MW average	37	5.9	30.1
IMW average	43.3	8.6	21.1

B average	40.7	7.5	24.8
IB average	40.9	8.8	23.2
Acetone average	37.7	6.7	28.6
Control average	38.8	7.5	26.7

D. Beneficiaries:

This proposed research addresses stated needs of stakeholders within the Christmas tree industry. A workshop was held in June 2003 in Boone, North Carolina to discuss the "Pest Management Strategic Plan for Christmas Tree Production in North Carolina, Tennessee, and Virginia." A summary of the workshop can be found online at: http://www.ipmcenters.org/pmsp/pdf/NCTNVAChristmasTree.pdf. Under the section, "Critical needs and priorities…," the first stated research priority was "need research to determine host plant resistance to and chemical control of balsam woolly adelgid" (page 8). Under the section for pest-by-pest profiles of major insect pests, for balsam woolly adelgid, research need #1 related directly to host resistance of Fraser fir to BWA.

The utilization of genetically resistant Christmas trees is a relatively inexpensive solution to a difficult pest problem. This will minimize adverse environmental effects from the pest and related management strategies. In addition to improving the existing situation for Christmas tree growers (production agriculture), this research is also applicable to the native stands of Fraser fir, which exist only as mountain top populations in VA, TN and NC, and where over 95% of mature trees were killed shortly after the initial infestation of BWA in the 1950s.

This research addresses stated needs of stakeholders within the Christmas tree industry: "need research to determine host plant resistance to and chemical control of balsam woolly adelgid" (http://www.ipmcenters.org/pmsp/pdf/NCTNVAChristmasTree.pdf).

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E. Lessons Learned:

- We had reasonable success in stimulating BWA to insert and we are in the process of evaluating sheath branching. However, the problem with mold requires that we use antimicrobials in future trials, which may influence feeding.
- Protease activity was not present in whole ground BWA, however we did observe peroxidase activity.
- Inoculation techniques are best performed at 20˚C.
- Juvabione is present at significantly higher levels in infested than healthy Fraser fir trees.

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(Previously Approved)
Project Title: Pilot Mountain Foods: Developing a local food movement for the greater Winston Salem area

A. Project Summary and Approach

Participating farmers with Pilot Mountain Pride were able to move produce such as strawberries, squash, zucchini, cucumbers, potatoes, basil, tomatoes, cabbage, watermelons, beans, red peppers, green peppers, jalapeno peppers, cayenne peppers, table grapes, apples, peaches, fresh cut flowers, okra, sweet *corn,* broccoli, and sweet potatoes through the center. Approximately 85% of the produce brought to the center was of such a quality that PMP was able to move it to end users. The remaining 15% was returned to the farmers and they received consultation from PMP staff on how to improve the quality of their produce to satisfy end users. These farmers had to find other markets for this remaining produce. End users to date include Lowes Food Stores, Noble's Grill (Winston-Salem), Fabian's (Winston-Salem), Mary's Of Course Cafe (Winston-Salem), Milner's (Winston-Salem), Meridian (Winston-Salem), New South Cafe (Winston-Salem), Trio (Mount Airy), Fletchers (Dobson), Harvest Grill (Dobson), Tlaquepaque Mexican Restaurant (Dobson, Mount Airy, Pilot Mountain), Chile Verde Mexican Restaurant (Mount Airy), Neighbors Food Stores, Mount Airy Country Club, and Surry County Schools. Produce was also moved through outdoor markets set up by PMP in Dobson and Mount Airy. Starting in late June, PMP opened an on-site market on Fridays for the general public in Pilot Mountain.

The overall impact to date has been positive with the opening of markets that did not exist this time last year. The volume of the types of produce through the center has been lower than anticipated. Primarily, this has been due to unusually high temperatures this summer and inconsistent rainfall. The first item to move through the center was strawberries grown from a single farmer. The quality associated with these strawberries was mixed; Lowes Foods rejected the load PMP sent to them. The farmer picked the strawberries too ripe which would not allow them to move through Lowes Foods distribution process. In order to move them, PMP assisted the farmer with direct sales through impromptu markets located around the county in heavy employment zones. It provides those associated with PMP a learning experience about grading and accepting substandard produce. This project is as much about educating farmers in regards

to quality; immediately our farmers were able to learn much about expectations. PMP's first shipment of squash, zucchini, and cucumbers to Lowes Foods was perfect in respect to quality and the three stores in Winston-Salem, King, and Mount Airy that carried this produce quickly sold it. Additionally, the first deliveries to the other end users identified above were of good quality. In June, PMP provided enough quality volume to Lowes Foods that is was carried in 15 stores in the greater Winston-Salem area. By late July, PMP was providing Lowes with enough sweet corn to service all 110 of their stores. Starting in late September, PMP started receiving shipments of sweet potatoes which is estimated to be its largest volume product. However, Lowes Foods was unable to purchase the vast majority of the sweet potatoes. Therefore, PMP directed its farmers to take their sweet potatoes to a processor in eastern North Carolina who did purchase them.

PMP participated in a number of interesting events throughout the summer. On May 15th, PMP participated in the Yadkin Valley Wine Festival using the event to launch the PMP brand by giving out promotional items and providing strawberries for the food service vendors. On July 10th and 17th,PMP held impromptu outdoor farmers markets in front of the Lowes Foods stores on Robin hood Road in Winston-Salem and at their store in Mount Airy. Lowes allowed PMP to sell produce directly to customers on these two occasions. On September 11th, PMP gave away produce at the 2010 Celebrating Agriculture event at Fisher River Park in Dobson. This is a regional event that occurs each year and saw an increase in attendance this year due to it coinciding with the Blue Ridge Parkway 75th Anniversary Weekend which was held in Surry County and Carroll County, VA. PMP will be participating in the Harvest Festival at Shelton Vineyards on October gth and gth. Shelton Vineyards has asked PMP to participate by selling pumpkins and apples during the event.

The Buy Local Campaign was a real success this summer with radio spots airing on WIFM in Surry County and WSJS in the Winston-Salem/Greensboro market. The promotion with WSJS included three one hour interview segments during the 9:00am hour with their morning personality. These segments took place in July, August, and September. Television spots began airing June 28th and ran through September 19th on WXII in Winston-Salem. Newspaper ads ran bi-weekly in the Mount Airy News this summer promoting the onsite market each Friday at PMP. An ad for the market was also placed in Yadkin Valley Living, a regional lifestyle magazine. Copies have been enclosed with this report. Utilizing these various forms of media allowed PMP to gain name recognition in the region.

A significant portion of this grant was used for construction of the Forced Air Cooler, which was completed in September. The cooler was designed by NC State University who consulted with our local Cooperative Extension Office.

This project was conceived by recognizing that local farmers were not accessing local markets, including schools, restaurants, and supermarkets in our community and that a rising awareness of local food choices presented a new marketing opportunity for area produce growers. Therefore, local officials began planning for an agricultural consolidation center, GAP education process, and marketing program that would address these issues and provide the necessary infrastructure to enter these markets.

B. The objectives of this project.

1) Establish a facility where farmers can wash, grade, and pack fresh local foods for distribution within Surry County and the Triad region; 2) Establish a marketing intermediary to aggregate farm-based production for sale and distribution to local-area buyers; 3) Develop increased awareness of local food purchasing options among area businesses and consumers; and 4) Educate and train local farmers on best practices for accessing local markets, including establishment of GAP at the farm level and at the agricultural packaging and distribution facilities.

C. Goals and Outcomes Achieved

1) Goal: Farmers receive increased educational training in post-harvest handling and Good Agricultural Practices.

Performance Measure: Farmers attend workshops and training at the center with targeted educational programming.

Benchmark: Few farmers in the area have received GAP training or other food safety instruction.

Target: 50 farm operators receive training in the first year of operation, with 10% working towards full GAP certification.

Outcome: Approximately 70 farmers received GAP training in the spring and fall of last year. The training was coordinated by Surry Community College, Cooperative Extension-Surry Center, and Pilot Mountain Pride. Funding was secured by the College through a Project Skill-up grant that funds worker retraining programs. The GAP training was sold as a program that retrains farmers.

2) Goal: Area farms increase sales and distribution of produce to area institutions.

Performance Measure: The marketing intermediary, Pilot Mountain Foods, establishes sales accounts with Surry Community College, area school systems, and other institutions.

Benchmark: These institutions do not currently seek out or source locally grown foods. Target: Area institutions source more than $100,000 in local produce from the marketing intermediary in its earliest stage of operation.

Outcome: End users to date include Lowes Food Stores, Noble's Grill (Winston-Salem), Fabian's (Winston-Salem), Mary's Of Course Caje (Winston-Salem), Milner's (Winston- Salem), Meridian (Winston-Salem), New South Cafe (Winston-Salem), Trio (Mount Airy), Fletchers (Dobson), Harvest Grill (Dobson), Tlaquepaque Mexican Restaurant (Dobson, Mount Airy, Pilot Mountain), Chile Verde Mexican Restaurant (Mount Airy), Neighbors Food Stores, Mount Airy Country Club, and Surry County Schools. Produce was also moved through outdoor markets set up by PMP in Dobson and Mount Airy. Starting in late June, PMP opened an on-site market on Fridays for the general public in Pilot Mountain.

3) Goal: Public awareness of availability of local produce increases and consumers know where to source local specialty crops.

Performance measure: Through informational marketing at local institutions, all students, faculty and staff at Surry Community College and participating school systems are introduced to local specialty crops on cafeteria menus and know where to buy local specialty crops for home consumption.

Benchmark: Awareness of local food availability is underdeveloped in the area. Target: All students, faculty, and staff at area educational institutions know about availability of local foods and have access to it.

Outcome: A Buy Local Campaign was executed in 2010 utilizing print media, radio ads and dedicated programs, television commercials, and web presence. Examples of the Buy Local Campaign are attached herein. The campaign will continue into 2011 with funding already identified and secured.

The plan was completed and implementation began immediately. The plan was utilized on the construction side by architects and contractors. PMP staff utilized the plan in developing the first markets served by PMP in the spring, summer, and fall of 2010.

Activity 1 The actual facility manager during the first season was Bill Imus; Charles Boles worked in an advisory capacity due to health issues. Both gentlemen worked diligently with farmers, Cooperative Extension, and customers.
Activity 2: Production meetings actually started in mid-December 2009 and continued on a monthly basis until April 2010. This included field training related to specific crops as well as classroom-style meetings to assist farmers in determining the types of produce they could plant and grow. One large component was encouraging staggered plantings to promote better produce diversity throughout the season as well as providing certain varieties when their market values would higher due to limited supply.
Activity 3GAP and food safety training was held in March and April, two separate classes to better accommodate farmer schedules. Approximately 50 farmers participated most of whom sold produce through PMP's program. Cooperative Extension worked with a representative from Virginia Tech in putting together the training courses. This individual was an expert in the field of GAP.
Activity 4: Markets were developed with Lowes Food Stores, Noble's Grill (Winston-Salem), Fabian's (Winston-Salem), Mary's Of Course Café (Winston-Salem), Milner's (Winston-Salem), Meridian (Winston-Salem), New South Café (Winston-Salem), Trio (Mount Airy), Fletchers (Dobson), Harvest Grill (Dobson), Tlaquepaque Mexican Restaurant (Dobson, Mount Airy, Pilot Mountain), Chile Verde Mexican Restaurant (Mount Airy), Neighbors Food Stores, Mount Airy Country Club, Surry County Schools, Country Folks Produce (Pilot Mountain) and The Depot Restaurant (Dobson).

Activity 5To date, participating farmers with Pilot Mountain Pride have been able to move produce such as strawberries, squash, zucchini, cucumbers, potatoes, basil, tomatoes, cabbage, watermelons, beans, red peppers, green peppers, jalapeño peppers, cayenne peppers, table grapes, apples, peaches, fresh cut flowers, okra, sweet corn, broccoli, and sweet potatoes through the center. Approximately 85% of the produce brought to the center was of such a quality that PMP was able to move it to end users. The remaining 15% was returned to the farmers and they received consultation from PMP staff on how to improve the quality of their produce to satisfy end users. These farmers had to find other markets for this remaining produce.

ctivity 6Starting in late June, PMP opened an on-site market on Fridays for the general public in Pilot Mountain. The market closed for the season just before Thanksgiving. Results were lower than expected. The center's location was not as desirable for a retail-style market.

Activity 7: With the close of the Friday markets it became apparent that due to PMP's location access to the public was limited due to visibility. Many felt the market was a good idea but time and location were issues. Additional markets for produce sales will be needed in 2011 due to PMP's heavy dependence on Lowes Foods this past season. To that end, PMP has started working with Aramark and The Fresh Market to establish relationships for 2011 and beyond. To date, these meetings have been very productive. Aramark is awaiting our GAP certification and The Fresh Market is the in the process of setting PMP up as a vendor. Additional customers are actively being sought via PMP's marketing efforts. Additional equipment is needed in 2011 to assist with efficiency needs at PMP. Agencies such as Surry County, the Appalachian Regional Commission, and USDA are interested in receiving applications and requests from PMP in early 2011 to partner on these needs.

Activity 8:Additional GAP classes were being planned for winter 2011 to allow new farmers to participate with PMP's consolidation and marketing programs.

D. Beneficiaries

- 53 participating farmers sold local produce through PMP.
- Consumers in the greater Winston-Salem area were exposed to opportunities in purchasing local produce from PMP by way of our Buy Local Campaign.
- Five individuals found seasonal employment working for PMP during the months of May through December.
- Local restaurants, schools, Lowes Foods customers, and farmer market shoppers had the option of purchasing seasonal produce grown locally.
- The Town of Pilot Mountain and Surry County received a great deal of press and goodwill for their participation in creating an environment where PMP could be established and operate. The community as a whole has been very supportive of the project as was evident during the Grand Opening celebration which was attended by over 300 locals on May 20, 2010.

E. Lessons Learned

During the entire year, the following issues were identified:

- It was estimated that packaging costs would be in the $10,000 dollar range for this year. However, to date, packaging costs have been approximately $25,000 with packaging yet to be purchased for sweet potatoes. Grant

funding provided $5,000 with approximately $8,000 being paid by participating farmers (they are charged $1 for each box used to package their produce). This has not covered close to half of the costs. PMP believes that this is due to the average price of a produce box being well over $2 and the cost of doing business with Lowes Foods being higher than with other users. As an example, Lowes required that sweet corn be delivered in crates rather than bags. PMP incurred costs in the neighborhood of $18,000 buying crates rather than bags which could have been considerably less. When PMP's season ends around the first of November, all involved will develop a plan for lowering the costs of packaging.

- In May and June, PMP accepted product that it could not distribute due to quality issues. This was directly related to inconsistency in the grading of the produce at the center. This issue was anticipated as a part of the startup process and the training of staff. By the first of July, PMP was doing a much better job of grading and accepting produce with there being little to no loss of product accepted. The total value of lost product during the first two months of operation was in the range of $3,000.
- During the first two months of operation PMP's director had too many part-time laborers working at PMP. In hindsight, the volume of produce coming in did not support the amount of labor being utilized. Beginning in August, part-time labor was trimmed to include only one individual who works on an as-needed basis. PMP ran through more of its budget earmarked for part-time labor than necessary and is now having to work through high volume days with its one full-time employee. This issue, to some degree, can be chalked up to the unknowns of operating PMP in this first year.
- When construction of the forced air cooler commenced it was discovered that the estimated cost was woefully inadequate. The estimated cost was in the $15,000 range but actual costs were in the $50-55,000 range. We requested a budget amendment in July from NCDA and the Tobacco Trust Fund to allow us to utilize funding for this cooler.
- By the end of this season approximately 85%-90% of PMP's produce will have been sold to a single customer, Lowes Foods. During the later summer months, PMP was able to build a good cluster of local restaurants who were buying from PMP but they only accounted for a small percentage of PMP's overall business. Ideally, PMP does not want to be so dependent on one customer so continued market development will be necessary in the fall and early next year. To this end, at the time of this report, PMP was in discussions with Aramark to provide produce for their food service contract at Wake Forest University. If this arrangement goes well, Aramark could allow

PMP produce into other higher education institutions in the region such as Winston-Salem State University, Salem College, Elon University, and the University of North Carolina School of Arts, just to name a few.

F. Contact Persons

Chris Knopf, Surry County, 336-401-8390

Bryan Cave, NC Cooperative Extension-Surry Center, 336-401-8025

G. Additional Information

- News Articles and ads
- Economic Impact Analysis, Wake Forest University, Calloway School of Business
- Photos (CD)
- Search "Pilot Mountain Pride" on You Tube for great video segments about PMP and some of their customers

pilotmountainpride

A local food movement

MARKETING RESEARCH FINAL PROJECT- PILOT MOUNTAIN PRIDE

Arenschield, Jim

Corso, Anthony

Verga, Andrew

Webber, Curt

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Ex hibits A-C

I. Executive Summary

To fulfill the project requirement for a Marketing Research class, a group comprised of four MI3A students at Wake Forest Universities Schools of Business Dim Arenschicld, Anthony Corso, Andrew Verga and Curt \"\lebber] chose to perform a Market Research Analysis for a non-profit community organization, Pilot Mountain Pride (PMP).

"Pilot Mou11tai11 P1ideJellieS as all aggregatio11 po1i1tfor Sm7J'· Stokes a11d Fo'!)·th colm!J· IJJid-si;;:,ad farners O plati11g tbe/JJ ill t'OIItact 11ith area restaum11ts. retoile1:r a11d i11stilutio11S in need offruh locai!J gro1vn prodm'l!. Pilot Mountain Pn'de taku t/JJ1(1)' the challmge of poor n arketing acass due to 111eak ilifraslmc1mll and places n id-sized formers into cv/1/petitive!J· plic'l!(/lotal distn'bution."

We set up an initial meeting with the Surry county economic advisor, director of PMP, and economic analyst for the state of lorth Carolina to gather background information, address areas of concern for PMP and establish the scope and timeline for the project. pon completion of the initial meeting we wem to work on creating a sun·ey for the farmers involved with PMP that was designed to address the concerns of PMP's management team. After numerous rounds of pre-testing the sun•ey, we administered the survey during the November I'' PMP farmers meeting in the Surry County Extension Office in Dobson, NC where 18 of the 54 farmers were in attendance. The sun·ey was administered witll a paper and pencil response so manual inputs were required to analyze the data and run the proper analysis techniques. A week after the initial sun•ey was administered, we asked for a list of fanners to contact in an attempt to conducted in-depth interviews. \'Ve were given a list of ten farmers, however after multiple phone calls we were only able to get in touch with two of the farmers. Final steps included summarizing the data, observational research and intern iew responses to create a final report for PMP, as well as writing a final paper and presenting our fmdings for class erecl.it in Marketing Research.

II. Initial Meeting Recap

On Monday, September 2Q•hour team met with tl1e following people regarding the Pilot Mountain Pr.ide project:

- Chris Knopf, Assistant Cow1ty l\Ianager, Surry County
- Bryan Cave, Cooperative Extension directOr in Surry County
- Darren Rhodes, chief planner, division of commun.iry assistance, NC Department of Commerce

- Jared \Vtener: economist, division of policy, research, strategic planning, NC Department of Commerce
- William Imus: facility coordinator for Pilot Mountain Pride
- Stan Mandel, Executive Professor, \'\lake Forest University

Mr. Cave and Mr. Knopf proceeded to describe the Pilot Mountain Pride project as a local grower co-op with close tics to sustainable agricultural practices. Most of the farmers that participate in the program own small acreage farms, and as such have limited distribution capabilities regarding their crops. We were gi,·en a thorough explanation of the ways the program helps these small farmers obtain maximum value for their crops while encouraging the adoption of more advanced fanning techniques through the GAP certification probrram.

It was agreed upon that our project's main focus would be understanding retention factors for the program. In addition, the group also wanted to know what positive effects the program has on the lives of the families involved, if the project has or could have any effect on influencing a new generation of farmers to participate in the program, as well as how the program was perceived by the participants. I\fany small fam1ers in the in1mediate area are due to "age out" soon and gaining program buy-in will be crucial to its sustainability.

\'Ve agreed to meet the farmers at d1e next quarterly meeting to be held on November 1" at the Surry County Cooperative Extension, where we planned to distribute and collect the approved surveys. \'Vc would also be available w answer questions and address concerns.

III. Survey Questions & Regression Analysis

The interview guide was created using a Likert scale ratings to help standardize d1e response process and allow us to run regressions against various questions, the survey that we administered on November 1" is listed as Exhibit B.

Data Analysis

Regression was used to determine the fncrors that have the greatest impnct on retention in Pl\IP. The following analysis is bnscd on the strength of the T-stats and r-squared statistics from the resulting rebrression outputs as well as interpreting the means and standard deviations of the variables. All variables were compared individually to the

likelihood of participating in PMP in the coming year. The following will focus on three areas that, from the outputs themselves, have been defmed as strong indicators of retention and/or the variables' standard deviations are small.

Perception

#	T	R"'2	M	SD	Question
8	3.11	0.38	3.56	0.86	PMP is a well run organization
9	2.81	0.33	3.44	0.98	PMP is effective at selling produce
3	2.41	0.27	4.22	0.53	PMP is sustainable

Several questions in the survey were asked in order to gauge the participants' perception of P IP. Three of these questions gauged the perception ofPNUJ's ability to sell produce for the farmers, the perception of PNW's susrainabiliry and how well-run Pl\0) is perceived to be. All three of these questions resulted in T-stats of 2.8, 2.-1 and 3.1 and r''2 of .33, .27 and .38 when a regression was run against the likelihood of participating in PN!P in the upcoming year. These were the best statistics from the survey responses and according to the results they arc the best indicators of retention. Even though question 3 has the lowest T-stat of these three variables, making it less likely io determine retention, it *is* still a strong sign of positive perception. This is due to the fact that the mean is the highest of all variables and the SD is very small.

Compensation

Q#	T	R"'2	.M	SD	Question
11	2.30	0.25	3.06	0.87	my income has increased
4	2.16	0.23	4.00	0.77	Profit sharing agreement is fair for both parties
5	2.12	0.22	3.67	0.84	I am satisfied with compensation

Th ree questions &om the survey deal with compensation. W/e asked the farmers if they arc satisfied with compensation, if their income has increased due to thcir participation and the level of fairness of the PMP agreement to both parties. \XIhcn regression was used on these three factors against their likelihood to participate in PMP next year the resulting T-stats and r''2 were between 2.1 and 2.3 and .22 and .25 respectively. Due to the fact that the t-stats of

these three variables are greater than 1.96, they arc all strong predictors of retention. This information is preu:y logical since typical brokers take 40% commission compared to the 20% that PMP receives.

GAP Training

Q#	T	R''2	M	SO	Question
13	1.01	0.06	3.28	1.07	GAP training by PMP was primaxy reason for joining
15	0.69	0.03	4.06	0.42	I will use what I learned in GAP on other crops
14	0.54	0.02	4.00	0.69	GAP training was valuable to me

Three questions were asked that were relevant to the GAP training offered to PMP farmers. We asked if GAP was primary reason for joining, if they would usc GAP on other crops and how valuable GAP training is to the farmer. \XIhcn regression was run on these variables against the likelihood of participating in PMP in d1e coming year we found some surprising results. The T-stats were 1.01, .69 and .54, with an r''2 of .06, .03 and .02 respectively. The regression leads us to believe that me GAP training was not highly rated as one's reason for joining PMP, since the regression resulted in a fairly low T-stat and a high standard deviation. This docs not indicate mat GAP training is not valuable, ramer this could be d1at the farmers did not know enough about GAP for it to be a primary reason for joining. The data docs express the importance of GAP to the f:trmers and their intention to use what they have lcamcd from GAP on other crops. \'\lhile ncid1er of these vnriables is considered a great indicator of retention, the informacion gathered will be very useful to PMP. 13oth variables have a mean of at least 4 and relatively low standard dev.i:ttion. The participants are generally very likely to use what they learned in GAP training on other crops and consider GAP to be very valuable.

Non-Factors In Retention

Q#	T	R''2	M	SO	
12	1.15	0.08	2.50		More free time
17	0.79	0.04	3.39	1.2	Don't want PCvIP telling me what to grow
20	0.52	0.02	3.50	0.7	Interested in farming apprenticeships

Having more free time, giving up control of which crops to grow and interest in apprenticeships arc all considered non-factOrs in retention. The low means, high standard dev-iations and very low t-stats all inrucate that these three variables arc not inrucarors of retention. \Vhen comparing the outputs from question 12 (more free time) and question 11 (Increased income) it is apparent that the farmers are working just as much and just as hard as they were before being a part of PMP. They are making more money, due to the favorable terms of tl1e brokerage agreement and tl1e outcome of GAP training. The farmers are nor, however, taking time off but are effectively putting just as much time and money back into their business.

The near future

T	R^2	M	SD	Q#	
4.36	0.54	3.67	1.03	16	Plan to increase acreage fot PMP crops

\'\/hen the participants were asked if mey planned to increase acreage for Pl\fP crops me average response was 3.67 with a standard deviation of 1.03. When a regression was for likelihood of returning against acreage increase the resulting t-stats and r"2 were the highest of all at 4.36 and .54 respectively. \Vhile it would be great to know how much mer hope ro increase, it is a great sign to see mat the participants mat intend to continue with Pi'vfP also intend to increase the acreage that mey designate.

IV. Interview Takeaways

Our secondary data collection metl1od was in-depth interviews. Given the small population size and general consistency of the survey data, we felt that in-depth interviews could provide us wim canrud opinions perhaps undetected by our survey questions. \Ve requested the names and phone numbers of 10 PMP members to conduct 30 minute phone interviews.

The interview guide was created using me analysis of our survey data, Ex hibit A lists the questions we asked. Altl1ough our regression analysis revealed several signHicant factors in the decision to "participate next year," we suspected that there were adrutional factors still to be sought out. Specifically, we observed at their meeting some

discontent about varying qualities of produce and a general lack of consensus about planting dates. Their discussion seemed reserved. \Ve decided that our interviews should be com·ersational and have a casual air in order to encourage honest, forthcoming opinions from the farmers. \Ve kept our written questions broad and let the conversation rake its course.

The interviews shed some light on both the positive and negative aspects of PMP's program. Overall, the respondents were pleased with their experience and intend to continue working with PMP next year. They all seemed to be granting PMP some operational leeway since it was the first year of the program and it is basically a non-profit entity.

However, the rwo points of contention we observed in the meeting did come tluough as true concerns in the interviews. Each farmer decided individually whether they would use plastic over their seed beds or not, they chose their own fertilizers, etc. This led to varying qualities of produce between farmers, but all were paid the same amount per pound. The farmers that made the extra investment for plastic sheeting were not rewarded for it. Tlus *is* a reasonable complaint and one that PtvfP must address before next season's crops are planted. There arc two ways to solve this problem. First, Pl'viP could require aU participating farmers to adopt the same methods (e.g. all use plastic sheeting and the same kind of fertilizer) wluch would hopefully result in more uniform quality. This method does not, however, allow farmers to decide for themselves how much time and money they arc going to im·est in their crops and could cause more people to leave the program. *1* safer, although more difficult option, would be for PMP to develop different customers for different qualities of produce. For example, high quality produce could be sold to grocery stores while low quality produce could be sold to a food processing company to be canned or used in other products. Operationally, the receiver at the PMP warehouse will ha,e to perform a quality inspection and assign a price upon delivery. This is a f;tirly standard practice in the agricultural industry and the farmers will ftnd rhe process familiar. By distinguishing between different qualities of produce and setting prices accordingly, P1\IP will be incentivizing good farming practices (plastic sheeting, etc.) while still allowing the fanners to choose their own methods.

The second issue is planting dates. A general lack of organization tlus past season caused several farms to

hru.vcst the same crop at the same time. Whenever this happens PMP *is* forced to reduce their asking price in order to

move the extra produce before it spoils. Ideally, farmers would coordinate their planting dates so that tl1e harvests are staggered. PMP would then be able to keep a consistent supply at weir regular price for a longer period of time, instead of having 500 bushels of okra one week and none the next. Once again, this issue comes down to decision making power. The farmers want as much autOnomy as possible, but in order for the program to work certain decisions need to be made by PMP and then handed down to ilic farmers. Our interviews revealed that the farmers arc more willing to take direction from PMP on planting dates tl1an on farming mctl10ds. A good compromise between tl1ese two parties would be for Pl\1P to set a schedule of planting dates for each crop but allow each farmer to decide on their own fanning methods (e.g. plastic sheets, fertilizer, etc.).

V. Managerial Conclusions

The strongest indicators of future participation in ilie program were the farmers' perceptions of PMP as an organization. The farmers respect Pl\fP's management and believe mat the organization is a sustainable enrcrprise. PMP should keep its decision making processes transparent in order to maintain tlUs positive perception.

i\s for the two points of contention, produce quality and planting dates, PJVIP should feel confident that the decisions they make will be accepted by tl1eir farmers. As mentioned previously, we recommend that PMP conduct a quality inspection upon deli; cty of produce and set a price accordingly. Instituting this procedure will result in greater financial rewards for those farmers that made additional investments. Planting dates can either be assigned by PMP or drawn in a lottery.

In terms of attracting new farmers to the program, we recommend using testimonials about tl1e benefits of GAP certification. Although current participants found the GAP training extremely valuable, they did not indicate that it a reason for iliem joining. It was a true benefit for the farmers but one about which they were unaware when they signed up. We believe that telling fanners more about GAP up front will make the program seem even more artractive and lead to increased participation in Surry County.

Exhibit A - PMP Interview Guide:

'1. \\!ere you present at the meeting where we distributed our sun·ey?

2. Arc you continuing with PJ'vn> next year?

3. \Vhy or why not?

4. What did you like best about working wirh Pl\1P?

5. What did you like least about working with PMP?

6. Is working with PMP easier that trying to seU produce on your own?

7. Is working with PJ'vn> more lucrative than selling product on your own?

8. Any other thoughts or comments?

Exhibit B

prictc·

WAKE FOREST
UNtVERSt l'V

Please agree or disagree "th the following seucmcnts.

FARMERS YIEW OF PMP·

It was easy to work "th PMP.

2	3	5
Strongly disagree	Neither agr<'C nor diS"!,!'CC	Strongly <lgrt>c

PMP provided me with lbe infonnation and resources I needed to he successful in the program.

2	3	5
Strongly dis3grce Disagree	Ncnhcr agree nor dis3gree Agree	StrOngly 3!,>t"CC

PMP is a sustainable enterprise.

2	J	5
Strongly dis3g<ec Disagree	:-< 1thcr agree nor di :lj,'!Cc Agree	St rongly agroc

Tbe profit sh:oring arm n -:cmcnt be tween PM" and tbc farmers is fair for both pa rties.

2	3	5
Strongly dis3gree	Neither agree nor disagree Agree	Strongly agree

I am satisfied wi th the com pensation I received from PMP.

2	3	4	5
Strongly disagree Dis"'}rcc	Neither agre-e nor disagr<·c Agree		Strongly agree

PMP wus responsive to feedback I g:IVe the m a bo ut tbe program.

2	3	5
Strongly disagree Dis"!,-...CC	tcit hcr agree nor disaArcc J\grcc	Strongly agree

PMP has met my expectations.

	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strong!) agree

PMP is a well run organization.

	2	3	4	5
Strongly disag c	Ois"b'l"ee	i'\either agree nor disagree	Agree	Strongly agr<'C

FARMERS Y|EW OF CROP/INCOM E/P.EHSONAL TIME B/C OF PMP;

PMP *is* effecti;c at selling produce.

	2	3	4	5
Strongly disawcc	**Di agrcc**	**Neither agree nor di:;.agrcc**	**Agree**	Strongly agree

Pl\IP has suceessfully pushed our produce into the marketplace.

	2	3	4	5
Stronglr disagree	Disagree	**Neither agrc.-c nor tlis:1 -;rcc**	**Agree**	Strongly awcc

My income has increased as a result of participating in the PMP progr:.m.

	2	3	4	5
Strongly disagree	Disagree	i'\cither agn;-c nor disagree	**Agree**	Strongly agree

I have had more free time as a result of panicip:oting in the PMP progr:.nt.

	2	3	4	5
Strongly disaj,>rCc	Disagree	**Neither 4ЫГСС nor disagree**	,\ e	Strongly ag«-c

I wiU continue 10 participate in the PM P progmm.

	2	3	4	5
Strongly diugrcc	Disagree	**i'!cithcr ab'TCC nor disagree**	,\ e	SLrOngly agn-c

12 1 r ,, g c

FARMERS Yl EW OF GAP TRAINING/ADDITIONAL PMP BENEFITS:

Please agree or disagree with the following Stlltements:

The GAP training offered by PMP w:os the primary reason for my participation in the program.

2	3	4	5
Strongly disagree	Disagree	Neither agree nor di agrcc	Agree	Strongly agrec

The GAP training was Ylllullble to me.

2	3	4	5
Strongly disagree	DiS:Ij,'TCC	**Neither agree nor dis:1grcc**	Agree	**Strongly agree**

I will use wh:u I learned in the GAP training on other crops besides those I grow for PMP.

2	3	5
Strongly disagree	**Neither abnec nor disagree:**	**Agree**	Strongly agree

I plan to increase the amount of acre< ge I desi;..,.:uc for Pl'\'IP crops next season.

2	3	5
Stronglr disagree	Disagree	'either agree nnr <.hsOtgll'C	.\grec	**Strongly agree**

I don't want PMP telling me what to grow, I sbowd be able 10 choose whichever crops I w:mt.

2	3	5
Strongly di<31:rec	Disagree	Neil her agree nor dis" ;«"	Agree	Stronglr "!,'fee

QEVELOPING NEW RELATIONSHIPS/NEW FARMERS:

I wowd recommend that other farmers join I'M1>.

2	3	5
Strongly dis"";rcc	Neither agree nor disagree	Agree	Stronglr agr.'C

I think that PM I' is helping generate interest in f"nniog:tmODj,'I'<l youu: people.

2	3	4	5
Stronglr disagree	Disagree	Neither agree nor disagree	,\grcc	Strongly "!:""

I am interested in lellroiog about Fanning Apprenticeship programs.

2	5
Strongly disagree	Di<af:!t'C	**i'!cithcr agn·c nor disagree**	Agree	Strongly "!:fCC

Exhibit C: T-stat and r"2-Largest to Smallest

T	R"2	M	SO	Q#	Question
4.36	0.54	3.67	1	16	Plan to increase acreage for PMP crops
3.11	0.38	3.56	0.9	8	PMP is a well run organization
2.81	0.33	3.44	1	9	PMP is effective at selling produce
2.41	0.27	4.22	0.6	3	PMP is sustainable
2.30	0.25	3.06	0.9	11	my income has increased
2.16	0.23	4.00	0.8	4	Profit sharing agreement is fair for both parties
2.12	0.22	3.67	0.8	5	I am satisfied with compensation
1.97	0.19	3.39	0.9	7	PMP bas met my expectations
1.83	0.17	3.61	0.8	6	PMP is responsive to feedback
1.53	0.13	3.67	0.6	18	recommend other farmers joining PMP
1.52	0.13	4.00	0.8	[illegible]	Easy to work with PMP
1.48	0.12	3.89	0.9	19	PMP generating interest among young people
1.30	0.10	3.83	0.8	10	PMP has successfully pushed produce to marketplace
1.15	0.08	2.50		12	More free rime
1.01	0.06	3.28	1.1	13	GAP training by PMl) was primary reason for joining
0.84	0.04	3.56	0.8	2	PMP provided me with info and resources I needed
0.79	0.04	3.39	1.2	17	Don't want PMP telling me what to grow
0.69	0.03	4.06	0.4	15	I will use what I learned in GAP on other crops
0.54	0.02	4.00	0.7	14	Gt\P training was valuable to me
0.52	0.02	3.50	0.7	20	Interested in farming apprenticeships
		4.22	0.6	21	Likelihood of participating next year

Red = Negative Coefficients

http://www2.joumalnow.com/news/2010/jul/07/pilot-mountain-pride-helping-smaller-farmers-proce-ar-391375/

JOURNAL

Published: July 07, 2010

Pilot Mountain Pride helping smaller farmers process their produce as well as finding buyers

By Michael Hastings

A new company in Pilot Mountain is helping small and mid-size farms by providing a market for their local produce.

A new company in Pilot Mountain is helping small and mid-size farms by providing a market for their local produce.

Pilot Mountain Pride is set up as an LLC (limited liability company) owned by the nonprofit Surry County Economic Development Foundation. It consists of a distribution center in the former Amos and Smith Hosiery Mill building in Pilot Mountain.

About 52 farms, ranging from V.S acre to 40 acres, are starting to supply produce to the center to be washed, graded, boxed and shipped to local markets. Pilot Mountain Pride also finds buyers for the produce.

"Farmers love to grow produce. They don't necessarily love to sell produce," said Bryan Cave. the director of the Surry County office of the N.C. Cooperative Extension Service.

Cave and Chris Knopf, the assistant manager of Surry County, have been working on the idea for about seven years. Both were interested in ways of supporting agriculture, which makes up 25 percent of the county's economy. The idea really started to take shape in 2007 when the two men were involved with N.C. STEP, a statewide revitalization program for small towns.

"We had two things in mind," Cave said. "One was diversifying agriculture. Tobacco growing is tailing off. We were looking for a way to diversify farms. The other thing was getting young people back into agriculture."

Pilot Mountain Pride gives 80 percent of its revenue back to farmers. The other 20 percent goes to supplies, labor and other costs.

The company has four employees. All the farmers receive free food-safety training, and the company

keeps detailed records so that aU the produce can be traced.

Charles Boles. the director, said that gross revenue is up to $8,000 a week. "And it's increasing every week," he said. "About 60 acres of corn is going to be harvested in a few weeks."

Boles helps fanners fmd buyers, and he helps farmers learn to grow new crops and extend their growing season. Farmers growing squash, for instance, are encouraged to plant broccoli in the fall. The company hopes to be in operation about 10 months of the year. And Boles said that it is on target to reach $250,000 in gross sales in the first year.

Knopf and Cave were able to get significant grants and other help to get the project started. Surry County loaned the town of Pilot Mountain money to buy the building used for the center. The town in turned leased it to Pilot Mountain Pride free for the first three years. Part of the building is a satellite campus for Surry County Community College. Wake Forest University School of Law provided legal services.

The Golden Leaf Foundation provided $100,000 to renovate the building and $90,000 for equipment. The N.C. Departmen t of Agriculture provided $28,000 for marketing and supplies.

The company got $75,000 from the North Carolina Tobacco Trust Fund and $75,000 from N.C. Rural Center to pay for a cooling system and other needs. And the Surry County Farm Bureau board provided about $33,000 for a truck, wash line, ice machine and scales.

Boles said that the company may need some more grant money, but his goal is to make it self-sustaining by about this time next year.

For buyers, Boles has been approaching restaurants, hospitals and retail stores. He was fortunate to get interest from Lowes Foods, which has been buying almost all of Pilot Mountain Pride's produce to date. Lowes displays the produce in Winston-Salem and other area stores along with the Pilot Mountain Pride logo so consumers will know that they are getting local produce.

On July 10 from noon to 4 p.m., Pilot Mountain Pride will hold a farmers market outside of the Lowes Foods on Robinhood Road.

The company also has sold produce to restaurants and Surry County schools. It trucks food to a market at the Surry County Government Center and Farm Bureau office in Dobson on Thursdays. and Pilot Mountain Pride holds a farmers market at its own location for the public on Fridays.

The company has provided welcome relief to Darren Slate. He mainly grows tobacco, but the declining market has him worried about being able to pass the farm to his sons, 19-year-old lsaac and 23-year-old Zach.

"]want to keep my sons on the farm, but you've got to make some money," he said.

Slate has sold the company cabbage and will soon have corn and sweet potatoes. The company not only allows him to diversifY and have a guaranteed buyer, but it also gives him a good price. "I'd probably be getting $4.50 a (50-pound) box from a broker, but they're paying me $7.95." he said. "The market is what we've needed for years."

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Pilot Mountain Pride is open for business

by Mondee Tuley
05.21.10- 10:35 pm

PILOT MOUNTAIN —More than 300 people carne out Thursday night to celebrate the opening of the new Pilot Mountain Pride center that will provide local farmers with a way to distribute their produce for sale.

Pilot Mountain Mayor Earl Sheppard welcomed everyone to the event that was sponsored by the Greater Mount Airy Chamber of Commerce.

"We started this journey three years ago. It's just great to see what can happen when a community comes together. It's been exciting. We received the go ahead from Golden LEAF 13 months ago, next Thursday we will dedicate the community college part. I just have one thing to say. If it hadn't been for Bryan Cave (director of the N.C. Cooperative Extension) and Chris Knopf(assistant county manager for economic development and tourism) this would have never happened. They have done an incredible job. They knew the right people. This is a new beginning. I'm excited because I'm a farmer. This is going to be a new beginning for our young farmers," Sheppard said.

Cave introduced the manager for Pilot Mountain Pride, Charles Boles. Boles is best known for his many years as a horticulture instructor at Surry Community College.

"When we were looking around for someone to lead this center, we thought of Charles and he thought enough of the project to come on board and we are very fortunate to have him," said Cave.

Bill Imus will be the facility director.

"Bill is also a farmer just like Charles. He knows quality product when he sees it so we are glad to have him,'. said Cave.

David Haynes, a member of the Surry County Farm Bureau Board, presented Pilot Mountain Pride with a special gift – a truck.

"There are a lot of people across the state watching to see how this is going to turn out. Our board took money out of that $25 membership you pay to help promote this.,. Haynes said.

He said Surry County Farm Bureau purchased the wash line that was the

centerpiece of the event at the center for the opening.

"Well, we got the product, we've got the wash line, we've got the coolers, then we realized that we have no way to transport it. Surry County Farm Bureau has purchased the truck sitting in the parking lot to haul your produce to market," said Haynes who handed the keys to the truck to Imus.

Betty Ann Collins, executive director with the Greater Mount Airy Chamber of Commerce, introduced Pete Burgess from the North Carolina Tobacco Trust Fund Commission. He presented a check for $75,000 to the center.

"l1 1ere were a great number of projects submitted across the state. The Trust Fund did not have enough money to fund all of the projects that were submitted. We got to looking at the projects and this one really jumped off the page as something that is unique. It's going to help a Jot of people. It's going to help farmers. It's going to form a partnership between the farmers and the communjty," Burgess said.

Ted Lord, a representative with the Golden LEAF foundation, also made a presentation at the event. He said the foundation was formed in 1999 as part of a settlement with tobacco companies to help promote economic development in rural economically distressed areas ofNorth Carolina.

"We are particularly interested in helping those areas that were impacted by the decline of tobacco —northwestern North Carolina in particular. Our board decided last year that one way to do tills would be to promote local agriculture," Lord said. "Ultimately, it is farmers who will be the beneficiaries oftrus."

The center is working with 52 local farmers to get their produce out to the community and to Lowes Foods stores, which has agreed to purchase and distribute some of the produce.

Dick McKellogg, a representative with Lowes Foods, said in the future, everyone who was at the grand opening would look back one day to see how far things have come.

"I'm very excited about this opportunity for Lowes Foods. You all should be so proud to have the leadership in tills community that you have. For years we have tried to work with local farmers and it's a tough thing to get off the ground. This is a great business model. To help you understand why this is so important —the world we live in today has changed. Everybody is talking about how we need to get back to our roots and wanting to buy local, but it's not as easy as, 'Hey, I've got a neighbor, who's got a buddy who has some produce, can we pull up to your dock tomorrow and bring a delivery,'" McKellogg said. "Y'all go out and grow it and we will sell it."

Knopf said the idea for the center started in 2003. He said along the way, the center has gained many partners for whom the center would not exjst without their help. Knopf recognized Todd Tucker, president of the Surry County

Economic Development Partnership and Jan Critz, vice president of existing industry with the EDP, for their help getting the center started.

Cave said he was pleased to see the center up and running.

"We feel like there is just something about this project that seems to be working right," said Cave.

Boles explained what Pilot Mountain Pride is to the audience.

"Pilot Mountain Pride is 52 farms, not an individual. It's not this building. It's 52 farms that have made a commitment to produce quality product that we can ship and send out to the distribution center. We really want to thank Lowes Foods for the opportunity to partner with them to sell our product along with many other places that will be selling to." Boles said.

Boles, who grew up in Surry County on a tobacco farm, said agriculture is the largest industry in the state.

'·Agriculture has gone through many, many changes the years that I've lived in this county —all 58 of them. I've seen a lot of ups and I've seen a lot of downs. This project is one that has been unreal to me. Bryan calls it the perfect storm. It's a situation where everything comes together and you don't expect them to. We've had some bumps in the road, we expect some more, but you know the wheels haven't fallen off yet. It's been really great. All of our funding agencies have been great to us. Really what this project is about is a little man over there and his name is Logan Jarrell. So that little kid right there, if he has the desire, can stay on the farm. That's really what this project is all about. It's about being able to farm and do well in Surry County," Boles said as he asked all ofthe farmers present to stand up.

Knopf said the community law clinic at the Wake Forest University School of Law has provided nearly $50,000 in free legal services to help open the center.

Everyone in attendance got to dine on a meal that came entirely from Surry County including pork barbecue, bread from Harvest Time Bread Company, fresh salad greens, sweet potatoes and dessert made with locally grown strawberries.

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Farmers taking advantage of free GAP training

by Morgan Wall
04.15.10 - 10:13 pm

DOBSON – A $20,000 grant from the Tobacco Trust Fund has led a number of area farmers to take advantage of training classes with the N.C. Cooperative Extension and Surry Community College offered free of charge.

The college applied for the grant, which was designed to help people dislocated due to the decline in the tobacco industry as part of Project Skill Up through the NC Community College System. After talking with the extension office, SCC decided to offer Good Agricultural Practices training.

"It is a food safety program for the farm," said Bryan Cave, director of the Surry County Cooperative E>..'tension, of the training. "The class covers aU parts of food safety on the farm from an overview to a self-assessment to standard operating procedures."

The training helps farmers look at their individual establishments to determine what practices will be best for them as well as looking at potential problems that could arise and ways to prevent them.

The ftrst group of farmers have already completed the four-day, 16-hour training session while the second group started Tuesday night. In the first group, 29 farmers from I8 farms received training. ln the second session, there are 39 farmers representing 29 farms.

"We have just been amazed with the number of people interested," said Terri Cockerhall\ coordinator of personal enrichment programs and special projects.

"We were anticipating maybe 30 on a good day. This is working really well,'. said Cave.

According to Cave, there are several factors he believes may have led to such a big interest in the training. One of the reasons is the number of stories regarding food contamination. With the seemingly increased prevalence, farmers are trying to address the issue. Also, Cave believes farmers are doing it "because it's the right thing to do." In the next two to three years, buyers of fresh produce will most likely begin to require GAP training for their providers.

Another contributing factor is the impending launch of the Pilot Mountain Pride

organization. The organization will provide a place for local farmers to take their produce to be professionally washed, graded and boxed to be sold to institutions. Individual farmers for the most part cannot afford professional washing equipment, nor can they produce enough to satisfy an institution's needs. The organization will require participating farmers to have GAP training.

"It's a good time to do it. We have a good partnership with the college. It's been a pretty good deal all around," said Cave.

Cave also pointed out that the process is not a simple one, meaning the farmers have to be motivated to see it through. The global positioning system coordinates from each -participating farm are recorded and a record keeping and traceback system has to be established. The traceback system allows farmers to determine down to the row where a specific item originated in case there is an issue.

A certifier from the Department of Agriculture also has to visit the farm to look at the state of the equipment and help create a hazard analysis plan to address any needs at the start of the harvest season. Each plan is site-specific. If the certifier signs off on the GAP plan at a farm, it can continue with the harvest as scheduled. A Department of Agriculture representative can later make unannounced visits to the farm to observe, just as they do for processing plants and larger operations.

Contact Morgan Wall at mwall@mtairynews.com or 719-1929.

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prim

Local Foods initiative to benefit farmers and consumers starts with a 'pig pickin" May 20

05.13.10-08:19am

Surry County has announced the opening of the Pilot Mountain Pride (PMP) center. a local foods initiative that will benefit the entire community while increasing jobs and income on area farms.

Pilot Mountain Pride is an aggregation center for small to medium size farms, g]ving them access that they would not have otherwise to retail, service and institutional markets.

To kick off the event there will be a pig pickin'g from 6 - 8 p.m. Thursday, May 20, at 612 E. Main St., Pilot Mountain. The food served will be entirely local. To RSVP, call 786-6116 ext. 4 or e-mail membership@mtairyncchamber.org.

The new program is not a co-op; everyone has the same market share. The program is open to farms in the greater Winston Salem area. Currently 60 farms growing between one-quarter and 40 acres of produce are involved. AU participating growers must attend Good Agricultural Practices (GAP) training for food safety purposes. The cost of the training is being covered by PMP. The facility will also be GAP Certified.

PMP is an excellent opportunity for farmers because they are paid every other week which is 15 to 45 days sooner than they would typically be paid. Also one-half of the packaging cost is covered by PMP.

This is also a new opportunity for area restaurants, markets, schools and hospitals to purchase truly local produce. Typically, the produce in a grocery store travels an average of 1,500 miles. The PMP produce purchased will be grown less than 50 miles away. Local produce is important as it creates a much smaller carbon footprint. Because, for example, a tomato grown in California is picked green at least ten days before a consumer in North Carolina purchases it at the supermarket, local food has nutritional benefi ts and better taste. Another benefit is food safety. A piece ofPMP produce can be traced back to the farm and even the fi eld where it was grown. Buyers are encouraged to visit the farms and meet the farmers.

PMP is a business that was started by Bryan Cave, Surry County Extension and Chris Knopf, Surry County assistant manager. It is unusual that a government agency would start a business, but this venture, established by Surry County, will be self sustaining in two years. "Our market research, conducted in 2009, indicated a growing but urunet demand for a consistent supply of quality, local produce in the greater Winston Salem area," said Knopf. It is anticipated that the business will earn $250,000 in the first year and by year three earn close to $1 million dollars with 80 percent going back to the farmers.

It all began in 2003 when Knopf attended a mobile workshop showcasing local

foods efforts in Asheville area as part of a statewide conference on land use. Both Knopf and Cave had an interest in supporting agriculture, which makes up 25 percent of Surry County's economy. because Cave grew up on a small farm and Knopf's grandfather was a farmer.

In 2006, there was a need identified through the NC STEP program for a community agriculture center. From the Golden Leaf grant, the county secured a location, the old Amos and Smith Hosiery Mill building at 612 East Main St., Pilot Mountain. A feasibility study complete by Smithson Mills, an agribusiness consultant, indicated that the center would be sustainable.

"This project is about more than just fruits and vegetables," says Bryan Cave. "It is also promoting family time and education about how food is grown. It's about the value of agriculture to the community and about preserving a way of life and rural character."

This project is based on partnership and is intended to inspire other communities throughout the state. To date, PMP has received fi nancial assistance from the Golden LEAF Foundation, North Carolina Department of Agriculture (NCDA), and the Surry County Farm Bureau Board. Golden LEAF funded the recently completed up-to the agriculture center and awarded a second grant to PMP from its Local Foods Initiative. NCDA awarded grant that is being utilized for equipment, supplies, and labor. The Surry County Farm Bureau Board agreed buy PMP its initial round of equipment which includes a wash line, ice machine, and scales. Wake Forest University School of Law has provided legal services as an in-kind contribution to PMP.

For more information or to fmd out how to purchase produce, contact Charles Boles at (336) 401-1876.

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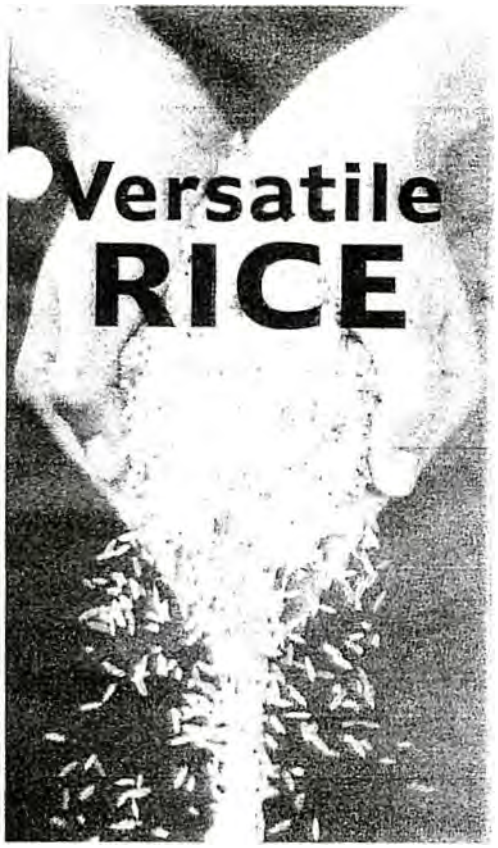
What is submitted in this final report is a copy of page 19 of the Yadkin Valley Living (YVL), showing the Pilot Mountain Pride marketing advertisement. The rice write-up was not relevant to the ad, and was a placement decision by the editors of YVL. During the conversion of this ad from print to digital the ad is unfortunately quite distorted. The ad was placed on the same page as something YVL had included in their magazine no SCBGP funds were associated with the rice article.



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. eptember has been ragged "National Rice Month" in celebration of the primary dietary staple for more than 1/2 of the worlds population. Americans consume an average of 25 pounds of rice per year. Farmers in Arkansas, California, Louisiana, Texas, Missouri and Mississippi produce 85% of the rice consumed in the United States. Rice is a f:.'Tear source of complex carbohydrates for energy with less than 100 calories per '/cup serving and no cholesterol, far or.gluren. Additional vitamins and minerals, such as folic acid, B vitamins, iron and zinc, are added to rice grown in the United Stares.

Rice can be found in several forms. Brown rice has only the outside non-edible hull removed leaving the nutrient-rich bran layers, a light brown color with a slightly che1..vy texture and a nut-like flavor. Brown rice is considered a whole grain. Regular milled white rice or polished rice is the most common form of rice with the outer hull removed and milled until white. Parboiled rice is the whole rice - has gone through a steam-pressure ,_..cess before milling which produces a firmer, more separate and fluffy grain.

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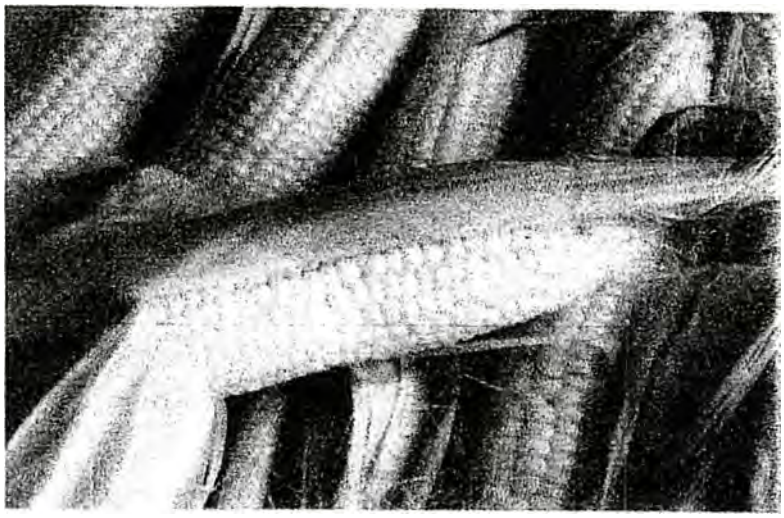

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2010 Career Technical Education Summer Conference
Agricultural Education Roundtable Session

Thursday, july 22,2010 • 8:00am to 10:00 am • Victoria A

1. g2 learning Center with Gabe Spencer
   Innovative greenhouse design with emphasis on green technologies

2. Agribusiness Management Trends and Issues and Horticulture II – landscaping with Horace Johnson
   Information and updates about the two courses

3. Japan Exchange Program with Allison Jennings and Dave Gibbs
   Highlights and benefits of an International exchange program

4. Completing Proficiency Award Applications with Jason Chester and Clark Adams
   Tips and ideas on completing award applications with success

5. Fund Raising and Community Spport with David Overcash and Laura Hoffner
   Ideas on creating local support and sustainability through partnerships and fundraising

6. SAE Tour in Johnston County with Bryant Wellons
   Ways to recognize SAE programs and raise awareness in your local community

7. NAAE Communities of Practice with Roger Teeple
   Connect with professionals from across the nation

8. Gearing up for Safety with Myron McClure
   Educating youth through agriculture safety curricula and raising their awareness

9. Biofuels with Andy VonCanon
   Discuss strategies for teaching biofuels with hands-on activities

10. Pilot Mountain Pride with Bryan Cave
    Learn how this community is helping local production agriculturists find new markets

11. Providence Grove FFA AlumniBarn Project with Amy Kidd
    Information on the completed projecr-andits benefits to the alumni, ag-ed program and community

12. Managing a School Farm with Chauncey Barber
    Gain insight into how to manage and operate a school farm

13. Ideas for Shop Projects with John Best
    Discuss ideas for student projects in the shop

14. Classroom Management with Tim Warren
    Learn strategies to manage your classroom effectively and efficiently

15. Hydroponics Systems with Jeremy Jones
    Learn about this production system and the local partnerships created

16. Working with the FFA Alumni with Ronnie Ansley
    Learn how to organize a local affiliate and discuss best practices for local affiliates

17. Harvest Connections "Help Haiti" Project with Dr. Phil Hamilton
    Gain insight into the program currently operating in Haiti and learn how your chapter can help

18. NCSU Agricultural Institute Update with Dr. Barbara Kirby
    Receive updates from the Agricultural Institute and learn how your students can benefit

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A local food ?JtOVement

Produce Market

Open to Public.

fridays S·am – 5 pm

(while supplies last)

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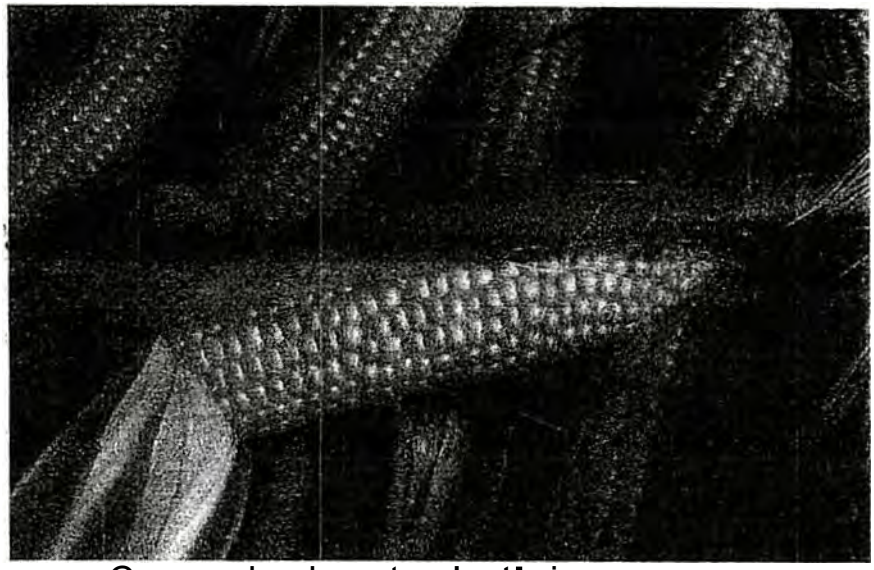

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Fnoay. July 2.2010

Local foods at grocers face formidable obstacles

Charlotte BusInonJoumoI • Dy V\lI! Boyc Start Writer

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Harris Teeter Inc.

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Large grocery chains say they're scrambling to keep up "ith demand for locally produced food. But they face a tough challenge. They require large volumes of inventory, and many local growers face limits in wbat they can supply.

Consumers are increasingly seeking food that's produced close to home. Food that doesn't bave to travel a long distance is regarded as safer, healthier and more environmentally responsible because it reduces the amount green bouse-gas emissions associated with transportation. Concerns about mass-produced food and greater interest in supporting small fanners have also fostered the local-foods movement.

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Tbe producers of local foods tend to be small-farm operators, wbicb means they face limits on the amount of product t1tey can supply to retailers, according to a report by the U.S. Department of Agriculture published in May. "For producers of local foods, it can be difficult to meet intermediary demands for higb volumes, consistent quality, timely deliveries and out-of-season availability," the report's authors conclude.

Tbom Duncan beads the local chapter of Slow Food, a nonprofit educational organization that encourages traditional ways of producing and preparing food. Duncan says tlte fundamental mismatch between the capacity of a local grower and demands of a large retailer makes the relationship difficult at best.

"These guys arc big players and they deal witb big volumes, and tbe smaller, local agricultural growers arc not playing on that level,• be says. The grocers' business model is "to move a lot of food and get a cheap price for it."

Despite tbat tough issue, some of tbe region's largest grocers are trying to find ways to put more local food on the shelves.

Matthews-based Harris Teeter Inc. offers locally grown produce "pending seasonality and availability," says spokeswoman Catherine Renhl. The company must be able to secure a sufficient supply of any product to meet demand and may bave to souree from different areas to keep certain products available.

Reub says Harris Teeter sourees upward of five dozen locally grown items, depending on the season and supplies. The grocer tags produce grown within the state with a "Locally Grown" label. A "Regionally Grown" htbel indicates the item bas traveled six or fewer hours to tbe store.

"Supporting locally grown products is another way Harris Teeter can slay true to its pledge to provide a wide variety of the bigbest·quality products wbile helping improve the environment and local economies," Reub adds.

In North Carolina, tbe company bur.; from local producers including Cook Farms in Monroe, Hildreth Fanns in Wadesboro and Bureh Fanns in Faison.

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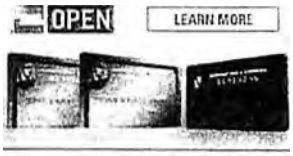

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Salisbwy-bascd Food Lion is a subsidiaty of Brussels-based Delhaize Gr _ which also operates the Bloom nod Hannaford chains.

Dclhaize includes local-food-procurement activities in its annual corporate-responsibility report.

In its 2009 report, Dclhaizc says "all our operating companies continue to give prominence to local products as an everyday focus on what is a core part of our business."

Food Lion spokeswoman Christy Phillips-Brown says the company sources the majority of its produce locally during the growing season.Tbe company purchases all of its blueberries, potatoes, peaches and watermelons from fanners in the Carolioas, plus a "significant portion" of strawberries, tomatoes, green beans, coro, lettuce, squash and cabbage during peak growing seasons.

"It is our goal to provide as many locally grown product<: as possible to our customer base, at a great price,"she says.

Food Lion also run scampaigns to promote items grown in North Carolina, using in-store samples, special shelf tags and biographies of local fanners.

According to the USDA report , one strategy for small, local fanners to overcome their scale limitations is to pool tbcir resources to meet the supply requirements of large grocers. In that vein, Winston Salem-based Lowe's Food Stores Inc. is working this year with Pilot Mountain Pride, a cooperative tbat coordinates 53 fanners in the Triad area to sell their goods as one entity.

l..owe·s is the only retailer selling Pilot Mountain produce, and the first shipment from the group nearly sold out in a day. Barbara Saulpaugh, vice president of marketing and merchandising, hopes the success of the project will spark some interest in other markets, including Charlotte.

"It is pretty impractical to deal with each farmer individually," she says. Ibis approach is really the way to go. We hope to help get other co-ops started with what we learn this year."

Staff writer Will Boye con be readred at (704) 973-u56 or wboye@bizjournals.com.

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IMMEDIATE RELEASE

Meet Your Local i=armers at Lowes i=oods- Winston-Salem, NC- Ju! 16, 2010

Lowes Foods has teamed up wiUllocal food movement,PUot Mountain Pride to serve locally grown produce to stores in Surry,Stokes and Forsyth counties. This Saturday, customers in Surry County wnt have the chance to meet the farmers that grow their produce through a farmer's market held at Lowes Foods stores in the area. Customers walbe able to purchase localproduce at this event as well as at other nearby Lowes Foods stores.

Farmer's markets wat be held at Lowes Foods in Paot Mountain and Mount Airy this Saturday July 17.2010 from Noon until4:00pm. Local farmers will be selling their own crops outside of the store.but additional Paot Mountain Pride produce can be found in these and other Lowes Foods stores.

"The timin g was fantastic. We've been trying to embrace locally grown and put back into the communities in which we operate for some time." says Dick Mc!<ellogg, Oiredor of Produce for Lowes Foods.

Pilot Mountain Pride is a localfood movement that provides locally grown produce to restaurants and retailers in Forsyth, Surry and Stokes counties. The company helps mid-sized farmers distribute their produds throughout the area. and provides marketing and Internal support for farmers that do not hove access to these resources.Pilot Mountain Pride Is currenUy growing a wide variety of produce induding com.bellpeppers,cucumbers,cantaloupe,potatoes, strawberries.blueberries. and more.For more information on where you can find Rot Mountain Pride produds, visit !Y!..PIlotrn.ourttal!Jprlcl!l.,.com.

Founded in 1954,Lowes Foods employs 8500 people and operates 111 stores in North Carolina.South Carolina and Virginia. The company is committed to offering fabulous fresh foods and delivering personalattention to each of its customers. They offer programs such as Lowes Foods To Go and Fresh Rewards that focus on saving people time end money in a tamUy-oriented environmenL Information about these programs and other services offered by the company may be found at tmJJ(Yo()'VW.loy.rosfoods.corn/ or by following Lowes Foods on E.ac(tb..9_QJ.: or Il,'llter.

Contact
Beth Talley
Lowe's Food Stores. Inc.
(336) 775-3290
bth.talley@lowesfoods.com

e12010 Lowe's Food Stores,Inc. All r1ghts reserved.

Af:, jculture center in Pil A will Offer new opportunities

MEGHANN EVANS
STAFF RD>ORTIR

Soon, ·Surry County produce may be found on grocery store shelves, in school cafeterias, and in other locations throughout the Triad.

This will be made possible through the new Pilot Mountain Pride Agriculture Center, which should open in May. This center will allow local farmers to sell their produce on a larger scale. The center will ouy the produce and sell it at a slightly higher price, only making enough to cover the cost of operating the center.

The produce will be' sold to places such as scnools, restaurants, hospitals, ruld stores in Sun)' County and the Winston-Salem region.

Farmers also wiU be able to rent tlie center to .use the assembly line to wash, grade, ahd package their produce to get it ready for market.

"It's just about creating markets for farmers and putting money, in farmers' pockets," said Cluis Knopf, assistant county manager for economic development and tourism.

Bry.an ave, co peratlve extensiOn dtrector, belteves the center wi.ll ser .e wo pu o es. He explruneq, Its for eXJsting fann,ers, to . open a ,door they ve never had before.

The other purpose is "to make agriculture affordable for younger folks to get started."

The average age of a farmer in Surry County is approaching 60.'Cave saitl it's hard for many young people to get started because of the money it costs to farm full-scale. The average·amount n farmer has invested in his operation is $650,000, says Cave.

"It's .hard for someone young to start," he explained.

He hopes Pilot Mountain Pride will help make that easier.

."We've got to have somebody to feed us when the others age out." said Cave.

Cave explained that the center will function similarly as a cooperative, but it has no membership fees.To sell to the center, people can grow one acre or 25 acres of fmits and vegetables accepted by the center. The center has a long Jist of foods it will buy if it is of good..quality. Cave said the center will be ideal for people who simply have home garden and want to expand. The

See PILOT, page GA

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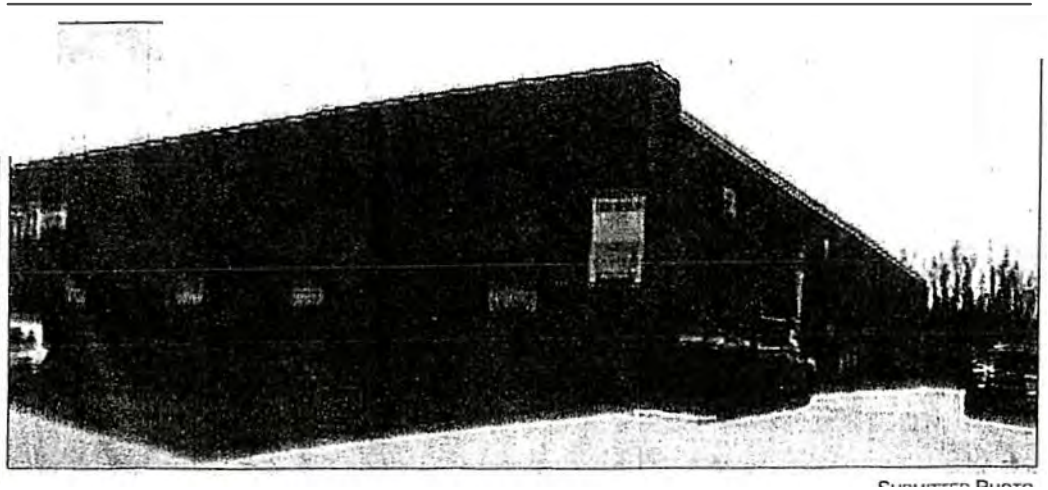


PILOT:

Continued from page·lA

growers just need to receive Good Aglicultural Practices (GAP) certification to be able to participate.

So far Cave said 40 to 45 people have committed to participating. People can call .him at the cooperative extension office in Dobson to find out more about the center and how to get GAP certified. Farmers do not have to sign contr cts with the center.They just tell the center what they are interested · in growing, and the center will agree *tq* try to sell .it. Cave has told farmers not to expect to sell everything to the center during the first year or so.

Cave said local farmers have been invo'lved in the process since the beginning. Before structuring how the center would be set up, the county conducted.a mru·keting study. Over the pasfew years, Cave has talked to many farmers about the center and its potential.

He also bas talked to businesses which are interested in purchasing the final product. Cave said, "Folks like local."

Knopf said the county has been talking about starting ml agriculture center for aroun• six years. In the past few year:,, county officials were able to get started. Now the center will be housed in a fom1er industrial faci)jty in Pilot Mountain. Suri-y Community College will also occupy part of the building. The upfit of the I?uilding was paid for by a grant from the Golden Leaf Foundation. Funds from selling produce will pay for the maintenance of the building, but no profit will be made by the center.

"It's designed to operate and pay for itself,• said Knopf.

Now the process is in its final stage ·before being completed. And the farmers are getting reatly aS well. GAP training began at the end of March for local farmers.

"It's really coming together nicely," Knopf remarked.

Cave hopes that the center, by providing an avemfor people to sell produce, will encourage moe people to get started in agric;ulture.

"We're hoping t]:lat we actually get new fanners," said Cave.

For more information about to the center, visit the onJjne blog: pilotmountainpride.blogspQt.com .A Web site will soon be completed for the center.

Contact Meghmm Evans at mevans@mtairvnews.com or 719-1952.

VOTTI\:T .

SURRY COUNTY Farm Bureau made a num-
r of contributions to Pilot Mountain Pride-a new
"'-county effort to put growers in touch with markets for their produce. The program is seven years in the making, and the idea behind.it is to compensate for the loss of tobacco income to the county. Surry County Farm Bureau gave money,bought washing and grading equipment and scales, and contributed to the cost of giant coolers for the facility. Also, during the May 20 open house, Surry County Farm Bureau presented the facility with a refrigerated truck. On May 6, Surry County Young Farmers and Ranchers served breakfast to farmers touring the facilities of MDI, who will purchase proouce.sold through Pilot Mountain Pride. Fifty-two farms are growing produce to run through the facility to grocery stores and elsewhere.

Surry County Fann Bureau presented the truck to the Pilot Mountain Pride program, a new markeUng agent for counry produce gruwers.

..,.. **WAKE COUNTY** Farm Bureau Women's Committee provided a "cow" for kids to "milk" when students visited Vaughan's Veggies, which is owned and operated by Wake County Farm Bureau Member R.L. Vaughan. Students were also invited to pick berries, feed chickens and pigs, make "moo masks" and take home Rudy Rooster coloring books during tour s of Vaughan's strawberry and vegetable farm.

Wake Counry Fann Bureau Ml!mber R.L Vaughan (back, ?r) hosted students at his ..._,,this spring.

WAKE COUNTY Farm Bureau Board Members Fred and Shirley Burt provided a cow-milking booth May 15 at the Yates Mill County Park. About 100 visitors of all ages tried their hands at milking the cow and making a "moo mask." Rudy Rooster books and other Farm Bureau brochures were provided.

Wake County Fann Bureau Board Members Fred and Shirley Burt provided a cow-milking booth recenuy at res Mill Counry Park.

YADK[illegible] of a safety program to encourage drivers to be aware of farm equipment on the roads. One billboard is on N.C. Highway 67 and the other is on U.S. Highway 601.

WILKES COUNTY Farm Bureau sponsored a meeting about highway laws related to agri_culture, which featured troopers from the North Carolina Highway Patrol About 126 farm·rs fro_!Tl four counties attended the meeting.

(Previously Approved)

Project Title: Preventing Plant Pests Through Effective Tracking of Nursery Plant Material – NCPlants

A. Project Summary:

The *NCPlants* project began unofficially on September 16, 2009 and the initial implementation of Phase I of the project began on October 1, 2010. NC Plants is an on-line data base system that nursery dealers and certified nurserymen can log into (password protected) and enter their supplier name(s), location information, and the nursery plant stock classes purchased from those suppliers. Entering this information in *NCPlants* is a requirement for initial nursery dealer registration and for license renewal of existing nursery dealers. Plant supplier data will be entered and/or updated at least annually; and nurseries and nursery dealers are encouraged to update and validate the information throughout the year if they drop suppliers or add new ones. In addition to listing and validating plant supplier and stock class information, *NCPlants* also allows nursery dealers to manage their store locations and districts. Finally, the application permits Plant Industry Staff to build and save queries of the nursery dealer, plant supplier, and plant stock class information.

- What was the impetus or motivation for the implementation of this project? Specifically, describe the issue, problem, or need that was addressed by this project.

There were two major considerations governing the development of this project. Primarily, the Plant Industry Division wanted to assist the state's nursery and garden center industries by providing an on-line web site for entering plant source information as required in North Carolina's-Nursery Rules (02 NCAC 48A .1200 Nursery Certification). Under these rules, all nurseries and garden centers are required to maintain accurate records of plant acquisitions and make these available for review upon request. Secondly, the NCDA&CS-Plant Industry Division wanted to develop a searchable database such that, in the event of a quarantine pest outbreak, it would be possible to determine and track the movement of potentially infested nursery plant material. The ability to essentially free up unrelated nurseries would ensure plant material could be moved without plant pest restrictions. Unfortunately, prior to this project, all plant acquisition records were handled in hardcopy format with no easy way to search.

B. Project Approach:

The project approach for *NCPlants* was to first develop business requirements by holding weekly meetings with key staff. The project manager also worked with Plant Industry staff during this period to define five main work phases for the project; the initiation phase, planning and design phase, execution and build phase, implementation phase, and close-out phase. Once the business requirements and work phases were defined, a programmer was hired to design and code the system. Weekly status meetings continued to be held to keep staff informed as well as receiving weekly status reports from the contractor. The contractor's design of *NCPlants* was reviewed and approved. The application was then coded and the contractor demonstrated his progress weekly to the project team. Each phase of the project's development was tested by Plant Industry users and a final user acceptance testing phase was conducted. After a brief pilot rollout phase to a group of volunteer Nursery Dealers, the project went live and into the implementation phase.

- What is the web address for the tracking system?

  https://www.ncplants.com/Security/Login.aspx
  Note: Due to the collection of confidential business information, user identifications and passwords are part of the initial registration process.

C. Goals and Outcomes Achieved:

The *NCPlants* project led to the development of a secure web-based tracking system that permits North Carolina's certified Nurseries and Nursery Dealers to individually list their plant acquisitions as currently required in Nursery Certification Regulations. The *NCPlants* tracking system will assist the NCDA&CS' field and technical staff in effectively monitoring the movement of nursery stock based on current and projected patterns. The tracking system allows Plant Industry staff to query the system, and provides the data base framework needed for tracing the movement of nursery stock into and throughout the state should a plant pest regulatory incident occur. There are 118 nursery dealers currently enrolled in *NCPlants* and enrollment is expected to increase considerably in January/February 2011.

- Elaborate on the completion of the expected measureable outcomes indicated in your approved project proposal (provided below):

- As part of the initial testing, it is expected that a voluntary pilot project would be implemented with the target of obtaining up to 5% of the 1,600 currently certified nurseries and 5% of the 2,300 currently registered nursery dealers entering plant acquisition data by December 31, 2010.

  As follow-up, a voluntary pilot project was implemented for targeting the registration of nursery dealers only. Given the timing for nursery registration and based on discussions with our nursery industry, the decision was made to delay the registration of nurseries in the NC Plants system until October 1, 2011. In North Carolina by regulation, nurseries register for the period of October 1st-September 30th. As such, requirements for issuance of the nursery certificates had already been met by individual nurseries. NCDA&CS will be initiating an educational effort to ensure full compliance for the nurseries. Nursery Dealers: Conference calls were scheduled to answer questions of those nursery dealers required to register. Given the limited participation, most found the system easy to navigate.

- By December 31, 2010, it is expected that greater than 75% of new nurseries and nursery dealers in North Carolina will be applying online for registration and inspection services.

  Note: All NC nurseries will be required to register through NC Plants as a prerequisite for issuance of their 2013 nursery license. Nursery Dealers: As part of expected project outcomes, nursery dealers were required to formally register each of their individual site locations with the NC Plants System. An interim check, nursery dealer registrations were at the 75% compliance level. Our assessment noted that all major retail box stores, all mid-range size stores and most independent retail outlets were registered in NC Plants. Registration was enhanced given the issuance of the nursery dealer license was contingent on registering and reporting plant acquisitions.

D. Beneficiaries:

All North Carolina nurserymen are required to maintain accurate records of plant acquisitions and distributions in order to trace the spread of plant pests. This record-keeping provision applies both to nurseries and to garden centers in North Carolina. Historically, this plant acquisition information has been acquired at our field staff level and maintained solely in hardcopy format. As such, it has been difficult to conduct the reviews necessary to effectively and efficiently track plant material. *NCPlants* will benefit garden centers and nurseries with their efforts to comply with plant acquisitions record-

keeping activities and requirements by providing a secure on line data base system in which to conduct those activities. *NCPlants* will benefit NCDA&CS by providing ready and timely access to plant acquisition data for compliance monitoring purposes. Estimates note that for every dollar spent in pest exclusion, a savings ranging from $17-24 in potential control or eradication costs is realized. In both the short and long-term, the *NCPlants System* is expected to benefit North Carolina's nursery industry and to assist NCDA&CS with the ability to more quickly and precisely track plant material that may potentially harbor quarantine plant pests; to exclude those pests, and to reduce or eliminate the need for costly control and eradication measures.

E. Lessons Learned:

Phase I of *NCPlants* was very successful. Lessons were learned from the project and those lessons should be applied to Phase II of *NCPlants*. Lessons learned are:

1. Conduct more user acceptance testing by holding additional required group testing sessions.
2. Better promote Plant Industry Division staff participation in the entire project process.
3. Work to promote more industry involvement with the process; particularly in the user testing and pilot role out phases.

F. Contact Person:

Gene Cross,

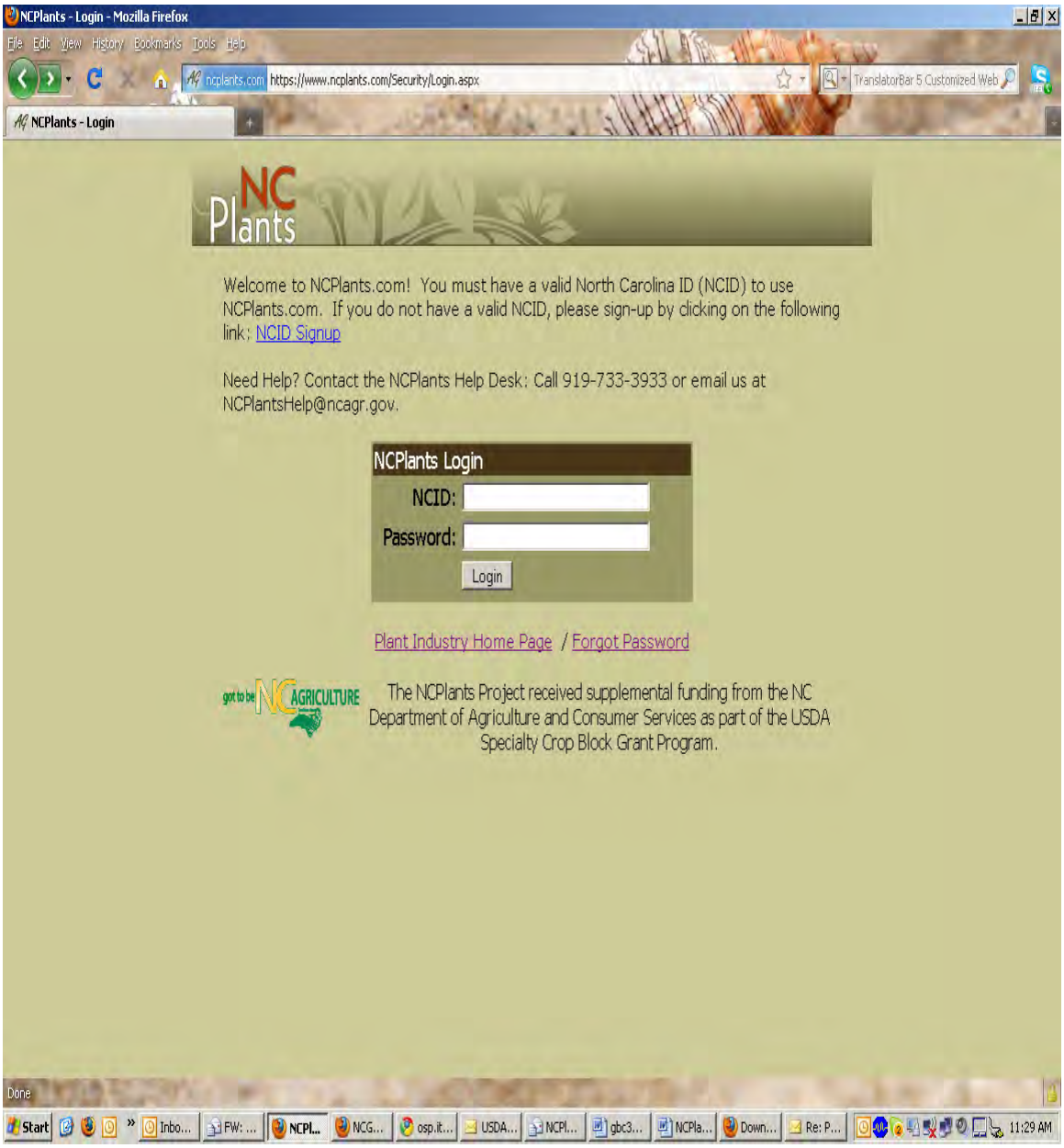
NCDA&CS Plant Industry Division Director

Phone: 919-707-3732, Email:

Gene.Cross@ncagr.gov

G. Additional Information:

Phase II of *NCPlants* is expected to provide on-line registration for new or existing nurseries or dealers, completion/submission and query of nursery inspection reports, and possibly an on-line payment option for nursery business licenses. A “mock” quarantine plant pest tracking and regulatory action exercise is also planned for Phase II. Refinements and adjustments to Phase I of *NCPlants* will occur as needed during Phase II of the project.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NCPlants - Login
NC Plants
Welcome to NCPlants.com! You must have a valid North Carolina ID (NCID) to use NCPlants.com. If you do not have a valid NCID, please sign-up by clicking on the following link: NCID Signup
Need Help? Contact the NCPlants Help Desk: Call 919-733-3933 or email us at NCPlantsHelp@ncagr.gov.
NCPlants Login
NCID:
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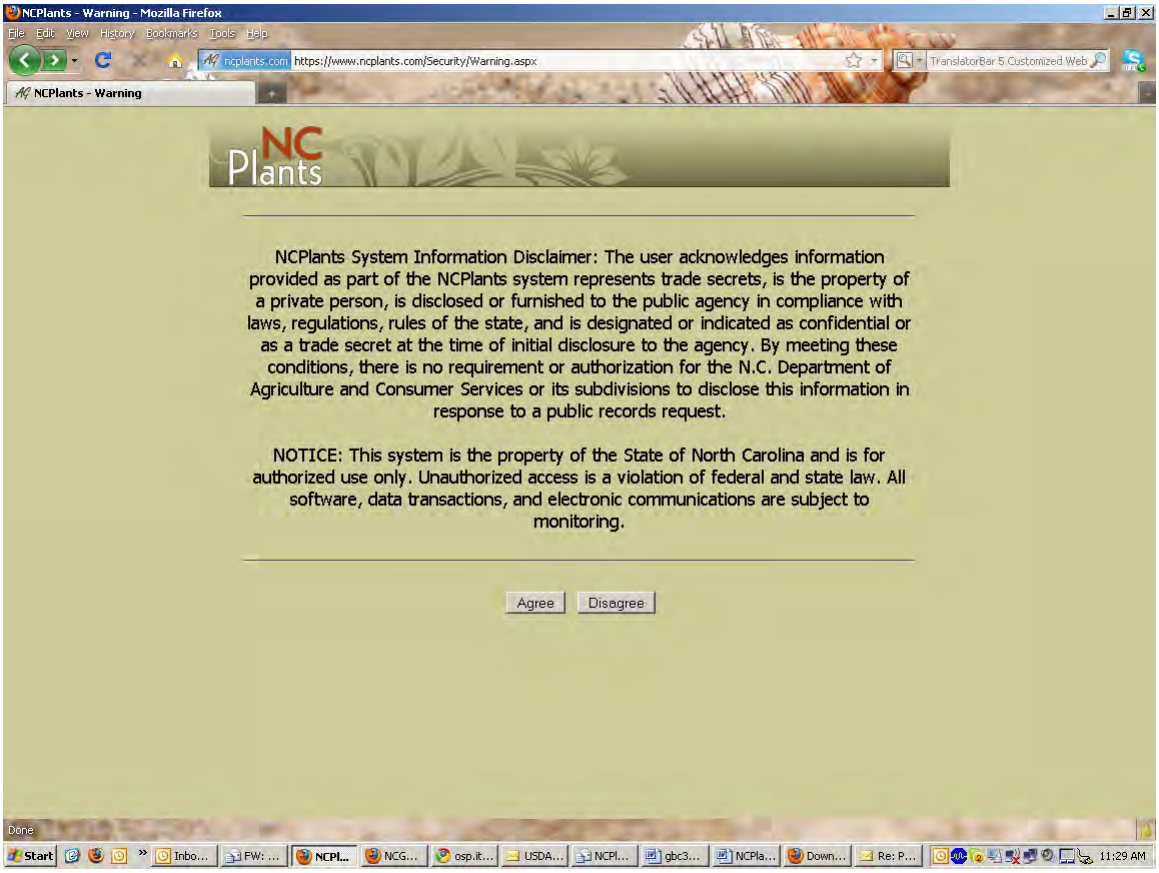
Plant Industry Home Page / Forgot Password
The NCPlants Project received supplemental funding from the NC Department of Agriculture and Consumer Services as part of the USDA Specialty Crop Block Grant Program.
Done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File Edit View History Bookmarks Tools Help
ncplants.com https://www.ncplants.com/Security/Warning.aspx
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NC Plants
NCPlants System Information Disclaimer: The user acknowledges information provided as part of the NCPlants system represents trade secrets, is the property of a private person, is disclosed or furnished to the public agency in compliance with laws, regulations, rules of the state, and is designated or indicated as confidential or as a trade secret at the time of initial disclosure to the agency. By meeting these conditions, there is no requirement or authorization for the N.C. Department of Agriculture and Consumer Services or its subdivisions to disclose this information in response to a public records request.
NOTICE: This system is the property of the State of North Carolina and is for authorized use only. Unauthorized access is a violation of federal and state law. All software, data transactions, and electronic communications are subject to monitoring.
Agree
Disagree
Done
Start
11:29 AM

NCPlants - Home - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ncplants.com https://www.ncplants.com/Home/Home.aspx#ScrollPosition

NCPlants - Home

NC Plants

Links Site Map Contact Us Logout

Home Queries Utilities

NC Dept of Agriculture and Consumer Services

Steve Troxler, Commissioner of Agriculture

Welcome Gene Cross to the NCPlants system!

We hope that your participation in the NCPlants program will be greatly simplified through the use of this system. We are interested in hearing from you. Please Contact Us with your comments and questions.

NCPlants Bulletin Board Messages:

: Pest Alerts (North Carolina)

- **Tropical Spiderwort (TSW)**
  Detections of this federally-listed weed continue to be found at the Cherry Research Farm in Goldsboro, where an eradication program is actively underway. TSW is tolerant of glyphosate making it difficult to control in Roundup Ready crops. Its production of seeds underground make it more difficult to control with herbicides. While thought to primarily be an agronomic crop issue, this weed may be transported in nursery plant materials.

  For more information on this weed, please visit: http://www.ncagr.gov/plantindustry/plant/entomology/pestalerts/TSW.htm

- **Ornamental Sweet Potatoes**
  The N.C. Department of Agriculture and Consumer Services-Plant Industry Division implements both an internal and external quarantine for the Sweetpotato Weevil in this state. This quarantine includes the movement of sweet potatoes, sweet potato roots, plants (including ornamental plants), and vines or roots or any other plants belonging to the genus Ipomoea from quarantine areas outside North Carolina.

: Pest Alerts (Other States)

- **Detection of Hemlock Woolly Adelgid**
  The Hemlock Woolly Adelgid (HWA) has been detected for the first time in Hemlock Bluffs Nature Preserve in Cary by town officials. This represents a detection far from the currently known range of the HWA in the foothills and mountains of North Carolina. Town officials expect to map the infestation at Hemlock Bluffs and respond with injections of pesticides into the trees or around tree bases or spraying the trees with special soaps or horticultural oils. The HWA arrived in the U.S. in the 1920s from Asia and is able to spread rapidly since natural enemies found in its native range are not present to keep it in check.

- **Detection of Emerald Ash Borer in Tennessee**
  The Tennessee Department of Agriculture has announced the first detection of the Emerald Ash Borer (EAB) in this state. The EAB only attacks ash trees and was thought to have been introduced into Michigan on wood packing material from Asia. The EAB has now been detected in Illinois, Indiana, Iowa, Kentucky, Maryland, Minnesota, Missouri, New York, Ohio, Pennsylvania, Virginia, West Virginia, and Wisconsin. With this detection, Tennessee will issue a quarantine for Knox and Loudon Counties prohibiting the movement of firewood, ash nursery stock, ash timber, and any other materials that might be capable of spreading EAB.

Done

Start Inb... FW:... NCPl... NCG... Tob... osp.... USD... NCPl... gbc... NCPl... Dow... Re: ... 11:28 AM

Project Title: Creating Stable and Sustainable Markets for NC Christmas Trees

A. Project Summary:

The North Carolina Christmas Tree Association (NCCTA) used grant funds to enhance and expand the association's marketing activities by creating more visibility of North Carolina Christmas trees in existing markets, creating opportunities for North Carolina growers in new markets, increased use of point of sale and consumer education materials, and promotion of North Carolina Christmas trees and growers at trade and consumer shows.

NCCTA sought to help the North Carolina Christmas tree industry create stable and sustainable markets in the face of increasing supply of Christmas trees nationwide, an uncertain economy, and a long-term erosion of the real tree market to artificial tree sales.

The project used a pre and post activity survey to assess present and future marketing needs and measure program effectiveness.

The project expanded on NCCTA efforts to use advertising to drive all potential buyers (wholesale, retail, choose & cut) to the NCCTA website *www.NCchristmastrees.com* where buyers and consumers can find tree availability, tree care, positive attributes of real trees, fire safety tips, and locate tree farms and retail lot locations.

The project expanded branding efforts of North Carolina Fraser Fir "The Perfect Christmas Tree" by creating and distributing point of sale materials to growers and their customers.

NCCTA was able to increase and improve their presence at local, regional and national “Green Industry”, consumer, and other trade show events.

B. Project Approach:

Graphs are in a separate Excel document

An eleven question pre-project grower survey was created and distributed to evaluate association marketing efforts. The survey was an opportunity to collect information on grower planting practices as well as their marketing perceptions. The survey served as a baseline for current marketing efforts and measured program impacts using a follow-up survey that was conducted in January 2012. Along with its function as an evaluation tool, this survey provided some very interesting information about both the NC Christmas tree industry and marketing activities.

Of the seventy-five respondents, a majority (74%) were primarily wholesale growers. Twelve percent of the respondents were choose & cut growers and 8% were retailers. The remaining 6% of respondents included combinations of wholesale, choose & cut, retail, and allied business.

Figure 1. Percieved effectiveness of NCCTA funded promotional items (weighted 2010 average)

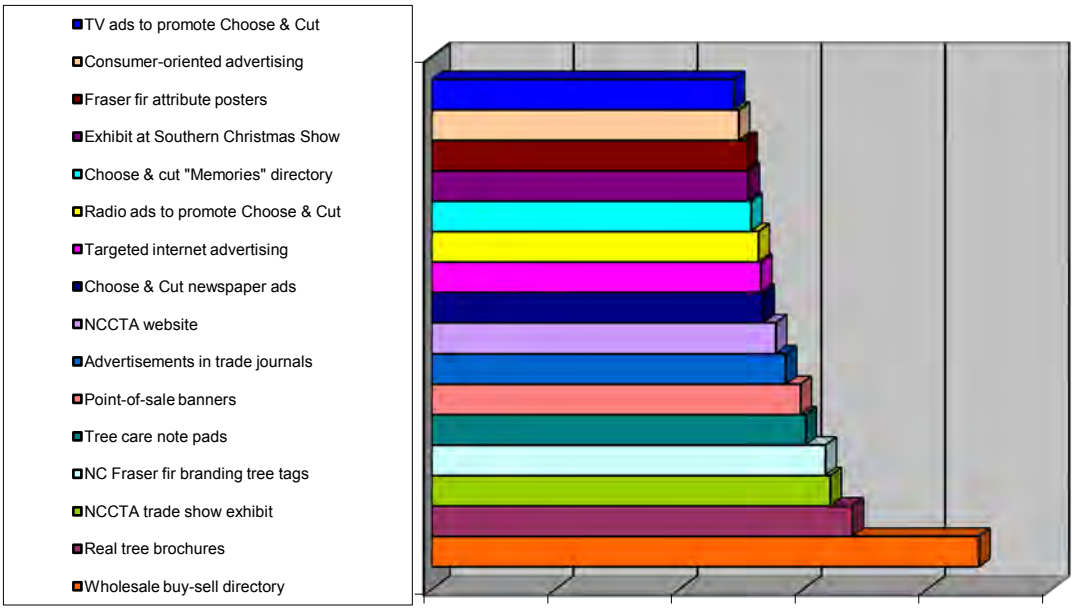
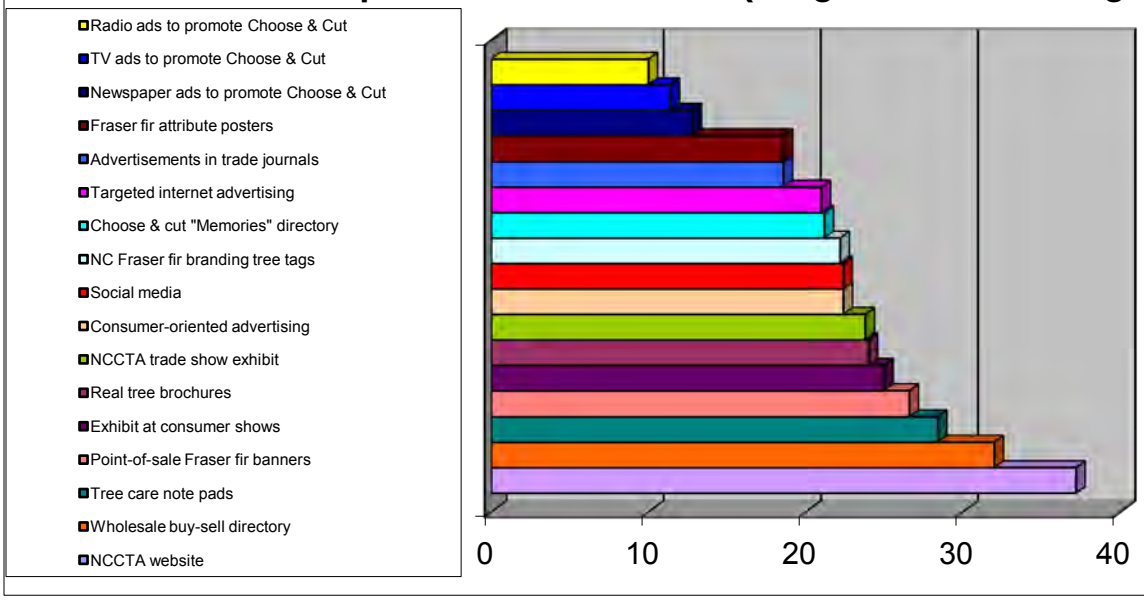


Figure 2. Perceived effectiveness of NCCTA funded promotional activities (weighted 2012 average)



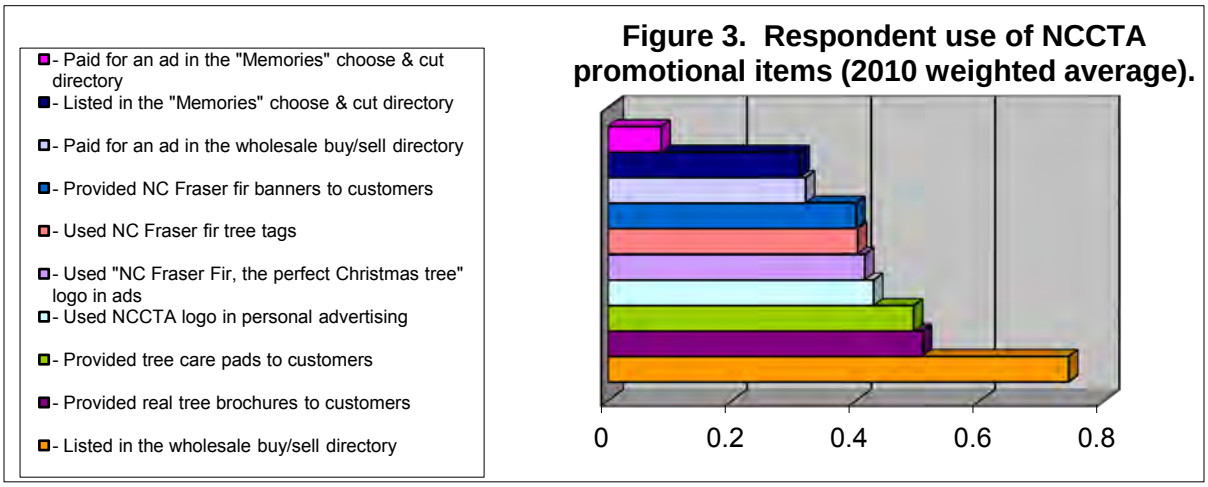


Figure 3. Respondent use of NCCTA promotional items (2010 weighted average).
- Paid for an ad in the "Memories" choose & cut directory
- Listed in the "Memories" choose & cut directory
- Paid for an ad in the wholesale buy/sell directory
- Provided NC Fraser fir banners to customers
- Used NC Fraser fir tree tags
- Used "NC Fraser Fir, the perfect Christmas tree" logo in ads
- Used NCCTA logo in personal advertising
- Provided tree care pads to customers
- Provided real tree brochures to customers
- Listed in the wholesale buy/sell directory
0
0.2
0.4
0.6
0.8

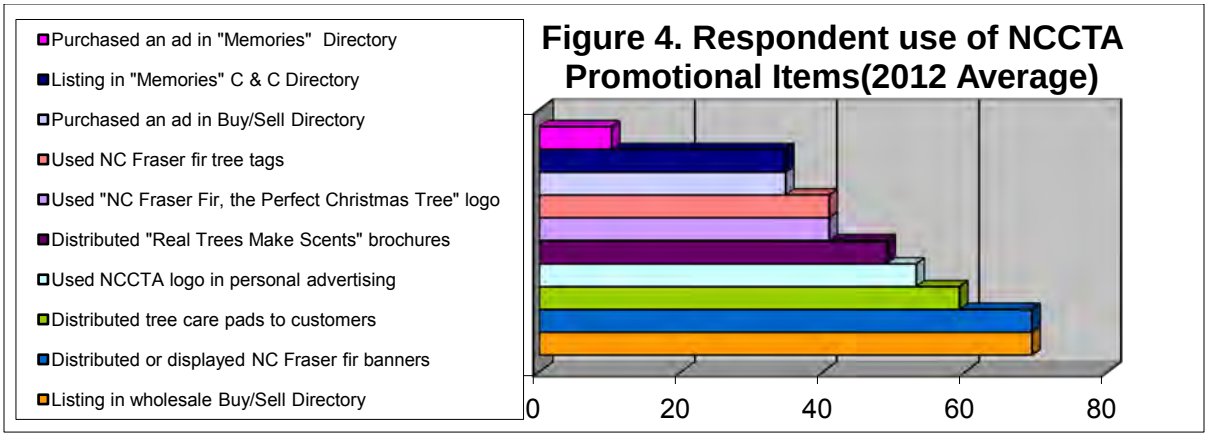
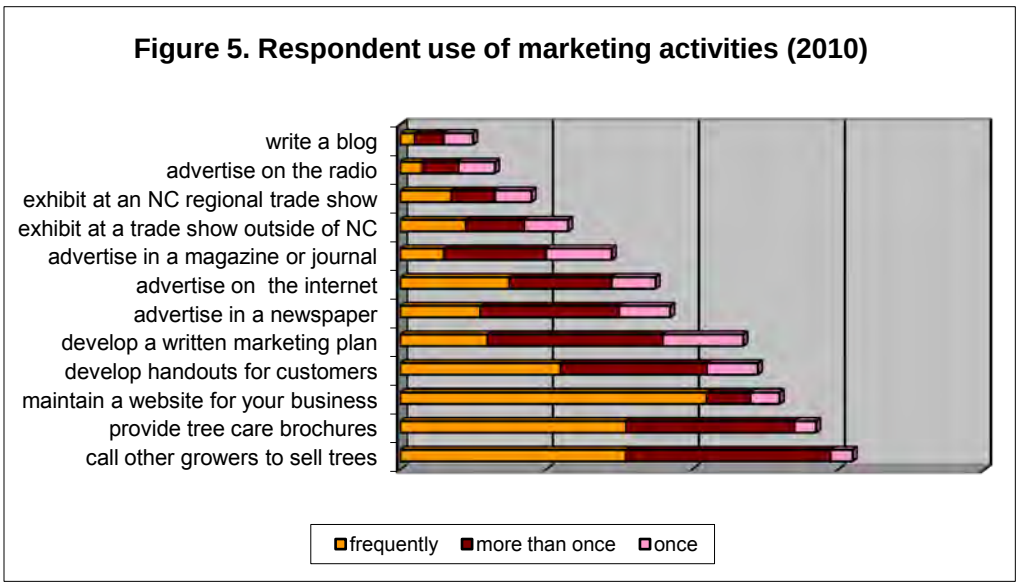
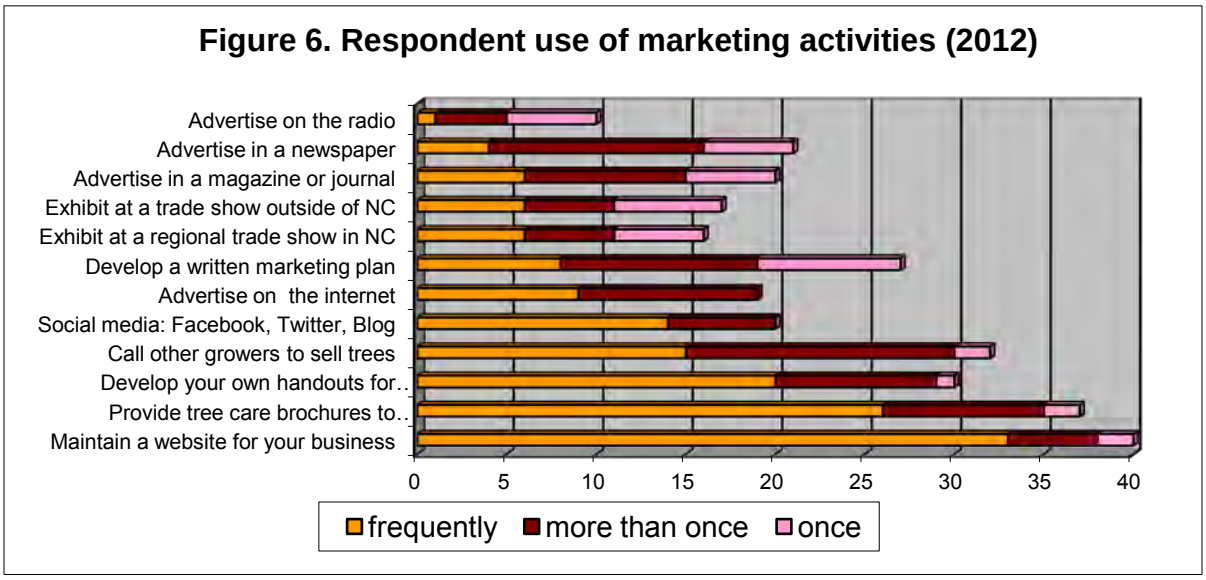


Figure 4. Respondent use of NCCTA Promotional Items(2012 Average)
Purchased an ad in "Memories" Directory
Listing in "Memories" C & C Directory
Purchased an ad in Buy/Sell Directory
Used NC Fraser fir tree tags
Used "NC Fraser Fir, the Perfect Christmas Tree" logo
Distributed "Real Trees Make Scents" brochures
Used NCCTA logo in personal advertising
Distributed tree care pads to customers
Distributed or displayed NC Fraser fir banners
Listing in wholesale Buy/Sell Directory
0
20
40
60
80





Acreage & Annual Tree Planting Results

The growers who responded to the survey collectively operated between 10,000 and just over 18,000 acres of Christmas trees depending on the acreage assignment applied from each farm size category (low, medium, or high end of range). Data from this survey indicated a reduction or cessation of annual planting among a majority of respondents beginning in 2005. This trend has

helped the leadership of the NCCTA to predict the duration of the current oversupply of Christmas trees. Where growers have quit planting all together, this survey has indicated changes in industry demographics and future changes in membership that the NCCTA is likely to face. Along with the follow-up survey, NCCTA leadership has received valuable snapshots of industry planting trends that can be considered against other more comprehensive surveys such as the ag census and green industry surveys.

Grower Perceptions about Promotional Efforts

This survey provided useful insights into the value growers place on different NCCTA promotional activities and services. The marketing activity data were weighted and sorted to provide a visual ranking of their value to respondents. Survey questions provided information on the perceived value of promotional activities, their use by members, and their effectiveness in attracting wholesale and choose & cut customers. Respondents were also asked what marketing activities they engaged in themselves.

Figure 1 ranks the perceived value that growers placed on NCCTA marketing activities and products in 2010. Keep in mind that a majority of respondents were primarily wholesale growers. This likely decreased the cumulative value placed on choose & cut activities compared to wholesale activities. Clearly though, the buy / sell directory stands out as the single most-valued activity conducted by the NCCTA. Among NCCTA promotional point-of-sale materials, the real tree brochure was perceived as the most valuable followed by NC Fraser fir tree tags, tree care note pads, NC Fraser fir banners, and attribute posters. Among NCCTA promotional activities, the trade show exhibit was valued most highly, followed by trade journal ads, the NCCTA website, Internet advertising, and lastly, consumer oriented advertising.

Figure 2 provides the results to the same question asked in 2012. The most notable change in grower perceptions is the top ranking of the NCCTA website. This reflects a fundamental shift in the way Christmas tree growers are interacting with their customers. Point-of-sale materials continue to be highly valued although the ranking of individual items has shifted. While there is very little difference among the weighted averages of many of these promotional activities, it is interesting to note that the perceived value of mass media activities have slipped behind point-of-sale items and social media activities.

When these NCCTA promotional activities were viewed from respondents' use of them as shown in Figures 3 and 4, several products and services stood out. Listing in the buy / sell directory was the most used practice followed by distribution of both real tree brochures and the tree care note pads. The use of real tree banners by respondents increased over the span of the 2010 and 2012 surveys. The purchase of ads in the buy / sell directory was ranked near the bottom of these activities despite the popularity of listing in the directory.

Respondents were asked to rank NCCTA activities in their value to finding either wholesale or choose & cut customers. Responses were similar for both 2010 and 2012. Not surprisingly, both groups of growers identified their own marketing efforts as the most important factor in gaining a customer. Both groups also ranked their perspective directories (Buy/Sell wholesale directory and the "Memories" choose & cut guide) and the NCCTA website as the next most important tools for gaining customers. NCCTA activities were perceived as providing greater opportunities to find customers than either county or national associations.

The NCCTA grower survey also examined what marketing activities growers take on themselves. Figures 5 & 6 show the frequency with which growers conducted different marketing activities. In 2010, among all marketing activities, "calling other growers to sell trees" was the most widely used activity. However, by 2012, calling other growers had fallen to fourth place with less than half the frequency of use of building a website. Within the "more than once" category of use, writing a business plan was on a par with providing handouts and tree care information and calling other growers. The use of internet marketing and social media increased from 2010 to 2012.

Grower reliance on calling their peers to market their trees could reflect a healthy network among growers and the practicality of working with friends and neighbors. However, the rounds of phone calls that recently have targeted major growers and other re-wholesalers contribute to rumors and levels of pessimism that undermine grower's price position. Reliance on phone calls to neighbors as a primary selling tool has surely played into buyers' manipulation of tree prices. Other marketing activities such as meetings or tradeshows at least provide access to broader information about current markets and tree pricing. Thankfully, the survey data does show a decreased reliance on "phone calls" and increased use of a range of marketing strategies that represent a more proactive marketing plan.

Information from these surveys not only provides insight into planting trends and the effectiveness of different marketing activities but will also guide the promotional efforts of the NCCTA. The relative importance of different activities should not necessarily eliminate a lower-ranked activity but may change the level of investment that the association commits to it. To a great degree, this survey reinforces the commitment already made to producing quality buy / sell and choose & cut directories and to keeping the website fresh, engaging, and easy to use.

C. Goals and Outcomes Achieved:

Goal: Increase the website usage by 15% over the life of the project

A complete redesign of the NCCTA website www.NCchristmastrees.com began in the late spring of 2010 and was completed in November 2010. The site featured added functions and search capabilities including:

- Improved look and easier user navigation and search functions Google mapping features
- Newly designed front page that incorporates the display of previous article module, events calendars, current tree inventory, and links to the Choose & Cut AND Buy & Sell Guides
- Targeted search options based on activities desired at choose & Cut farms and desired tree species for wholesale buyers.
- Each grower/business member of NCCTA now has their own page within the NCCTA website with search engine optimization that will be hugely beneficial in their rankings on search engines
- The Buy/Sell Guide and Choose and Cut Directory are now displayed as full color, active, interactive guides rather than a black & white pdf
- Events module upgrade
- A free interactive game from kewlbox.com has been added to the “kids” section
- A message board has been added that is accessible to all members with a password.
- Text/picture ads have been added to the website and are being given to ALL advertisers who purchase ads in any NCCTA publication. There is no charge for this additional service, these ads are a “bonus” for NCCTA advertisers.

- In September 2011, the online photo contest submission form for the annual Choose & Cut Directory was made available online. Entrants can now submit their photo entries on the website.

In 2009, website sessions totaled 117,194. After the website redesign in 2010, sessions totaled 206,829 and in 2011 the total number of sessions was 166,982. After evaluating the numbers, it can be concluded that the spike in sessions in 2010 can most likely be attributes to multiple visits by NC growers and technical web designers and NCCTA staff who repeatedly visited the site to update and edit during the redesign process. When reviewing the website usage increase from 2009 to 2011, it clearly depicts a 42.5% increase in total sessions.

The total number of pageview's on the site in 2009 was 489,934. In 2010, pageview's increased to 856,750. In 2011, the total number of pageview's increased to 1,020,211. So even though the total number of sessions decreased from 2010 to 2011, the interest in what was being viewed in 2011 increased by 108%. We believe that this can be attributed to the specific search elements that were added to the website in October 2010 allowing customers to target their searches based on their specific wants and needs. This targeted search results in those farms that meet the needs entered as well as a Google mapping feature to easily contact and/or locate the farm or grower.

Website statistics show an increase in average pageview's per session by 1.06 pages from 2009 to 2011, as well as increase in the average session length by 2:21 minutes, illustrating that site visitors are spending more time on the site and are visiting more pages. This increase may be even more important than the forty percent increase in number of sessions. Clearly improvements to the website have made it more accessible and useful.

Goal: Create more visibility for North Carolina Christmas trees in existing markets, and allowing the association to create opportunities for North Carolina growers in new markets

The Trade Show and Consumer Education Committee along with Jennifer Greene (NCCTA) planned and organized the following trade show agenda for 2010-2011. One change in the type of shows attended reflected an increased importance placed on consumer shows that provide an opportunity to boost real tree sales in general and have a return for both wholesale and retail market segments. Strong interest at consumer shows has been a bright spot during a period when ornamental nursery trade shows have been particularly lack-luster due to the economy. However, trade shows are a key means of distributing buy/sell directories to wholesale buyers and the NCCTA needs to maintain a trade show presence especially when times are hard.

Both consumer and trade shows provide valuable "face-time" with consumers and potential customers of NC Christmas trees. NCCTA participated in ten shows in 2010 and twelve shows in 2011:

- Green N' Growin', Greensboro, NC – January 2010, January 2011
  Attendees - approx. 3,500

Who - Industry professionals/potential wholesale buyers

- SCNLA SCNLA (South Carolina Nursery Landscape Association Trade Show), Myrtle Beach, SC – February 2010, February 2011
  Attendees - approx. 1,800

Who - Industry professionals/potential wholesale buyers

- Got To Be NC Fest, Raleigh, NC – May 2010, May 2011
  Attendees - approx. 85,000

Who - Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- TNLA, San Antonio, Texas – August 2010
  Attendees - 7,000+ Attendees

Who - marketable area with many potential wholesale and retail buyers

- National CTA Convention, Winston-Salem, NC – August 2010
  Attendees - approx. 300

Who – Industry peers in need of pre-cut trees on their lots and seedlings

- National CTA Convention, Sandusky, Ohio – August 2011
  Attendees - approx. 300

Who – Industry peers in need of pre-cut trees on their lots and seedlings

- Mountain State Fair, Fletcher, NC – September 2010, September 2011
  Attendees - in excess of 180,00

Who – Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- North Carolina State Fair Exhibit in coordination with the NC Green Industry Council "the Authentic Green", Raleigh, NC – October 2010
  Attendance - In 2010, a record breaking attendance was recorded at 1,091,887.

- Van Wingerden Greenhouse Company open house, Mills River, NC– November10

- Christmas In The Valley, Hickory, NC – October 2010, December 2011
  Attendees – Approx. 3,500

Who – Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- Southern Christmas Show – November 2010, November 2011
  Attendees - in excess of 100,000

Who – Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- Birmingham Home & Garden Show, Birmingham, AL – March 2011
  Attendees - 16,700+

Who - Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- International Floriculture Expo, Miami FL – June 2011
  Attendees - Hosts nearly 200 high volume mass market key buyers (including 8 of "The top Super 10 Retailers" listed in Super Floral Retailing Magazine)

Who - Limited to only high volume mass market key buyers such as grocery store chains, Wal-Mart, Home Depot, Lowes, etc.

- Christmas in July Festival, West Jefferson, NC – July 2011
  Attendees - Approx. 20,000

Who - The annual Christmas in July Festival in downtown West Jefferson was started by Christmas tree growers in Ashe County to highlight the industry and draw outside buyers to see the bountiful Fraser fir in the area.

- PANTS, Phoenixville, PA – August 2011
  Attendees - Approx. 7,300

Who - Production Nursery, Re-wholesaler, Garden Centers, Landscape Nursery, Landscape Contractor, Landscape Maintenance, Landscape Architects, Distributors

- North Carolina State Fair, Raleigh, NC – October 2011
  The average attendance for the fair is 823,782.

Presence at these trade shows were enhanced with the following items purchased:

- 10'x8' pop up display
- Retractable banner with graphics
- New posters, banners, and signage for pop up display
- Digital photo frame
- "Get Real" stickers for kids
- coloring pages
- "Real Trees make Scents" brochures
- Environmental Choice flyers comparing the environmental benefits of a real Christmas trees to artificial trees
- signage promoting the NCCTA social media sites (Facebook, Twitter, and blog site)
- Laminated photos were added to the display to depict the different aspects of production, harvest, choose & cut, greenery production
- Larger display areas were purchased to enhance exposure

Expanded advertising efforts included:

- A quarter page ad in Our State Magazine – October 2010, November 2010

- A full page ad in Our State Magazine – October 2011, November 2011
- Quarter page ad in Blue Ridge Country Magazine -
- (2) half page ads in seven targeted months of Plant & Supply Locator – 2010 & 2011 - January, April, May, June, July, August, September
- Web Text ad & web banner ad on Raysweather.com– November, December 2010
- WSOCTV.com text ads, banner, ads, & rich media ads, two day "home page domination" page wrap ads – November & December 2010, November & December 2011 – "Domination" days were November 11 (Veteran's Day) & November 25 (Black Friday)
- Garden Center Magazine classified ad for twelve months – 2010, 2011
- Full page ad and half page editorial in the Fayettville Observer featured in a special "Buy NC" full color insert – July 2011
- Half page ad in Southern Living magazine - November & December 2011
- Half page ad in the Appalachian State University (ASU) football program for 6 home games – September thru November 2011
- On-site tent display at two ASU home games – October 29 & November 12
- Web banner on *www.GoASU.com* – October & November 2011
- Quarter page ad in five targeted issues of
- American Nurseryman Magazine – June, July August, September, December 2011
- Half page ad in three target issues of Produce News Magazine – June, July, August 2011

All promotional materials and advertisements drive consumers and buyers to the NCCTA website *www.NCchristmastrees.com* and target wholesale, retail and choose & cut markets.

Goal: Demonstrate a 20% increase in the percentage of growers using NCCTA point-of-sale materials over the life of the project

In 2010, two hundred retailer kits were produced and made available to all NCCTA grower members. These materials enhance the brand identity of North Carolina Fraser fir as the "Perfect Christmas Tree", and educate consumers about positive attributes of farm grown Christmas trees, proper tree care and fire safety. Approximately 140 kits had been distributed as of December 31, 2010. A follow-up email allowing any NCCTA grower member to pick up additional kits was sent out on January 5, 2011. Each kit included:

- (1) 12”x18” corrugated plastic “NC Fraser Fir, The Perfect Christmas Tree” signs
- (2) 11”x14” laminated Fraser Fir attribute posters
- (2) 11”x14” laminated Fraser Fir Care Posters
- (25) Real Trees Makes Scents brochures
- (15) Fraser Fir care pads with 50 tear sheets each = 750 Fraser Fir Care Sheets
- (2) 36”x55” Fraser Fir outdoor banners

In 2011, additional point-of-sale materials such as were purchased and made available to all NCCTA grower members and their customers. Approximately fifty kits were mailed in and out of state to retail lots selling North Carolina Fraser fir. A total of two hundred Fraser fir outdoor banners, five thousand “real Tree Makes Scents” brochures, two-hundred thousand tear sheets about tree care (distributed in pads of 50) were distributed in 2011 to growers and their customers selling North Carolina Fraser fir. NCCTA staff used email, mailings and website to promote availability, distribution from the NCCTA office, and materials were made available at association meetings. The increased value of point-of-sale materials to NCCTA members was supported by their elevated ranking in the 2012 over the 2010 grower survey.

D. Beneficiaries:

Direct beneficiaries include the 1,000+ Christmas tree growers in North Carolina and contiguous counties in Virginia and Tennessee. All of these growers are not claimed as members of the North Carolina Christmas Tree Association, but the vast majority of tree production in these areas is from Association members. Furthermore, any promotion that stabilizes or increases demand for North Carolina Christmas trees will benefit all of these growers over time, regardless of association affiliation.

E. Lessons Learned

Investments made by the NCCTA over the last two years have expanded our promotional impact. Website usage has increased dramatically. Not only does the association provide a higher quality presence on-line, but the total promotional effort drives potential buyers and consumers to the website. Our goal of increased website use was far exceeded. Grower survey results changed

from 2010 to 2012 to reflect this increased focus on using the website to promote North Carolina Fraser Fir. Other investments were just as important, however. Improvements to our trade show exhibit increased its professional appearance and visibility helping to attract contacts at a time when trade show attendance was down. The enhanced ability of the NCCTA to provide point-of-sale materials to members was critical at this juncture in the Christmas tree market when so many growers were struggling to maintain market share. Use of NCCTA point-of-sale materials was an added benefit that members could provide their customers. Additional promotional activities funded through the NCDA & CS Specialty Crops Block Grant have made it possible for the NCCTA to fulfill its mission to the North Carolina tree industry during two of the most difficult years the industry has ever faced. With these investments in our strategic marketing plan, the NCCTA is well positioned to continue promoting North Carolina Christmas trees.

F. Contact Person

North Carolina Christmas Tree Association

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Boone, NC 28607

Jennifer Greene, Executive Director

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2

Project Title: North Carolina Watermelon Consumer Awareness Campaign

A. Project Summary

The North Carolina Watermelon Growers Association (NCWGA) was responsible for implementing a statewide media campaign to promote the Specialty Crop Program. This project was implemented from June2010 –September 2011. The marketing committee was assembled and developed the media campaign. The NCWGA developed a request for proposal (RFP) and distributed it to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. The media campaign consisted of television, radio, printed ads and promotional materials. The advertisements promoted the NC Watermelon Industry, educated consumers on why they should "Buy Local". The advertisements were placed in key markets of the state during the months of July through August 2010 and 2011. The NCWGA also measured the expected outcomes of the project. Expected outcomes were measured from certified audited reports from the various media outlets.

If this is the statement you are referring to "The North Carolina Watermelon Association (NCWA) will be responsible for implementing a statewide media campaign to promote the Specialty Crop Program." It should have read "The North Carolina Watermelon Association (NCWA) will be responsible for implementing a statewide media campaign to promote the NC Watermelon Industry."

This new project teamed up the North Carolina Watermelon Growers' Association with the NCDA Marketing Division to promote the NC industry thereby changing the purchasing behavior of consumers and retailers to buy North Carolina watermelons. Increasing consumer purchases were increased and as a result the economic vitality of the watermelon industry in NC became stronger.

The North Carolina watermelon industry generated in 2006 an estimated $11.5 million in farm income according to the Agricultural Statistics from the NCDA&CS. The economic downturn coupled with higher fuel costs had severe consequences of negatively affecting the income of these producers. A promotional campaign helped to stabilize this industry and increase the sales of locally grown fruits and vegetables .This campaign built upon recent US domestic consumer trends and growing interest in sourcing local food industry.

This project did not build upon a previously funded project.

The economic downturn coupled with higher fuel costs has had severe consequences and negatively affected the income of watermelon producers. A promotional campaign could help stabilize this industry, build demand for the product and increase sales of locally grown watermelons. It can also help to build consumer preference for NC watermelons over those of other states/countries.

This marketing project teamed up the North Carolina Watermelon Association with the North Carolina Department of Agriculture's Marketing Division to promote NC watermelons and thereby favorably influence the purchasing behavior of consumers and retailers towards North Carolina watermelons. Increasing consumer purchases will strengthen the economic vitality of the watermelon industry in NC.

The goal of the promotional campaign is to increase awareness and sales of North Carolina watermelons to the target audience during the 2010 and 2011 marketing seasons.

B. Project Approach

The requested funds of $20,000.00 was used for a target mixed media marketing program that included radio, television and print media promotion, along with development of promotional materials. The funds were used during the months of July through August in 2010 and an equivalent amount of funding was applied for use during the same time frame in 2011. Program funds were utilized for creative development, purchase of media, execution of the promotional program elements and related agency fees.

During the summer of 2010 the NCWA rented 10 billboards and advertised watermelons on major interstates and key roadways crisscrossing the state with an emphasis on roads leading to the beach. The billboards ran in July and August. The following table shows the total direct exposure count (DEC) for each billboard. DEC's are the number of people per day, ages 18-56, that have the opportunity to view them.

North Carolina Watermelon Association
2010 Billboard Advertising
(July 1, 2010 – August 31, 2010)

Board Placement	DEC	Days Run	Total DEC/Board
1-95 Roanoke Rapids	18,050	62	1,119,100
1-95 Lumberton, NC	36,664	62	2,273,168
1-95 Smithfield, NC	28,822	62	1,786,964
1-40 Watha, NC MM 392.5	15,010	62	930,620
US 264 Washington, NC	12,500	62	775,000
SR 581 Spring Hope, NC	11,275	62	699,50
1-85 Warren Co., NC	18,590	62	1,152,580
Rt. 70 Goldsboro, NC	23,500	62	1,457,000
Rt. 17 Ocean Isle, NC	12,100	62	750,200
I-40, Exit 116	29,269	62	1,814,678

Total DEC			**12,758,360**

UNC-TV

Watermelon advertising spots were developed and run during June, July and August on North Carolina's public broadcasting system. This station's demographics seem to be a genuine audience who would search for North Carolina grown produce. The UNC-TV broadcast system covers the entire state and parts of Virginia. Below are the total numbers of viewers that have seen the ads run on this station.

UNC-TV Spots

Program	Average # of HHs/week	Weeks Run	Total # of HHs/Show
How-To/Weekend Programming	4,700,000	10	47,000,000
Children's Programming	4,700,000	10	47,000,000
Totals Households:			94,000,000

Radio

Summer watermelon advertising spots were developed and run during June, July and August on North Carolina radio stations WNCT-FM, WKXB-FM and WKLM-FM.. The demographics of these stations are a combination of NC residents and tourists that visit North Carolina beaches. These ads promoted watermelons as a delicious, nutritious and refreshing summer treat.

Radio Audience

Station	Total # of Impression
WNCT-FM	793,800

WKXB-FM	**233,352**
WKLM-FM	**353,920**
Total # of Impressions	**1,381,072**

Magazine Advertising

Magazine ads were run in the Sunbelt Foodservice Magazine. The Sunbelt Magazine is a monthly publication. The NCWA ran ads in the June and July issues of the magazine. Sunbelt is a business publication dedicated to the service of the food distribution industry and all its varied elements. The association also ran a display ad in Our State Magazine.

Sunbelt Foodservice Magazine

Distribution	Months	Total Distribution
27,829	2	55,658

Our State

Estimated readership	Months	Total Readership
720,000/month	1	720,000

Bus Wraps

Last summer, the NCWA purchased bus wraps that ran in three market areas, Asheville, Durham and Winston-Salem. The buses ran everyday that the transit systems operated during any given week. Bus routes were changed daily for maximum exposure. The length of the contract was from June 14th – August 6th.

Transit Advertising Program Recap – 2010

Ad Size: Queen Bus Ads – 30" X 88"- All Markets – Watermelons – (NCWA)

Asheville:

Start date: June 15, 2010 – End Date: August 15, 2010

Number of bus ads – 1 unit

Daily circulation – 9,500 viewers per bus per day

Total circulation - @ 9,500 viewers per day X 54 days = 513,000 viewers

Durham:

Start date: June 15, 2010 – End Date: August 15, 2010

Number of bus ads – 1 unit

Daily circulation 11,700 viewers per bus per day

Total circulation - @ 11,700 viewers per day X 54 days = 631,800 viewers

Winston-Salem:

Start date: June 15, 2010 – End Date: August 15, 2010

Number of bus ads – 1 unit

Daily circulation 12,000 viewers per bus per day

Total circulation - @ 12,000 viewers per day X 54 days = 648,000 viewers

Promotional Items

Miscellaneous promotional items were purchased during the year to be given away to produce buyers, legislators, tourists and convention attendees. Among these items were NCWA shirts, tee-shirts, hats, bumper stickers, brochures, magnetic car decals, window decals, 8.5 x 11 & 11 x 17 posters and fans.

Benchmarks:

Consumer exposure to previous campaign (2008)	**22,376,896**
North Carolina Watermelon Farm Income (2009)	**$12 million**
<u>Target:</u>	
Consumer exposure to campaign (2010)	**25,000,000**
NC Watermelon Farm Income: 3% increase:	**$12.4 million**
Website hits:	**10% increase**
<u>Results:</u>	
Consumer exposure to campaign (2010)	**110,707,890**
NC Watermelon Farm Income: 3% increase:	**$ 24,000,000**
Website hits:	**10% increase**

Mrs. Bonnie Holloman, Executive Director, of the North Carolina Vegetable Growers Association, worked directly with Nick Augostini of the North Carolina Department of Agriculture and Consumer Services Marketing Division on this project. Mrs. Holloman coordinated the execution of marketing agreements and monitored programs throughout the grant period. She along with Nick Augostini worked together to make sure that the projects were on track.

C. Goals and Outcomes Achieved

The fund of $20,000.00 was used for a targeted marketing program of radio, television, and print media promotion. The funds were used during the months of July through August in 2010 and 2011. Program funds were used for creative development, purchase of media, executive of promotional program elements and related agency fees.

Consumer impressions were measured through audited media results from the contracted advertising agency. NC Farm income from watermelon sales were tracked through use of the NCDA/USDA Statistical Reporting Service. The benchmark for comparison is an increase in consumer exposure to the prior

campaign (2008) 42,376,896 with a North Carolina Watermelon Farm Income (2007) of $12.40 million.

The Consumer exposure to SCBG funded campaign in 2010 was 110,707,890 and 82,342,088 for 2011with North Carolina Watermelon Farm Income for 2010 $24.05 million and North Carolina Watermelon Farm Income 2011 of $29.07 million.

The goal was an increase in consumer exposure to the campaign (2010) of 45,000,000

The Consumer exposure to SCBG funded campaign in 2010 was 110,707,890 and 82,342,088 for 2011with North Carolina Watermelon Farm Income for 2010 $24.05 million and North Carolina Watermelon Farm Income 2011 of $29.07 million.

The North Carolina watermelon industry generated in 2007 an estimated $12.4 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2011 year NC Ag Statistics reported an estimated an $29.07 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown fruits and vegetables. An estimated 192, 000,000 views on the advertising campaign was generated according to the reports from the media outlets.

This project benefitted growers throughout North Carolina. There are approximately 200 farms in North Carolina that have watermelons or vegetable production and all have been affected by this project in terms of potential increase in sales and a definite awareness of NC's relevancy in agriculture.

D. Beneficiaries

The North Carolina watermelons industry generated in 2007 an estimated $12.4 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2010 year NC Ag Statistics reported an estimated $24.05 million in farm income. For the 2011 year NC Ag Statistics reported an estimated $29.07 million in farm income the promotional campaign helped stabilize this industry and increase the sales of locally grown watermelons.

The project allowed the staff to examine the close relationship of supply and demand and "demand creation" through the awareness campaign and resulting

success of the project as a whole. The increase in sales was a dramatic experience for all involved including growers, shippers and brokers. The close relationship between the NCDA&CS and the NCWGA allowed for strong communication and hence a successful project.

E. Lessons Learned

The unexpected result was a sharp increase in demand for local foods even stronger than previous years. This demand help drove the success of the project and expanding sales.

F. Contact Person

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Project Title: North Carolina Floriculture Consumer Awareness Campaign

A. Project Summary

The North Carolina Commercial Flower Growers' Association (NCCFGA) was responsible for implementing a statewide media campaign to promote NC Floriculture Products with the help of the Specialty Crop Program. This project was implemented from November 2009 until May 2010. The marketing committee was assembled and developed the media campaign. The NCCFGA developed a request for proposal (RFP) and distributed to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery.

The media campaign consisted of television, billboards, print advertisements, and promotional materials. The advertisements promoted the Floriculture Industry, educated consumers on why they should "Buy Local" when selecting plants and flowers to plant on their properties and encouraged consumers to consult with Local Nurseries when purchasing these plants. The advertisements were placed in key markets of the state during the spring and fall of 2010 and during certain holiday seasons when consumers were purchasing plants. (Mother's Day, Valentine's Day, Thanksgiving, Christmas, Easter.) The NCCFGA measured the expected outcomes of the project.

The NCCFGA surveyed grower members through the use of its quarterly newsletter to see how sales of plant material were affected during the period the advertising occurred versus the sales of plants that were sold the previous year. The NCCFGA developed all surveys for use in evaluating promotional activities along with the assistance of NCDA.

Individual cut flower producers participated and applied for $500+ in a cooperative advertising as part of the promotional process. Grant dollars were matched, up to $500+, by individual cut flower producers. These funds were utilized to promote the products of specific producers through print, website, radio and TV ads, and were built upon the overall "Buy Local" campaign conducted by the Floriculture Association. Synergistic marketing opportunities

and awareness occurred because of the two campaigns running simultaneously. The NC Commercial Flower Growers' Association kept track of all cooperative efforts, requiring dealers who applied for cooperative funds to provide proof of matching expenditures towards the cooperative promotional efforts, as well as tracking their promotional results.

This new project teamed up the North Carolina Commercial Flower Growers' Association with the NCDA Marketing Division to promote the NC industry thereby changing the purchasing behavior of consumers and retailers to buy North Carolina plants. Increasing consumer purchases were increased and as a result the economic vitality of the floriculture industry in NC became stronger.

The North Carolina floriculture industry generated in 2008 an estimated $217.2 million in farm income according to the USDA Agricultural Statistics Floriculture Crops Summary. The economic downturn coupled with higher fuel costs had severe consequences of negatively affecting the income of these producers. A promotional campaign helped to stabilize this industry and increase the sales of locally grown plants. This campaign built upon recent US domestic consumer trends and growing interest in sourcing the local horticulture industry.

This project did not build upon a previously funded project.

B. Project Approach

The requested fund of $20,000.00 was used for a target mixed media marketing program that included television and print media promotion, along with development of promotional materials. The funds were used during the months of November 2009 until May 2010. The marketing committee was assembled and developed the media campaign. The NCCFGA developed a request for proposal (RFP) and distributed to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery.

During the months of April and May 2010 the NCCFGA posted 13 billboards with Lamar Outdoor Advertising to promote NC Flowers & Plants on major interstates and key

roadways all across the state of North Carolina. These billboards were illuminated and were in digital format. During the month of May, the NCCFGA had the governor of NC Proclaim that May was NC Floriculture Month. Press releases were sent out to media outlets across the state. Several news articles as well as TV mentions were seen across the state from these direct press releases. During mid September and into mid October TV advertisement spots were developed and run on UNC-TV to promote fall gardening and the purchase of NC grown poinsettias, flowers and plants. Both the billboards and the TV spots featured the NCCFGA web site: www.ncflowers.org which features a searchable map for local growers across the state. Web trends were up during these advertising periods.

Cooperative Advertising Funding was made available to individual floriculture & cut flower producers who participated and applied for $500+ in a cooperative advertising. These cooperative funds were used for ad placement assistance for their individual businesses. The companies were required to use the NCCFGA logo in the ad. Examples of the cooperative advertising proof of use entries received were radio, print media, and TV advertisements.

Mrs. Bonnie Holloman, Executive Director, of the North Carolina Commercial Flower Growers Association, worked directly with John Aydlett of the North Carolina Department of Agriculture and Consumer Services Marketing Division on this project. Mrs. Holloman coordinated the execution of marketing agreements and monitored programs throughout the grant period. She along with John Aydlett worked together to make sure that the projects were on track.

The following seven NC Commercial Flower Grower Members participated in the cooperative advertising part of the promotional procession:

Greenhouse/Nursery
Brawley Company Garden Center
Chris' Greenhouse
Coley Bunch Greenhouse
Homewood Nursery
Mitchells Greenhouse

Pender Pines Garden Center
Southview Greenhouses

C. Goals and Outcomes Achieved

The requested fund of $20,000.00 was used for a target mixed media marketing program that included television and print media promotion, along with development of promotional materials. The funds were used during the months of November 2009 until May 2010. The marketing committee was assembled and developed the media campaign. The NCCFGA developed a request for proposal (RFP) and distributed to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. Funding was made available to individual commercial flower grower producers who participated and applied for $500+ in a cooperative advertising.

Floriculture value went up from $217.2 million in 2008 to $249.7 million in 2010, and has continued its growth in 2011. Consumer impressions were measured through audited media results from the contracted advertising agency. Through this media campaign, there was a potential of reaching over 84,005,913 persons who could have seen these advertisements and promotions. All projects and accomplishments pertaining to this grant were reported the NCCFGA membership through its association newsletter and website.

The North Carolina floriculture industry generated in 2008 an estimated $217.2 million in farm income according to the USDA Agricultural Statistics Floriculture Crops Summary. This project was directly responsible for an increase in sales to NC growers. For the 2010 year USDA Agricultural Statistics Floriculture Crops Summary reported an estimated $249.7 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown floriculture products. An estimated 84,005,913 views on the advertising campaign was generated according to the reports from the media outlets.

D. Beneficiaries

This project benefitted growers throughout North Carolina. In 2009 there were approximately 298 Commercial Greenhouse operations in North Carolina and all have been affected by this project in terms of potential increase in sales and a definite awareness of NC's relevancy in agriculture.

E. Lessons Learned

The project allowed the staff to examine the close relationship of supply and demand and "demand creation" through the awareness campaign and resulting success of the project as a whole. The close relationship between the NCDA&CS and the NCCFGA allowed for strong communication and hence a successful project.

The unexpected result was an increase in demand for local products even stronger than previous years. This demand help drove the success of the project and expanding sales.

F. Contact Person

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(Previously Approved)

Project Title: Marketing Assistance in Promoting North Carolina Specialty Crops

A. Project Summary

Many North Carolina Consumers are unaware of the availability and variety of Specialty Crops grown in this state. This low awareness level limits the market potential for Specialty Crop Farmers. This project involves the design and placement of N.C. specialty crop billboard banners on 20 NCDA&CS Food Distribution Tractor Trailers. The banners will be displayed for four years. Our goal is to enhance consumer awareness of the variety and availability of N.C. specialty crops. This enhanced awareness will lead to increased consumption of N.C. specialty crops. These billboard banners will deliver a quick and concise promotional message to consumers. NCDA&CS Food Distribution trucks distribute food commodities to public schools and charitable institutions across the state.

Each year, these tractor trailers travel about half a million miles. The display of rolling billboards on these trailers will generate approximately one million visual impressions daily. This mobile marketing channel is extremely cost effective compared to other advertising forms such as radio, TV, newspaper, and traditional billboard advertising. This project increases consumer awareness of the variety and availability of N.C. specialty crops. Ultimately, it will benefit the thousands of specialty crop farmers in the state by increasing consumer awareness and sales movement of N.C. specialty crops.

B. Project Approach

North Carolina produces numerous specialty crops throughout the state. Consumers are always looking for exciting new nursery or specialty crops. As

consumer demand increases for these diverse crops, so will sales opportunities for farmers growing these crops. Marketing specialty crops is a challenge for our farmers. It is crucial to find a cost effective marketing tool in these economic times. Specialty crops require marketing and advertising to educate the consumer about the availability of these products.

Transit advertising has been proven as one of the fastest growing and most cost-effective tools. At $0.70 per thousand impressions, mobile billboard graphics are actually less than half the cost of traditional billboard advertising. Other mobile advertising facts based on recent studies:

- A staggering percentage, 96% of all North Americans travel in a vehicle at least once a week.
- On average, vehicle graphics generate between 30,000- 70,000 visual impressions daily (Source: Transportation Advertising Council of America)
- 90% of travelers notice graphics on wrapped vehicles
- 75% of consumers form impressions of companies based on their fleet graphics and 98% of those said that vehicle graphics created a positive image (Source: The American Trucking Association)
- Mobile ads generate 2.5 times more attention than a static billboard. (Source: Perception Research Services)

NCDA&CS Food Distribution Division is collaborating with the Marketing Division to place billboards on the state's 30 tractor trailers. The trucks are part of Food Distributions' fleet that delivers USDA approved foods to schools, disaster relief agencies, charitable institutions and others throughout the state. Each year the Food Service trailers traveled 465,000 miles for delivery purposes. By placing billboard banners on these tractor trailers, we are reaching thousands of people everyday just by traveling the state's highways. The objective of this grant project is to place 20 banners to promote N.C. specialty crops on NCDA&CS foodservice trailers.

NCDA&CS consulted with the respective specialty product association on the graphic design and production of the banners. N.C. specialty crop commodity associations such as the N.C. Vegetable Growers Association, N.C. Watermelon Association, N.C. Commercial Flower Growers Association, N.C. Blueberry Association, N.C. Sweet Potato Association, N.C. Christmas Tree Association, N.C. Green Industry Association, N.C. Strawberry Association, and N.C. Peach Association had expressed early support for the program.

NCDA&CS's Marketing Division graphic artist's and marketing specialist worked collectively with each individual commodity group to develop the messaging and graphic design for each billboard. A contractor was identified and contracted to finalize the design in collaboration with NCDA staff to print the banners. The contractor's employees working with NCDA&CS's Food Distribution Division scheduled appointments and conducted the installation of the billboards. Installation and quality control was documented and confirmed through visual inspection and photo documentation prior to payment from grant and commodity funds to the contractor.

These banners solely promote the following specialty crops: N.C. apples, blueberries, Christmas trees, commercial flowers, green industry, herbs, melons, muscadine grapes, nursery products, peaches, pecans, potatoes, pumpkins, sod, strawberries, sweet potatoes, tomatoes, turf grass, vegetables, and watermelon.

NCDA&CS staff has and is currently tracking ncfarmfresh.com web traffic utilizing Google Analytics.

C. Goals and Outcomes Achieved

This project contained both short-term and longer-term expected measurable outcomes. In order to assess progress toward these goals, project managers collected data through Google Analytics and through vehicle mileage records.

Short-Term Outcomes:

As outlined in the project proposal, specialty product associations were involved in the process resulting in 20 banners on NCDA&CS tractor trailers promoting specialty agricultural products. For many of the smaller associations, and their members, this project represented a major marketing investment in their products.

One of the stated metrics for this project was to realize a 5% increase in visits to **www.ncfarmfresh.com**, which was added to the billboards to collect web traffic data reflecting the results of this project. The total web visits for this website for

Fiscal Year 08-09 were 164,943. During the fiscal year for the project, the website recorded 186,843 visits—a 13.3% increase over the previous year.

A second metric for this project was to measure the impact on farmers by tracking the number of searches for farms and farmers markets on this website. **www.ncfarmfresh.com** recorded 654,850 unique page views for N.C. farms and farmers markets during the year, a 32.5% increase over the previous year (494,033 unique views)

These vehicles traveled a total of 464,717 miles for delivery purposes during the fiscal year. Total visual impressions on featured specialty crops were approximately 1.46 billion. The visual impact of vehicle graphics generate between 30,000 – 70,000 visual impressions on average daily, and are noticeable by 96% of travelers. Ninety-eight percent of travelers stated that fleet graphics create a positive image for the company/product, while 75% of people develop an impression about a company and its products, and 29% would base a buying decision on that impression. (The American Trucking Association study: *The Visual Impact of Trucks in Traffic*)

Long-Term Outcomes:

Due to organizational limitations of some of the specialty product associations, some of the banners were not fully implemented until later in the grant cycle, limiting the full effect of the marketing effort. Now fully fielded, the effectiveness of this project is expected to increase in scale as more consumers are exposed to the marketing effort each year.

D. Beneficiaries

The beneficiaries of this project are the 14 N.C. specialty crop associations and over 8,700 farmers involved in growing these specialty crops (2007 USDA Census of Agriculture). The commodities supported by this grant accounted for $1,311,555,000 in farm gate value in North Carolina in 2010. If this project increases consumer awareness and consumption for these commodities just 1 percent it would impact the farm gate value for these farmer's by $13,115,550.

Associations Assisted:

NC Christmas Tree Association

NC Strawberry Association

NC Peach Growers Society

NC Vegetable Growers Association

NC Watermelon Association

NC Commercial Flower Growers Association

NC Sweet Potato Commission

NC Pecan Growers Association

NC Blueberry Council

NC Potato Association, Inc

NC Sod Producers Association

NC Apple Growers Association

NC Tomato Growers Association

NC Muscadine Grape Growers Association

E. Lessons Learned

Fulfilling the activities of this project has led to some lessons learned. The offer of the free marketing medium was widely welcomed by the specialty product associations and their members, particularly among the smaller associations with limited resources. Those associations with limited resources required longer lead times to approve graphic designs and meet other criteria, but were no less enthusiastic. While other factors may have contributed to the growth in visits to the N.C. Farm Fresh website, it is clear these banner ads are increasing consumer awareness of N.C. specialty food products.

F. Contact Person

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(Previously Approved)

Project Title North Carolina Sweet Potato Western European Marketing Campaign

FINAL REPORT

By the

NC Sweet Potato Commission, Inc.

For the grant program entitled:

North Carolina Western European Marketing Campaign

February 15, 2011

Project Summary

Three marketing strategies were employed during the 2009-2010 NC Western European Marketing Campaign: Food service sector: joint participation in a USA Cafeteria Promotion in Germany; an exhibit stand within the pavilion of a Dutch importer at Fruit Logistica Exhibition and Trade Show in Berlin, Germany; and a promotional campaign in the ICA retail grocery stores in Sweden.

Each promotion reached a different sector of the European marketplace for sweet potatoes. The Western European markets know little of sweet potatoes in general. The exhibit stand within the Valstar pavilion provided an educational, informational and cost effective opportunity to get North Carolina's sweet potato message as to quality, availability and cost to the over 53,000 purchasers of fruits and vegetables from 71 countries especially Europe, Scandinavia and the UK. The cafeteria promotion although small in scope, raised awareness of the positive sales potential for North Carolina sweet potatoes with foodservice operators and also influenced their visitors' purchasing intent by providing the opportunity to sample/taste a relatively unknown product in a menu application in a manner they could duplicate in their home. The third promotion with Swedish retailer, ICA , established a new and consistent market for North Carolina sweet potatoes as well as building awareness and loyalty to NC sweet potatoes.

- What was the impetus or motivation for the implementation of this project? Specifically, describe the issue, problem, or need that was addressed by this project.

  Domestic sweet potato consumption (5% increase in 2 years prior to 2009) was not growing at the same rate as the planted acreage (13% increase in 2 years prior to 2009). The probability of a burdensome oversupply and depressed farm prices on an already mature retail/foodservice marketplace necessitated the need to find new marketing outlets which had the potential for growth. Western Europe was determined to have the most potential to establish a new and consistent market for fresh North Carolina sweet potatoes. The food sampling that was conducted in retail and foodservice outlets within Germany and Sweden created awareness and helped to establish a brand loyalty for North Carolina sweet potatoes. Since 2009 there have been almost 50 new growers who have incorporated sweet potatoes into their annual cropping priorities.

Project Approach

In three different European food sectors an educational and participatory approach was employed to provide as much impact as possible in order to achieve the goals of building awareness and brand loyalty to North Carolina sweet potatoes. Colorful signage at all three promotions was eye catching and depicted the North Carolina SweetPotato logo as well as sweet potatoes being grown in their natural state in North Carolina. Educational material was also available in all three promotional events.

Foodservice:
Three corporate cafeteria promotions were established in Berlin and the Rhine region of Germany. Each cafeteria featured NC sweet potatoes with posters, menu integration and a special promotional brochure featuring their origin, versatility and health benefits with accompanying recipes for home usage. In addition to brochures and product samples a postcard announcing an online contest was offered to cafeteria visitors.

Produce Trade Show and Exhibition:
At the Fruit Logistica in early February, 2010 in Berlin Germany, NC sweet potatoes were exhibited and sampled at a 6m2 area in the Best Fresh Group Pavilion for the entire four days. A cooking desk featuring pictures of NC sweet potatoes and our logo were prominently displayed. Stand personnel prepared on site tasteful and easy sweet potato recipe samples and handed them out to trade show participants who were from over 70 countries with a total attendance of over 54,000. Informational leaflets in both English and German were handed out to visitors.

Retail:
During May of 2010 Swedish food retailer ICA conducted a promotional campaign which consisted of in-store sampling, food demonstrations and retail in-store advertising in 68 ICA Maxi Stormarknad stores

Goals and Outcomes Achieved
The activities within each sector of the Western European food market created a synergy between the decision makers—the produce trade, importers, wholesalers, retailers and food service professionals as well as the consumer.

Goal of establishing a new and consistent market in Western Europe for NC Sweet potatoes.
The United Kingdom experienced a 78% growth since 2006 but in Western Europe sweet potatoes were considered a specialty item with little or no shipments from North Carolina. (WISER Trade Report April 2010). Since the completion of the three promotional efforts, North Carolina sweet potato shipments into Western Europe has risen 47%. The German cafeteria promotion and the Swedish retail in-store sampling created a "pull through" effect in that consumers tasted sweet potatoes from North Carolina and created a demand. The Fruit Logistica Trade Exhibition created the "push through" effect by educating and informing the produce trade distributors that North Carolina is a reliable source for their needs. Although there are no direct shipments into Denmark/Sweden listed on the Wiser Trade @HCC Database report dated June 2010, the Netherlands (the port through which sweet potatoes are received and then transported within Europe) reports an increase of 28.74%. NCDA&CS Market News Service in North Carolina reports that International shipments represented 12% of the total fresh market shipment from 11-19-2009 through 2-11-10 and 20% in fresh market shipments during the period of 11-18-2010 through 02-23-2011. An 8 % increase for North Carolina sweet potatoes in one year.

The goal of building awareness and purchase intent of North Carolina sweet potatoes to Western European consumers as well as convincing European retailers to carry North Carolina sweet potatoes in their produce sections more consistently was achieved. An increase in consumer awareness was realized through the ICA in-store demonstrations. A total of 21,382

tastings were made that constituted an average of 338/store. Of the customers who tasted the samples 51% had never tried them. The comments included the following: Many customers said they hadn't really dared to buy it because they didn't know how it tasted; a lot of children like the samples very much and told their parents to purchase; Lots of questions and discussion about how to prepare the product. According to the reporting agency (mk2) for the cafeteria promotion, almost every visitor took an offered informational brochure about North Carolina sweet potatoes which built awareness.

Goal of increased NC acreage and help support domestic pricing of fresh sweet potatoes by allowing producers to be more efficient in terms of the scale of their production and by offering them additional market outlets lessening the possibility of oversupply and by adding new growers. North Carolina's acreage has increased exponentially since 2009. The increasing export market has reduced the risk of having an oversupply and stabilized domestic pricing. USDA/NASS report for sweet potato acreage says that in 2009, 47,000 acres were planted with 2010 acreage at 54,000. Statistics from NCDA&CS Market News Service reports that pricing per 40 lb. carton remained stable at $16-$18 range in spite of the 15% increase in acreage. The increase in exports has contributed to the stability of market.

The total number of NC sweet potato producers has increased 8% from 347 in 2009 to 374 in 2010. While the number of new growers is relatively small, existing producers have expanded their acreage and facilities to meet demand and those farmers who had not planted sweet potatoes during the past several years are now including them in their cropping priorities.

Beneficiaries

Scandinavians (over 21,000) in Sweden/Denmark were educationally benefitted by the in-store promotions. The 68 ICA stores benefitted due to increased sales of sweet potatoes during and after the promotion as well as the intangible benefit of providing an educational service. As sweet potato exports continue to rise, over 350 sweet potato growers were benefitted by being able to increase planted acreage ; an increase in demand by shippers for the farm product and more marketing options other than domestic sales. Consumers, both domestic and international were benefitted. Due to the different size preferences of customers in the USA and Western Europe, a uniform product was available to each market although on different shores.

Lessons Learned

The in-store promotion would have had more impact if it had been executed in late November/early December as planned due to the increased holiday foot traffic in the retail stores. In retrospect, this project should have been for 2 years rather than one. Although approval occurred in October 2009, the contract was not executed until mid December 2009 with the first advance arriving in mid March of 2010 which meant that the Swedish in-store promotion would occur in the spring, a less opportune time. We will take into consideration the length of time needed from grant approval to fund disbursement in planning future marketing efforts.

Also, having sweet potato menu suggestions or a recipe sheet accompanied by preparation tips and in home storage instructions in the native language would have greatly increased the interest, awareness and purchase intent.

Contact Person

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Additional Information

Attached are the following: The ICA Evaluation; USA Cafeteria Promotion Evaluation; and trip reports from Nathan Holleman, NCDA&CS International Marketing Specialist who traveled to Germany, Denmark and Sweden during the Fruit Logistica Exhibition and Trade Show in Feb. Although there are no direct shipments into Denmark/Sweden listed on the Wiser Trade @HCC Database report dated June 2010, the Netherlands (the port through which sweet potatoes are received and then transported within Scandinavia) reports an increase of 28.74%.

RETAILHOUSE

EVALUATION

MAXI ICA STORMARKNAD

SWEET POTATO WEEK 19, 2010

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BACKGROUND

- The Sweet Potato promotional activities were carried out on Friday 14 May 2010.

- The campaign activities were conducted in 68 ICA Maxi Stormarknad stores, in the “Fruit department”.

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PURPOSE OF THE CAMPAIGN

Aims and Objectives:

- Inform customers about Sweet Potato and how to use it.
- Increase Sweet Potato consumption.

Target Market:

- The campaign was aiming to attract all customers that shop at ICA Maxi.

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MATERIAL

SIGN FOR TABLE (A4)

POP-UP

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MEDIA

Picture of product

Price offer

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DESCRIPTION OF EVALUATION

Evaluation ICA Maxi stores

- Total number of stores evaluated: 58
- Total number of stores participating: 68
- Implemente : During week 20
- Method: Phone Survey

Evaluation – event personnel

- Total number of people evaluated: 69
- Total number of people participating: 63
- Implemented: During weeks 20 and 21
- Method: Questionnaire reported on Retail House portal

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EVALUATION - ICA MAXI STORES

- Grade how the activity increase sales
- Grade the event personnel's efforts in-store
- Grade the effect of the material
- Grade the total impact of the campaign
- What volume were ordered to the activity?
- How much was sold?
- Comments

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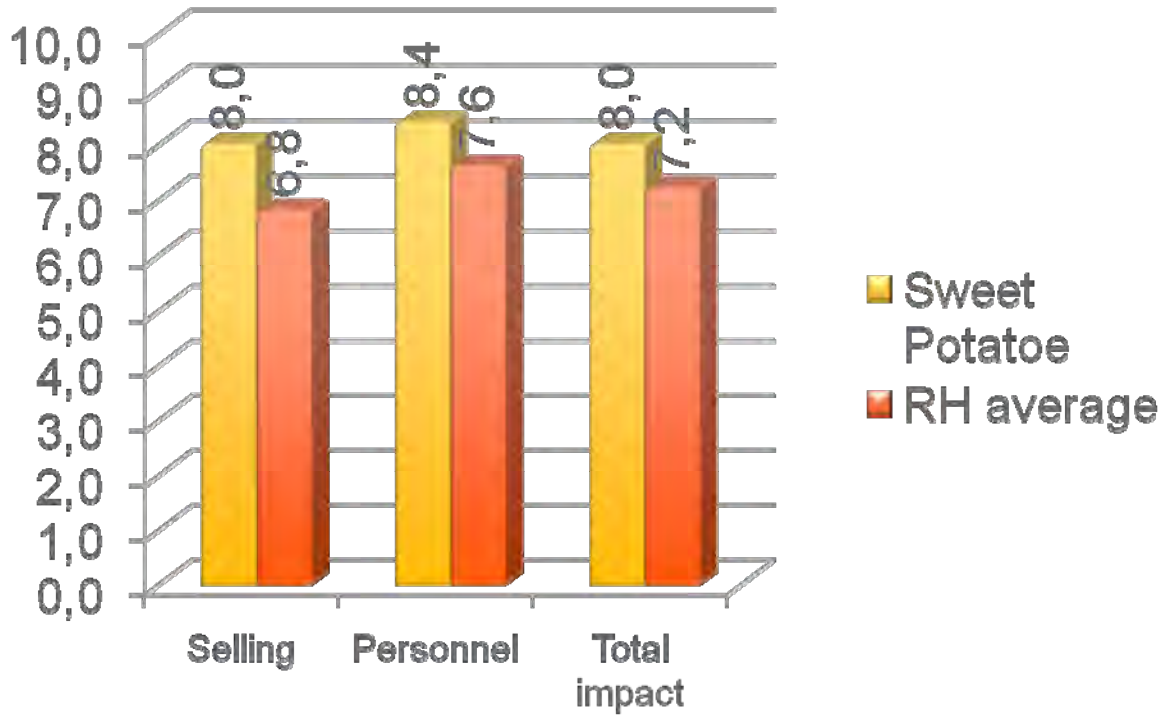
RESULTS- ICA MAXI STORES



The stores subjective rating.

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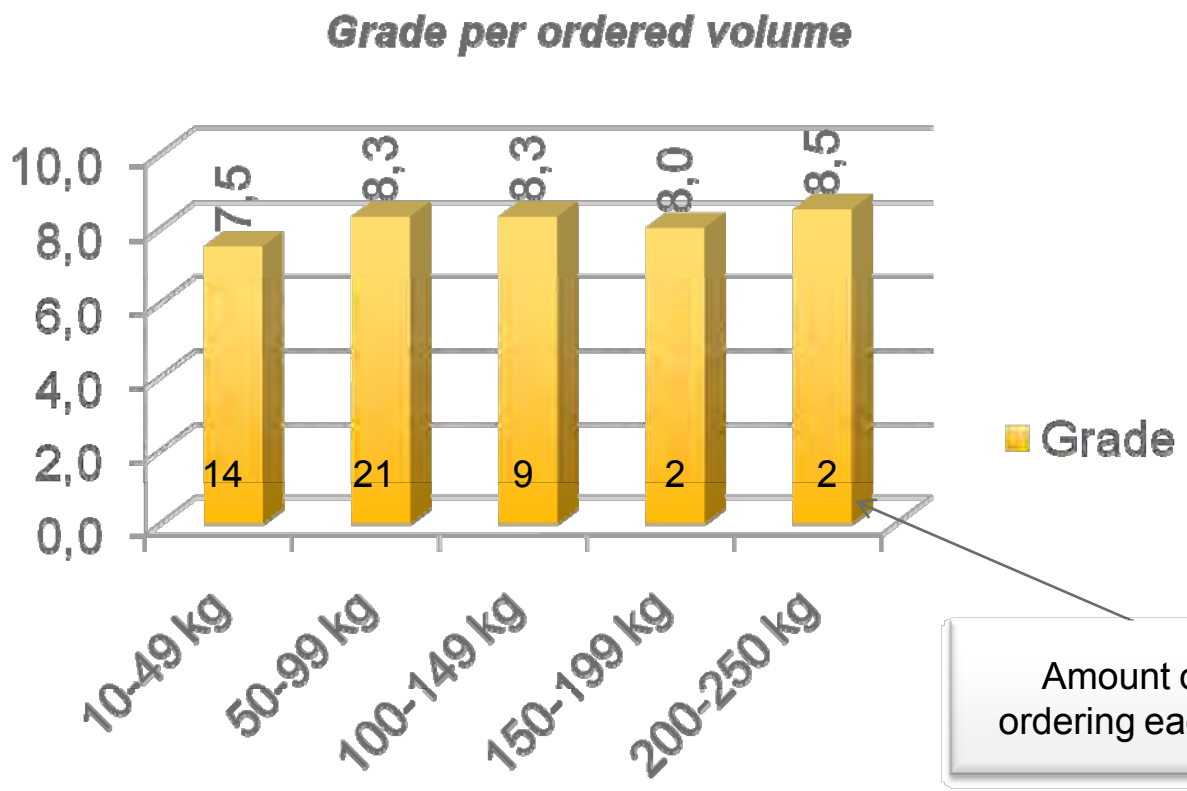
RESULTS- ICA MAXI STORES



Amount of stores ordering each volume.

Enköping ordered 250 kg and sold 258kg!

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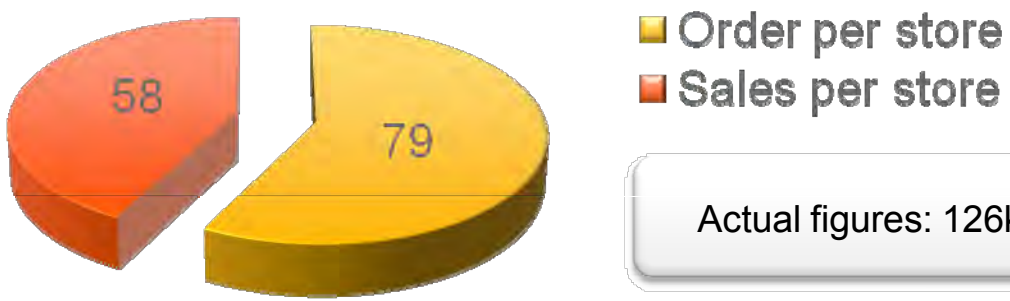
RESULTS-ICA MAXI STORES,
Estimated figures according to Department Manager
(answer from 48 stores)

KILO POTATOES



Actual figures: 126kg/store

Several stores say that what remained after the activity, were sold the days after.

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SALES FIGURES

Average weeks before: 1261 kg

Total: 8964 kg

Increase: 610%

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COMMENTS FROM STORES
REALLY FUN WITH ACTIVITY ON SUCH AN UNKNOWN PRODUCT. IT WAS A TRUE SUCCESS.
ICA Supermarket

COMMENTS FROM STORES

- ✓ Really fun with activity on such an unknown product. It was a true success.
- ✓ I love the concept with advertising plus demonstration.
- ✓ It tasted good, it smelled nice and it looked great.
- ✓ Difficult to sell such an odd product. It´s not very common up here.
- ✓ A bit boring only to offer the potatoes, there could have been something more to it, like meat or something.
- ✓ There ought to be more demonstrations with fruit & vegetable. There are a lot of products that the customers do not know about.
- ✓ We sold 12 boxes in one day, usually we sell 2 boxes in a week!

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EVALUATION - EVENT PERSONNEL

- Where in store were the activity placed?
- Did you expose the material?
- Estimate how many consumers that tasted Sweet Potatoe during demonstration
- How many had tried Sweet Potato before?
- Which age group showed the biggest interest in the product?
- Grade the consumers interest of the campaign
- What is the most common opinion from the consumers?
- Comments

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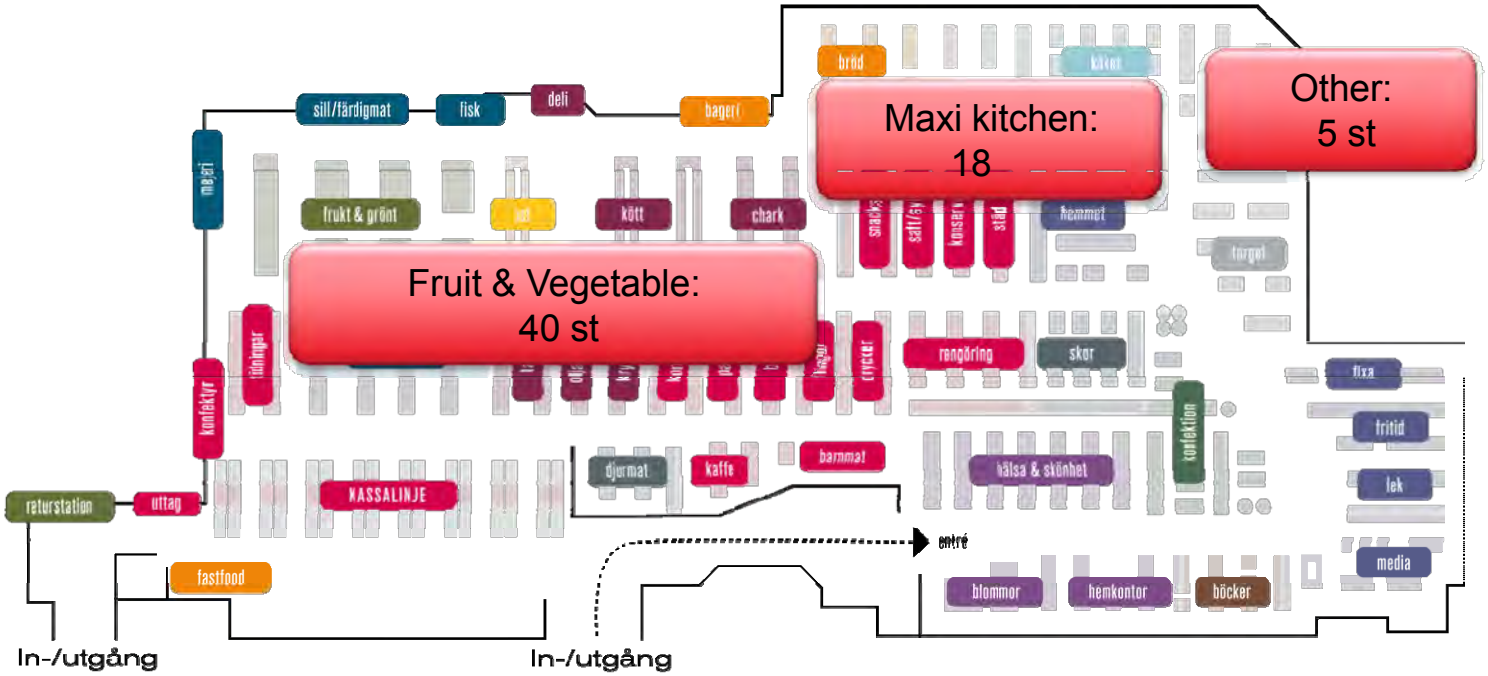
POSITION OF THE ACTIVITY



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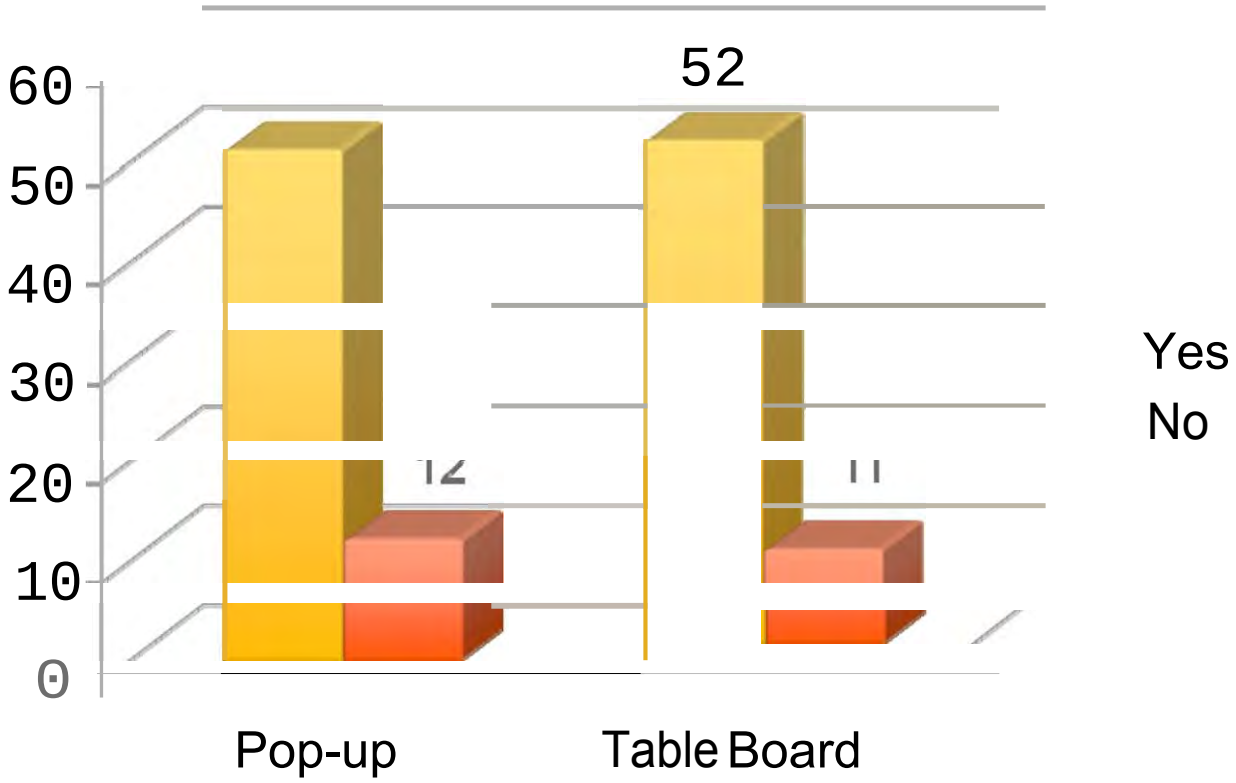
DID YOU EXPOSE THE MATERIAL?



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TASTINGS

Total: 21 382 st

Average per store: 338 st

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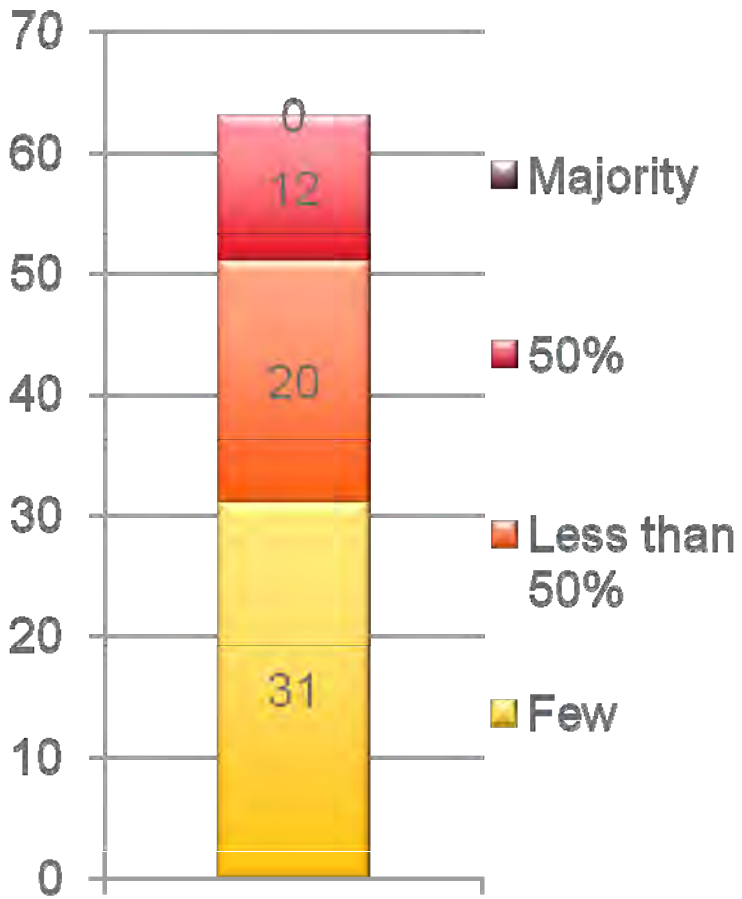
HOW MANY HAD TRIED SWEET POTATOE BEFORE?



Many people knew about Sweet potatoe, but had never tried it.

They hadn´t really dared to buy it because they didn´t know how it tasted before.

Two persons said they had lived in USA, so they had tried it there.

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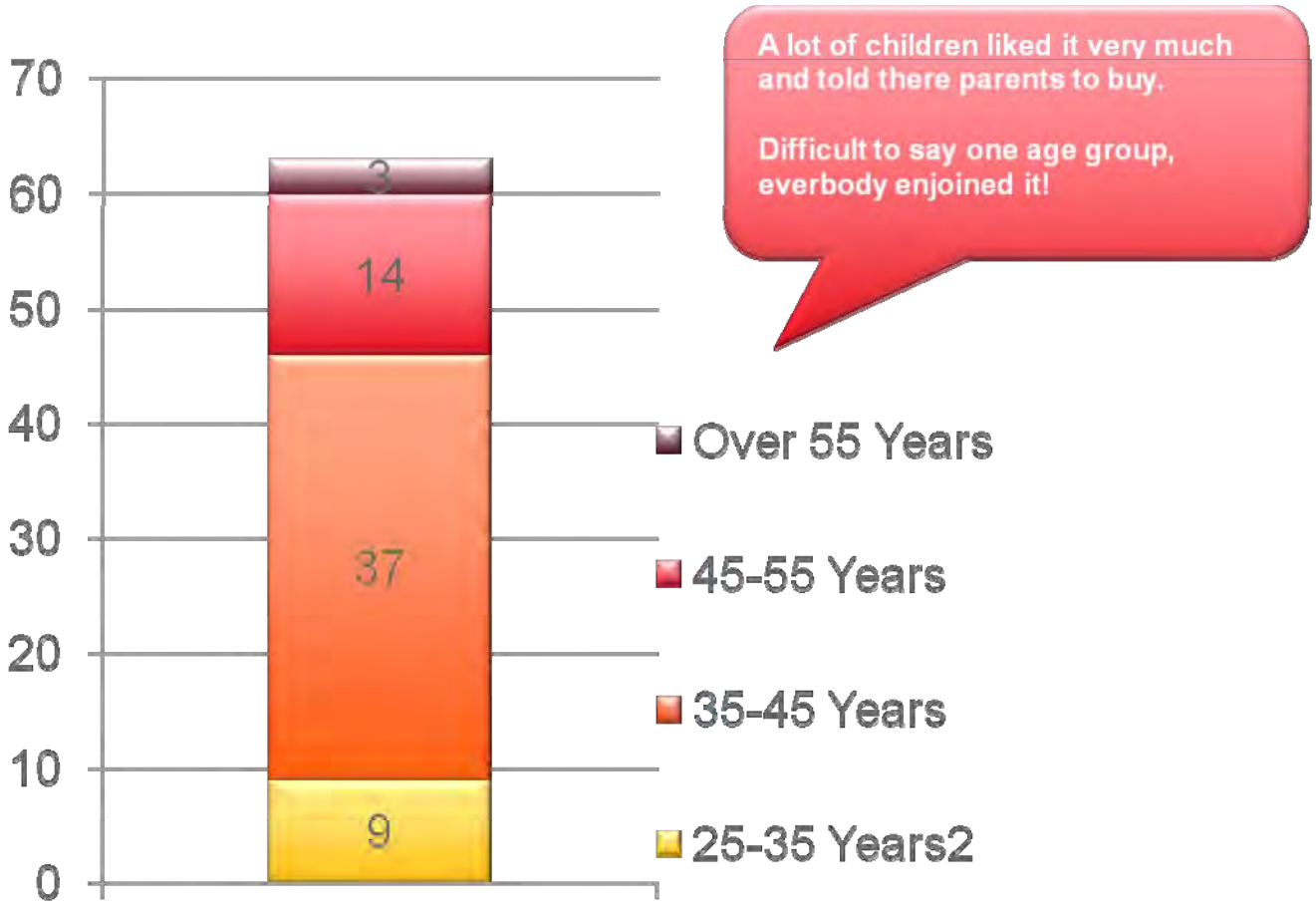
WHICH AGE GROUP SHOWED THE BIGGEST INTEREST IN THE PRODUCT?



A lot of children liked it very much and told there parents to buy.

Difficult to say one age group, everbody enjoined it!

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COMMENTS FROM CUSTOMERS
I HAVE ALWAYS BEEN CURIOUS, BUT NEVER DARED TO TRY IT.

COMMENTS FROM CUSTOMERS

- ✓ Delicious
- ✓ Too sweet.
- ✓ I thought it was a carrot.
- ✓ I have always been curious, but never dared to try it.
- ✓ So simple, and real nice balance with the sweet and salt.
- ✓ Almost better than Swedish fresh potatoes.
- ✓ I surely will have Sweet Potatoes this weekend!
- ✓ Good price today, they are usually too expensive.
- ✓ A lot of questions and discussions about how to prepare them.

© Retail House

COMMENTS FROM PERSONELL
ONE OF THE BEST ACTIVITIES I HAVE WORKED WITH!

COMMENTS FROM PERSONELL

- ✓ Everything was perfect!
- ✓ It would have been nice with recipes to hand out.
- ✓ Really fun activity. The customer were optimistic and I sold a lot.
- ✓ One of the best activity I have worked with!
- ✓ Customers had seen sweet potatoes in cooking programs on tv. They were standing in line to taste it.
- ✓ An american woman came by and was really excited about the recipe!
- ✓ A bit cumbersome because there was no running water at the activity table. Had to run through the store to rinse the potatoes.

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Maxi Ängelholm

Maxi Karlskoga

Maxi Olofström

Maxi Partille

EXPERIENCE & FINDINGS

Experience for the customers

- Good to learn about an unknown product.
- Inspiration how to use the Sweet Potato in different ways.
- Great price offer.

Value for the stores

- An activity that gives the store a happening for it´s customers.
- An unknown product has been discovered.
- Increased sales in the most strategic categories
- Satisfied customers = Satisfied stores

Supplier/ICA Fruit & Veg

- An acitvity that creates value to the stores strengthens the relation to ICA Maxi.
- Increased sales

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THOUGHTS & ADVICE

- A recipe brochure would be a perfect handout to the customer. Ideas and inspiration that will increase the sales after the campaign.
- Repetition is important to remind the customers of the Sweet Potato. Campaign merchandise gives the product visibility in store.
- There is a growing demand among the ICA Maxi Stores and the consumers of more fruit and vegetables demonstration.
- The combination of advertising, exposable material, products in stock, good price and personnel with engagement made this Sweet Potato activity a success!

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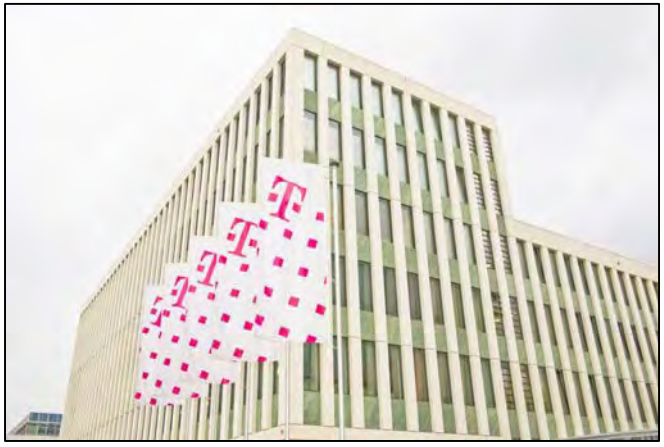
Sweet Potatoes from North Carolina

USA Cafeteria Promotion in Germany 2009 Season

North Carolina SweetPotato Commission

General information

- We cooperated with the foodservice company L & D to organize three corporate **cafeteria promotions** in the last week of October.
- L & D is a foodservice operator supplying most of the high-end cafeterias in the Rhine region and Berlin.
- Participating were three cafeterias, including the T-Mobile headquarters as well as the Telekom and T-Home, Germany‘s largest telephone company (about 90% market share), in Bonn.



Sweet Potatoes from North Carolina

Decoration

- For the USA Promotion the cafeteria decoration included Jack-O-Latern pumpkins and American flags.
- Posters and Roll-ups announced the promotion and drew attention to the American Indian summer menu.

Sweet Potatoes from North Carolina

Menu of the day

- Sweet potatoes were integrated into the cafeteria menu twice during the promotion week.
- More than **3.000 dishes** with sweet potatoes were sold during the promotion week.
- AdScreens advertised the dishes as menus of the day. The menu read as follows:

  Tuesday: Turkey with cranberries and **mashed sweet potatoes**.

  Thursday: Monkfish with pumpkin and **mashed sweet potatoes**.

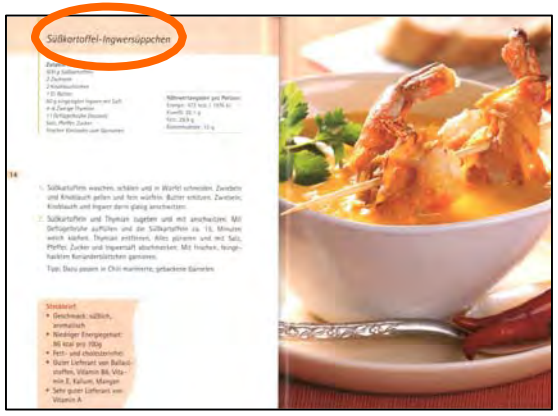
Sweet Potatoes from North Carolina

Information and recipe brochure

- A **special promotional brochure** was created for the cooperation showing the versatility of sweet potatoes in home cooking, discussing health benefits and origin of sweet potatoes.
- The following **recipes** with sweet potatoes developed for the North Carolina Sweet Potato Commission were presented in the recipe section:

  Sweet potato ginger soup

  Sweet potato bread
- The logo of the Commission was also published in the brochure.



Sweet Potatoes from North Carolina

Information booth

- The Sweet Potatoes Commission, accompanied by other MAP cooperators (the California Walnut Commission and the Cranberry Marketing Committee), was present with an **information booth**.
- mk² team members were offering the brochures and product samples of the other cooperators.
- In addition, a postcard announced an **online contest** to win one of five iTunes gift certificates. The contest question was:

  What holiday do Americans celebrate traditionally on the fourth Thursday in November?
  a) Columbus Day
  b) Thanksgiving
  c) Halloween

Indian Summer Feeling in Bonn

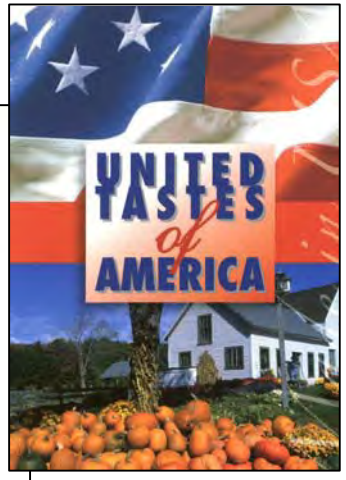
Probieren Sie doch einmal Rezepte aus dem United Tastes of America Kochbuch. Jetzt ist die beste Gelegenheit, denn es ist Erntezeit und die Cranberries, Walnüsse und Süßkartoffeln haben die Energie des ganzen Sommers getankt. Kulinarischer Genuss und die neue Lieblingsmusik machen das Heim gleich doppelt gemütlich, wenn draußen ein Herbststurm tobt.

Beantworten Sie einfach unsere Gewinnspielfrage und **gewinnen Sie einen von fünf iTunes Gutscheinen** im Wert von 50 Euro.

Welcher nationale Feiertag wird jeden vierten Donnerstag im November in den USA gefeiert?

Jetzt mitmachen und gewinnen auf www.american-foods.org/gewinnspiel

Einsendeschluss ist der **30.11.2009**. Der Rechtsweg ist ausgeschlossen



Sweet Potatoes from North Carolina

Results

- Daily **3.500 to 5.000 visitors** had the chance to ask the staff members questions about USA sweet potatoes and collect informational material at the booth for an entire week.
- About **4.500 brochures** were handed out.
- According to the management of L & D, it was **the most successful promotion** in the history of L & D and calls for a repetition.

NCDA Marketing Division, International Section
Trip Report for Nathan Holleman
Travel to: Berlin, Germany
Travel for: Fruit Logistica Produce Exhibition
Dates of Travel; February 1-5, 2010

Trip Summary

I visited the Fruit Logistica Produce trade exhibition during the first week of February on behalf of the North Carolina SweetPotato Commission in order to review a North Carolina sweet potato exhibit at the show by their Dutch importer, Valstar Holland. While at the show I was also able to meet with our SUSTA European representative, Victor Phaff, in order to discuss upcoming European trade shows we'll be participating in such as SIAL/Paris this year and ANUGA next year. I was also able to meet with our German Ag Marketing Specialist with the US Embassy in Berlin and several other USDA/FAS cooperators and consultants.

Valstar Holland did a great job exhibiting North Carolina sweet potatoes through their exhibit and by preparing samples for tasting by exhibit participants. They indicated that their sales of North Carolina sweet potatoes into Western Europe and Scandinavia continue to grow. We were also able to discuss upcoming Specialty Crop and Commission funded in-store demos that will occur in Germany during Easter. The only other sweet potatoes on display at the show were Egyptian. I will need to follow up with Valstar at a later date to determine how effective the show was for them in terms of new clients for and sales of North Carolina sweet potatoes.

Final numbers for the show indicate there were 53,000 visitors and 2300 exhibitors from 71 countries in attendance at the show, according to The Packer. Fruit Logistica is the European equivalent of the PMA show held every year here in the US.

Trip Specifics

I departed Raleigh on February 1st and arrived February 2nd in Berlin around noon. That afternoon I conducted a couple of store checks at retail outlets near the hotel. I visited an Aldi; very similar to those we have here in the US, but with very few US products. Later I went to a Rewe, similar to a Foodlion. They carried sweet potatoes but what they had were in bulk and from Israel. They didn't carry a lot of other US products, although they did have some US multinational labeled product, such as Heinz, Pepperidge Farms, etc., most likely manufactured in Europe under a licensing agreement.

Wednesday morning I went to the Fruit Logistica exhibition and viewed the North Carolina sweet potato booth which was part of the overall Valstar Holland exhibit. Valstar did a good job of presenting the product and preparing samples for tasting by show participants. They prepared sweet potato samples in two ways; one was microwaved and served with parsley and white truffle mayonnaise while the other were small pieces of sweet potatoes that were fried. The fried samples were most popular among those trying both of the samples. Valstar also handed out recipe brochures that were printed in both English and German to people visiting their booth. Photos of the exhibit follow this report.

I met with Valstar staff in order to discuss our joint upcoming in-store demonstrations to be conducted in around Easter. We discussed how best to demo the product in store, how best to use some leftover recipe brochures from another promotion, and other issues such as the need for a Memorandum of Understanding between Valstar and the Commission in order to satisfy grant requirements.

Later in the day I met with Victor Phaff who is the SUSTA European rep in order to talk about upcoming European trade shows we'll be participating in. I will be attending SIAL/Paris as co-manager of the SUSTA pavilion this October. Victor will be in charge of putting the pavilion together. We also decided that Victor will submit a proposal to include Fruit Logistica as SUSTA activity for next year. We feel that certain southeastern fruit, nut and vegetable producers could benefit from exhibiting at the show, in particular citrus, nut (peanut and pecan), onion, sweet potato and blueberry producers.

That evening I went to dinner with the Valstar staff and met some of their clients from Denmark and other Scandinavian countries. Sales of North Carolina sweet potatoes through Valstar continue to increase and in particular to countries such as Sweden and Finland.

Thursday I returned to the show. I visited the Egyptian pavilion where I saw Egyptian sweet potatoes (the only other sweet potatoes exhibited at the show). Our main competition in Europe for sweet potatoes is Israel and Egypt, but the Israeli season was over and they were not exhibiting product in their pavilion. I also saw many blueberries on display, primarily from Chile. While it's the wrong time of year to display NC blueberries it may still be a good show for blueberry exporters to attend for those who are interested in selling to the European market.

Later in the day I visited the US Pavilion, where I visited with Christel Wagner, Ag Marketing Specialist at the US Embassy in Berlin, Marcel Pinckaers, and Ag Marketing Specialist with the US Embassy at The Hague, and various other cooperators and consultants that I've known for many

years. I agreed to provide Marcel with a list of US exporters of North Carolina sweet potatoes as he has had many recent requests for such information.

I also told him and Christel about our upcoming German in-store demos so that they would be aware of the promotion. They seemed pleased with our efforts in their markets.

On a side note, I sampled Niagara grapes (a US domestic cultivar grown primarily in the NE) grown in Brazil. I wonder how long it will be before they grow some of our other domestic grape varieties down that way.

I departed Berlin the morning of the 5th and arrived home late that evening.

All in all I think it was a successful, albeit short, trip. I renewed many acquaintances, saw how North Carolina sweet potatoes were promoted to European importers and distributors, and was able to check out some of the competition. Valstar Holland seemed quite satisfied with the Commission's commitment to growing the European market for North Carolina sweet potatoes.

DISCOVERED
sweet potatoes
D

Innovations
VIA NOVA
NUMMER 1

DISCOVERED
Süßbataten
Süß und Gesund
Die Süßbataat ist eine Tropenfrucht. Sie ist gesund, vielseitig,
voller Überraschungen. In den USA wächst bereits jedes Kind mit Süßb
auf – heute entdecken auch viele Europäer diese großartige Knolle für
auch wenn sie nicht mit unserer Kartoffel verwandt ist.

Project Title: NC Sweet Potato Consumer Trust Initiative

A. Project Summary:

This programs purpose is to equip the NC Sweet Potato industry to proactively confront food safety issues, produce a nutritious, safe product, expand markets for its growers, and to prevent the devastating consequences resulting from food borne illnesses and food safety problems.

The safety of the food consumed has increasingly been in question as unacceptable lapses have occurred within several industries implicating a widening array of food products. Consumers become ill and in some cases died due to documented food safety problems. Frequently the tracking of the implicated product to its origin has taken considerable time and has been understandably accompanied by extensive media coverage. As a result, the NC farming industry for peanuts, tomatoes, and peppers, a few of the commodities recently implicated, have suffered significant sales losses due to food safety issues with no direct tie to NC, or their farm. Implicated commodities suffer swift damages to sales and slow recovery as consumer confidence quickly dips and slowly rebuilds.

The NC Sweet Potato industry has sought to avoid or at least rapidly mitigate any problems by implementing a proactive food safety system to include farm-to-fork produce tracking coupled with a crisis management plan for the industry and a tiered food safety program for all growers.

The sense of urgency is real. The viability and continued growth of the NC sweet potato industry, now a $226 million industry with over 300% farm revenue growth since 2001, is vital to North Carolina in general and the 350 farming operations of eastern NC in particular.

Within the US, consumers have zero tolerance for food borne disease. Other highly developed countries such as those in the EU especially have increasingly tightened their bio standards for imported fresh produce. Presently, the NC sweet potato industry exports $15 million of fresh sweet potatoes, 30% going to the UK and EU, an important market to NC which has grown 20% in recent years and has the potential to expand by another 4,000,000 pounds given success with a targeted export initiative proposed by the NC Sweet Potato Commission. Product traceability and compliance with residual chemical detection limits are key components of doing ongoing business in these markets.

The NC sweet potato industry seeks to lead other sweet potato producing states in implementing and leveraging a functioning food safety program to provide added confidence for both domestic and export customers. Concurrently, consumer perception and industry concerns over food safety have resulted in Federal food safety legislation being passed.

B. Project Approach:

Briefly summarized, the activities performed include:

Produce Traceability**:** With a goal of encouraging NC packer/shippers to develop and implement sweet potato traceability programs, progress has been made. This project and benefits were part of the agenda at each formal industry gathering (3 to 4 times per year; annual meeting, research updates, and field days) from project initiation in 2010 through the extended time period of the 2012 project closing. Actual results were reviewed at each meeting and an encouraging message was recurrently stated. Letters were sent directly to growers. Signage was displayed. Vendors attended these events and made direct contact with growers. On farm surveys and specific proposals were conducted by traceability vendors for each completed installation and for many other growers that later chose to not participate. Growers made independent decisions about the exact equipment needs fitting their situation. The shippers and growers selected and made their own decisions as private business entities about their installation plans for 2010 and 2011. Most all of the larger volume NC packer/shippers have installed traceability systems. Several have developed their own systems which fulfill their customers' requirements but did not meet the standards for reimbursement by this grant program (PTI compliance). In total seven packer/shippers utilized the cost share program (versus a goal of 15) despite intensive efforts to encourage broader participation. Thus phased installations at 33 and 57 locations did not occur; installation and startup for 8 shippers and 25 growers and later 7 shippers and 50 growers was not fully achieved. Training and testing did follow each installation. In the past year the pace of new installations was stalled by tepid retailer demand and an industry concentrating on dealing with excess supply issues. An approved extension of the grant period helped with additional consumer and industry efforts to encourage the two latest installations. Additionally involvement in various industry-driven food safety meetings encouraged growers and shippers to incorporate traceability systems into their operations.

Crop Protection Chemicals**:** With a goal of determing which crop protection chemicals are suitable for both domestic and international usage, all pesticides registered for post harvest treatment were reviewed. No desireable alternatives exist

and this investigation has determined Scholar, a product of Syngenta, is the only functional and approved product. Following considerable efforts, approval of Scholar for sweet potatoes shipped to the EU has been obtained as of August 22, 2011. This summary from the European Food Safety Authority (EFSA) states, in part: "In order to accommodate the authorized post-harvest use of fludioxonil on these crops (sweet potatoes, yams), it is proposed to raise the existing MRL from 0.05 mg/kg (set at the limit of quantification) to 10 mg/kg. The RMS drafted an evaluation report according to Article 8 of Regulation (EC) No 396/2005 which was submitted to the European Commission and forwarded to EFSA on 20 July 2010. Approval of Scholar was communicated among the NC packer shipper base as part of guidance about the NC export strategy and has helped expand the export horizons for NC packer shippers; in 2010/2011 export shipments represented 16% of the fresh crop versus 5% in 2009/2010. The EU protocol was adopted as it is the more stringent. Grower pest management practices as part of GAP and Euro Gap programs tie the usage to the traceability program. The baseline application data (noted above) was established.

Crisis Communication Program**:** The objective was to implement a NC Sweet Potato Crisis Communications plan to expedite media and consumer communication in the event of a food safety issue. A comprehensive Crisis Plan has been developed, and was thoroughly reviewed and revised as appropriate with input from the NCSPC board, the NCSU Food Safety Task Force, and the NCDA, and then implemented. The completed crisis plan also had support and training materials. An ongoing crisis communications team has been appointed by the board, industry representatives have participated in multiple Crisis Workshops (including a table-top crisis simulation session at the NCSPC annual meeting) which have been conducted, additionally several media training sessions have occurred for a group of 3-4 key leaders of the NC sweet potato selected as industry spokespeople. Training modules with the 7 of the top 19 packer shippers were conducted at the NCSPC annual meeting for all in attendance (of 150 including 10 packer shippers). The Crisis Plan Overview has been developed and provided to all NC growers as reference material. Separately from the grant, an industry-only web site is under development to facilitate expedited communications and for relaying support materials.

Tiered Food Safety Program**:** The goal has been to implement a tiered food safety program to encourage all NC sweet potato growers to upgrade food safety verification. The concept was introduced at the NCSPCF annual meeting in 2010 and has been reemphasized at research and annual meetings thereafter. The response and participation has greatly exceeded initial expectations. With the help of NCSU Cooperative Extension and the NC Fresh Produce Safety Task Force a GAP focused program has been developed and implemented that distributes GAP training into several sequential programs making an introduction to GAP principals and practices less daunting for the uninitiated. While initially envisioned as a five step

program, it was consolidated to a three step program following involvement by the NCSU Ag extension services. This modification did not reduce content but consolidated training for the ease of trainers and trainees. While originally viewed as an audience of 20 growers completing each step (80-100 total), over 400 attendees have taken part. Tier 1 and Tier 2/3 training were developed and have been conducted several times annually during the grant period with over 400 attendees. Demand for additional training is ongoing and will be supported by NCSU Cooperative Extension.

Beneficiaries of this grant funded project include:

- NC growers, packers, and shippers benefitted by having economic risk reduction and improved market access opportunities. Further they have gained a competitive advantage vs. growers elsewhere through the added confidence of knowing they are part of a state wide industry shipping a safe crop with a trace back program, and a crisis management plan at the ready if needed.
- Distributors are benefiting through a functioning inventory management system which will allow any needed product recall to be handled swiftly and accurately with a minimum of added cost. A crisis management plan will greatly help mitigate potential business loss due to any food safety crisis.
- Retailers, foodservice operators, and processors are benefitted from added confidence in their supply partners. They can be comforted by the knowledge that a functioning recall and communication system exists to protect their business in the event of a problem.
- Consumers are benefitting through an absence of food safety issues with NC sweet potatoes. Further they will witness a fast, accurate, and highly focused response in the event NC sweet potatoes are implicated in a food safety problem. More proactively, the NC Sweet Potato Commission will subtly advise consumers of the food safety advances made by growers in this state.

C. Goals and Outcomes Attained:

Traceability Program GOAL: Develop and implement a fresh sweet potato traceability program to include all NC sweet potato growers. TARGET: 15 Packer/Shippers and 75 Growers with GS1 compliant Traceability system in place and operational. OUTCOMES ATTAINED: The numerical goals have been partially achieved however the industry is more capable of functional trace back due to the attention given to this topic. 7 of 31 packer/shippers have sought cost share support for installation of compliant systems. We are aware of other packer shippers, including several of NC's largest grower/packer/shippers which have installed or upgraded similarly sophisticated systems but have not sought cost share support. In view of the retailer and distributor requirements for product trace back, it is our view

that all NC packer shippers have trace back capability. However, for a majority of the packer shippers the systems are not GS1/PTI compliant. Similarly, the installation of GS1/PTI compliant systems with 75 fresh market growers has not occurred. Growers are being increasing required to supply their customers (packer/shippers and processors) verification of their traceability information which is mostly being compiled manually as a condition of continuing business.

Crop Protection Chemicals GOAL: Determine which crop protection chemicals are suitable for domestic and export usage. Establish baseline data. Develop linkage of the traceability program with ongoing residue testing as mandated by exporters and EU procedures. TARGET: By the end of Year 1, 2010: Review (a) pesticides registered for post-harvest treatments in US that are allowed and not allowed in Europe; (b) investigate the available alternatives, if any; and (c) established a protocol for Minimum Residual Levels [MRL]. Develop a guide to be used for defining the export strategies to EU. Establish a baseline data set of MRLs for widely used chemicals on sweet potatoes. Develop traceability protocol required by EU importers, such as UK and Germany backed up with residue testing. By end of Year 2, 2011: Implement findings with all packer shippers with a prime focus on those exporting to the EU. Review and report upon ongoing residue testing data as supplied by packer shippers. OUTCOMES ATTAINED: The goals have been achieved. This investigation has determined Scholar, a product of Syngenta, is the only functional and approved product acceptable for use on sweet potatoes exported to the EU. Syngenta in conjunction with the NC SweetPotato Commission has been successful in obtaining EFSA approval at a functional level (10 mg/kg) for this product, technically described as fludioxonil. Significant communications and lobbying effort was required to achieve this outcome which also involved outreach to and active participation by the NC Congressional Representatives in the Senate and House. These activities involved meetings and explanation about crop protection and the help needed with multiple agencies but was a NOT lobbying initiative. No lobbying activities have occurred with SCBGP funds. Ongoing residue testing as required for export is being managed by the individual exporting packer shippers. The added expense of using this specialized product has been offset by the significant increases attained in export volume and value.

Crisis Communication Program GOAL: Implement a NC Sweet Potato Crisis Communications plan to expedite media and consumer communication in the event of a food safety issue. TARGET: By the end of Year 1, 2010: Complete development of a comprehensive NC sweet potato crisis communications plan, including media training, support materials and statements, media contacts, and grower/packer/shipper training materials. By the end of Year 2, 2011: Offer training

modules to all in NC industry with a goal of training at least 5 of the top 19 packer shippers. Conduct test scenarios and refine the plan as warranted. Distribute Crisis Plan materials to all growers as a reference guide at a Crisis Training Overview Workshop. OUTCOMES ATTAINED: The North Carolina sweet potato industry is vastly better prepared today to successfully respond (focused, anticipatory, trained, prompt, and accurate) to crisis's as or if they emerge. In learning from the misfortunes of others, the industry has seen both well handled and poor responses to other food related issues and has determined that the NC sweet potato industry will strive to be well equipped. Consequently, the NC sweet potato industry has been a guiding force in educating the growers, packers, and shippers in crisis management, crisis avoidance, and crisis response. Thus ongoing activities continue with training exercises, on camera training, and most recently education to the entire US sweet potato council at its annual meeting in January 2013. All goals for the grant funded activities have been successfully achieved.

D. Beneficiaries:

As included in the original grant application, the primary beneficiaries of this project were then and continue to be categorized into four distinct groupings:

1. The NC sweet potato industry including growers, packers, and shippers
2. Foodservice and institutional distribution companies including system distributors and exporters.
3. Retail grocery chains and their wholesale distribution companies, restaurant chains, independent restaurateurs, and processors.
4. The ultimate consumer, the person consuming NC sweet potatoes.

In quantifying the impact upon beneficiaries of this project, the following is provided:

- Successfully anticipating and addressing the issues covered in this grant has allowed NC sweet potatoes growers to confidently expand and consumers have responded. The number of growers approaches 400 (vs. 350 in 2009), acreage harvested has expanded to 64,000 in 2011 (vs. 46,000 in 2009), NC's share of production and sales has risen to 49.1% (vs. 47.5% in 2009), and farm level crop value has jumped to $226.6 million (vs. $179.4 million in 2009).
- As reflected in the numbers above NC continues to garner market share and expanded sales through all avenues; retail, foodservice, export, and processing. Exports have gained strength in large measure due to the efforts on the crop protection chemicals suitable for export usage. International fresh market sales have grown to 16% of total fresh market (2,018,192 cases vs. 1,556,013 in 2009).
- Menus both at home and at foodservice increasingly feature sweet potatoes. The healthful benefits as well as the fun to eat aspects attract consumer interest and their food dollars. The ultimate measure of consumer acceptance is measured in per capita consumption which has risen to 6.9 pounds, the highest per capita use in 42

years. In the nine years since 2003 to 2011 per capita use of sweet potatoes has increased 81.6%. Certainly continued growth is possible but not assured, hence continuation of the type of efforts funded by this grant are crucial.

E. Lessons Learned:

Several lessons have been learned throughout the grant period which includes:

1. Our ability to complete negotiations and execute contracts with selected traceability equipment vendors was thwarted as these actions were viewed as an intrusion upon the individual growers' rights to negotiate their own best deal. Our approach became to define vendors that were capable and to encourage contact between growers and vendors. Participation in the traceability initiative was not as strong as had been anticipated. Prior to the grant, retailers had expressed demands for a fully PTI compliant traceability system however this stance was moderated by some in favor of more simplistic traceability as a minimum. Despite a strong effort within NC to solicit participation, less than half of the support funds were used. However, it is certain, due to the many presentations at public and private meetings, the NC industry heard repeatedly about the benefits of a functioning traceability system and many upgraded what they were doing even if the result did not meet the fundable goal.
2. The crop protection chemical efforts demonstrated that few chemical companies devote extensive research efforts on sweet potatoes due to the limited market sales potential. Scholar is the one product that does work and does meet US and EU standards. Obtaining the needed approvals to allow Scholar to be used on sweet potatoes imported into the EU required considerable time and effort in bringing the initiative to the attention of NC's federal lawmakers and to US trade representatives. This extensive lobbying effort was not anticipated as this initiative was undertaken. The results, however, of expanded profitable sales for NC growers have validated the efforts involved.
3. The efforts on the crisis planning have been especially timely in view of food safety issues that have arisen with other crops and processors. Further, having a ever growing crisis management plan and conducting detailed "what if" scenario sessions has broadened the outlook and readiness of our industry.

F. Contact Person:

John W. Kimber
Office: 919-845-0969
Cell: 919-697-5352
john@kimbercompany.com

G. Additional Information:

Following are examples of materials used to attract industry interest:

Traceability:

Financial Assistance for Produce Traceability Equipment

Your customers want you to have a fast, convenient, and accurate trace back system for sweet potatoes in the event there is ever a food borne safety concern involving sweet potatoes from your business. Some customers require shippers to have a functioning trace back system in order to do business. Assuredly more will make this requirement as a condition of doing business. When or if ever a sweet potato food safety problem occurs, the survival of your business will heavily depend on how quickly you can assure your customers about the sweet potatoes you sold them.

The US Congress has passed sweeping food safety legislation to be implemented in 2011. This legislation is expected to mandate that produce providers have a functioning traceability system.

For packer shippers the traceability requirements not only include crops grown in your own fields but also crops from contracted acreage or other growers that sell through you.

How can you get financial help to offset a part of your costs to install a traceability system? The answer is straightforward; the NC Sweet Potato Commission Foundation has received a Specialty Crop Grant that will provide up to $500 in a refund to you if you are among the first 15 to act.

Depending on the complexity of your packing operation, traceability software and specialized equipment may cost $3,000 or more per system. To prompt faster adoption of this needed technology, the NCSPCF will offer, on a first-come first-serve basis, cost-share reimbursement of 15% [up to $500 total] of the software and specialized equipment expense for an approved system. This offer is for the first 15 [fifteen] who apply. The desired end result is speedier decision making by you, the shippers and growers, in agreeing to a timely rollout.

What is an "approved system"? An approved traceability system must be in compliance with the PTI, the Produce Traceability Initiative, who has established the Action Plan and Standards. It is your responsibility to require your traceability system provider to assure you that the system you purchase is in current compliance these standards.

How do you apply for the Financial Assistance? Once your traceability system is in place and functioning, complete the enclosed form and submit it to the NC Sweet Potato Commission Foundation offices in Benson by mail, fax, or email attachment. Don't delay, only the first 15 will receive a refund.

Where can I learn more about traceability and what I need to do? If you need added information give John Kimber a call at the NCSPCF, direct number is 919-845-0969.

NC Sweet Potato
Commission Foundation

Request for Traceability Equipment Cost-Share Reimbursement

Eligibility: To be eligible you must:

1. Be a current NC sweet potato grower, packer, or shipper growing 1 acre or more.
2. An approved traceability system, in compliance with current PTI standards must be in place and operational at your business within NC.
3. Provide a copy of the paid invoice, designating the software and specialized equipment expense (S&SE). The invoice copy must accompany this Request.
4. Agree that the NCSPCF and the NCDA&CS can view system during operation.

Name of Business:

_____

Business Address, City,
Zip_____

_____

Telephone(s):

_____

Person Completing this Request:

_____

Date Submitted: MMDDYYYY: _____/_____/_____

Traceability Equipment
Vendor_____

System Model or Type Installed:
_____ Date Installed:

_____

Location of Installation [if different than business
address]:_____

S&SE Expense: $_____ Multiply S&SE Expense by 15% = $_____

Reimbursement Amount: The LESSER of $500 or 15% of software expense =
$_____

Signature of Applicant:
_____ Send or Fax Request
and copy of paid invoice to: John Kimber, NCSPCF, 700 E. Parrish Dr., Suite C, Benson, NC 27504 Fax: 919-894-7018

For NCSPCF use:
Request # _____
Date received_____
Time Received_____
Reviewed by: _____
Approved by: _____
Payment amount: _____
Check #/ date: _____

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Project Title: Enhancing Foodborne Illness Crisis Management Capacity Within the North Carolina Specialty Crop Industry

A. Project Summary

It is estimated that 25 to 30% of Americans acquire foodborne illness annually. In recent years, fresh produce has come to the forefront of public discussion around food safety due to national attention garnered by outbreaks linked to the sector. It is now estimated that fresh produce causes more illnesses than any other food category. The potential impact of a major foodborne illness outbreak linked to specialty crops could be catastrophic to the North Carolina agriculture industry. It is necessary that producers, industry leaders and stakeholders prepare for the low-information and low-trust communication complications that have historically risen during these events. Through this project, activities were conducted to address the skills, preparation and effectiveness of crisis management and communications plans for specialty crops industries across North Carolina. An intense train-the-trainer workshop on crisis situations and response was conducted with 15 key industry leaders. Concurrently, a 2.5 hr role-play tabletop simulation of a foodborne illness outbreak was also delivered to 280 members of the specialty crop industry. Evaluation results suggest that this project enhanced the crisis management capacity of the North Carolina specialty crops industry to respond to a foodborne illness outbreak. This was accomplished through the increased development of crisis communication plans; media training for producers and industry representatives, including the use of social media networks. All materials developed through the activities of this project can be found at http://producecrisismanagement.wordpress.com/

Potential Impact

A major asset to any farm operation is to minimize risks when it comes to fresh produce safety. Through this project, 280 specialty crops producers (the majority who are located in North Carolina) and 15 industry stakeholders and leaders learned crisis management skills that are needed to remain viable in the event of incident. Evaluation of the outputs (evaluation methods are discussed later in the report) demonstrated that while only 21% of participants had a written crisis management plan prior to participating in the activities related to this project. At the summation of

the project, 44% of participants who were followed-up a month post-workshop with reported that they did indeed have a plan or were in the process of writing one.

Impacts culled from evaluation efforts included greater preparedness on how to handle a foodborne illness outbreak; increased understanding of what happens during an outbreak investigation leading to greater coordination; and, an overall higher level of knowledge and attitude towards the importance of managing of food safety risks.

Besides minimizing risks through Good Agricultural Practices, N.C. producers participating in the workshops reported a sense of preparation to answer difficult questions should a crisis occur, a comprehensive understanding of how an entire industry could be affected as well as the need for an increase in traceability to differentiate products in the event of an outbreak (and aid in the recovery process). Potential economic impact of increasing knowledge and attitudes around food safety issues as well as the tangible increase in plan development can affect the likelihood of keeping a product marketable and sustaining the health of the specialty crop industry in North Carolina. The project has further impact beyond North Carolina as the materials provided at http://producecrisismanagement.wordpress.com/ have been used and delivered in Michigan, Arkansas and Ohio.

Data was analyzed and presented at the International Association for Food Protection Annual Meeting, August 3, 2011, Milwaukee, WI Using role play to enhance foodborne illness crisis management capacity with producers. Kreske, A., Gunter, C., Ducharme, D., Phister, T., and Chapman, B.

The project methods and results have also been submitted to the Journal of Extension.

B. Project Approach

There were three activities carried out as part of this project

1. *Environmental Scan*

   A survey of producers in NC in 2010-2011 employing risk reduction practices showed 79% followed good agricultural practices and 21% had a crisis plan in place. Commodity groups (20) across the state were asked whether their organization possessed a crisis plan template of the four groups reached only three had templates.

2. *Intense Crisis management workshop (on and off-camera training)*

   Intense crisis communications workshop and crisis plan templates: Crisis preparedness training for growers and members of the Fresh Produce safety task force was completed on March 17-18, 2010 at NCSU, Raleigh, NC. This workshop focused on writing crisis management and communications plans, along with on-camera training discussing message development and how to handle difficult questions from the news media. Through leveraging additional funds from another USDA-funded project, the project team created template for industry members to use to build their own crisis communication plan was created and can be found at: http://producecrisismanagement.wordpress.com/training-materials/crisis-communication-plan-template/

3. *Role-play workshops*

   Rather than a traditional, lecture-based adult education extension activity, this project was based on a participatory role-play framework where participants were asked to assume different roles within the produce industry as an outbreak unfolded. Tabletop and simulation exercises have been used successfully to prepare and evaluate the disaster management capacity of public health officials in the event of a pandemic (Steward and Wan, 2007). These types of exercises utilize role-play, which promotes active learning, that is superior to passive learning (Bell, 2001; Van Ments, 1999). Role-play has been defined as ‘an experiential learning technique with

learners acting out roles in case scenarios to provide targeted practice and feedback to train skills' (Kiger, 2004). Using role-play in education improves the realism of the training situation and enables students to deal with difficult issues without consequences (Van Ments, 1999). Students develop skills, increase knowledge and form attitudes as a result of using role-play as a teaching method (Bell, 2001). Students recall more information from role-play sessions than from passive lectures (De Neve & Heppener, 1997).

Design of Role-play

Using role-play food safety experts guide students through a unique outbreak scenario resulting in an emotional engagement with the material and deeper understanding of the need for crisis preparedness. The learning objectives for the simulation included developing crisis management skills that are needed to remain viable, instill greater preparedness on how to handle a foodborne illness outbreak by participants, and increased understanding of what happens during an outbreak leading to greater coordination and an overall higher level of knowledge around food safety risks. The 2.5 hr table-top scenario on crisis management was designed as a role-play based on an real-life outbreak investigation, public discussion and market response situations.

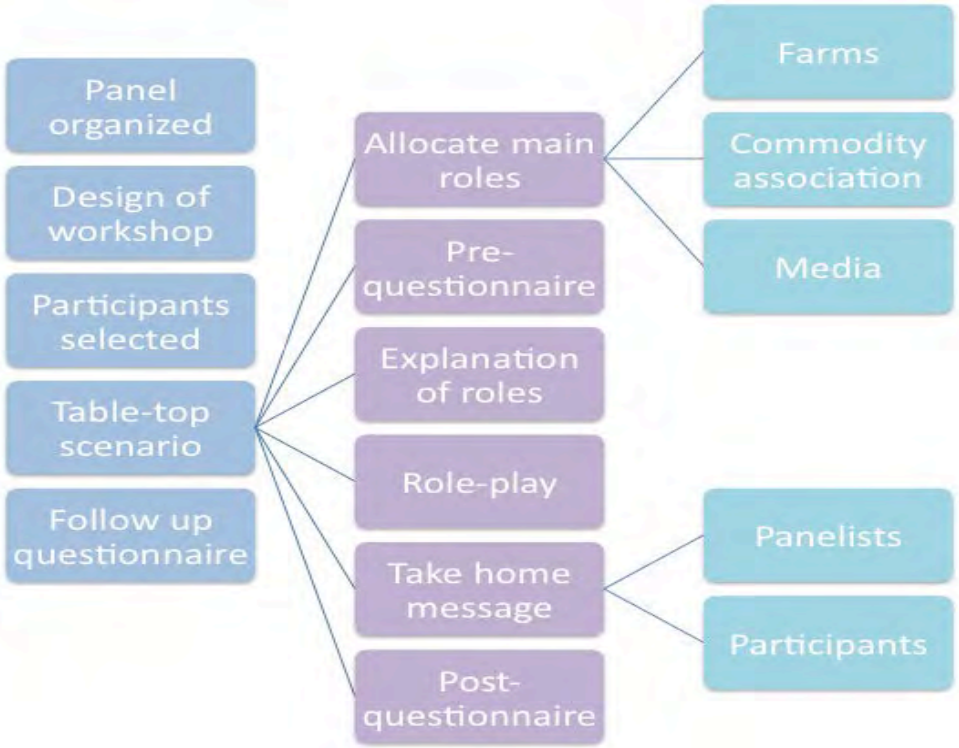

Figure 1. Outline of Project

The Outbreak Simulation Panel

The role-play was led by a panel including food safety experts, horticulturists, extension agents, local government regulators, and a farm bureau representative. The panel had a wide range of expertise in all the areas that maybe encountered when dealing with a produce-related outbreak.

Participants

This study was conducted with produce farmers in North Carolina from Fall 2009 through Spring 2011. The project team, all members of the North Carolina Fresh Produce Safety Task Force, received requests from commodity groups, associations and growers for assistance assessing outbreak crisis management skills and helping them prepare in the case of a foodborne illness outbreak. The tabletop simulation was scheduled to coincide with an association's or group's annual meeting and was specific to their commodity (Kline, Kneen, Barrett, Kleinschmidt, & Doohan, 2012). The participating organizations and locations of meetings are listed in Table 1.

Table 1. Participating Organizations and Locations of Meetings

Organization	Date	Participants	Location
N.C. Commodity Leadership Development Program	September 30, 2009	11	Raleigh, NC
Southeast Strawberry Expo	November 10, 2009	31	Durham, NC
Blackberry Growers Association	November 16, 2009		Kannapolis, NC
N.C. Agriculture Leadership Development Program	December 16, 2009	33	Raleigh, NC
NC SweetPotato Commission	January 21, 2010	121	Wilson, NC
NC Tomato Growers	April 13, 2010	12	Mills River, NC
Southeast Vegetable & Fruit Expo	November 30, 2010	27	Myrtle Beach, SC
United States SweetPotato Council Convention	January 23, 2011	45	Orange Beach, AL
Totals	**8 workshops**	**280**	

The Role-play

Each simulation consisted of an outbreak related to the group participating (i.e. a strawberry-linked outbreak was used for strawberry producers). Roles were allocated at random by a member of the panel as participants entered the workshop, each table represented a main role to be played during the simulation, such as a farm, the commodity association, or the media. Secondary roles were incorporated with a large group (>100 participants) such as, wholesalers, distributors, grocers, restaurants, and assisted living communities. Each of the scenarios can be found at the Produce Crisis Management website found at

http://producecrisismanagement.wordpress.com/.

In the pre-simulation questionnaire, participants were asked about whether they had food safety plans on their farm and to rate their crisis preparation and importance of crisis preparation. The role-play began with an introduction and description of each role and time for participants to become acquainted with their role. During this time, participants worked through a group handout with a diagram of their supply chain and made decisions about the role food safety plays in their organization/company.

The role-play consisted of two timelines: one tracking the investigation by public health authorities as shown in Table 2 and one tracking the traditional and social media response to the outbreak as shown in Table 3. With the use of two PowerPoint presentations, both timelines (outbreak investigation and media) were presented simultaneous during the simulation. During the simulation, participants acted out their role by attempting to manage their responses to the information as it appears on the slides. Panelists probed groups that were not participating in active discussion to maintain the dynamic of the simulation. During this time participants asked panelists questions related to the outbreak scenario and discussed strategies to deal with the crisis, some of the topics discussed are in Table 4. The outbreak investigation timeline included press releases with dates, damage control, industry investigations, recalls, on-farm investigations, and recovery. The media timeline included traditional news (findings, human interest stories, one year anniversary), social media networks (Wikipedia, YouTube, Twitter) key points when dealing with media representatives, comedians and celebrities. When dealing with the media, participants were reminded to avoid saying ‘no comment’, develop key messages, and to use the wording as safe as possible. After the company associated with the outbreak was implicated, the media reacted with constant coverage and all producers saw a reduction in sales and must find alternate outlets their product. After completion of the slides, participants and panelists discussed the take-home messages. The participants were asked to report on their group’s plan for recovery and each individual discussed what they learned. Each panelist covered key points that were instrumental in the management a crisis situations. In the post-simulation questionnaire, participants were asked about crisis management plans and their feelings regarding the simulation.

Table 2. Outline of Outbreak Investigation

Objectives	Descriptions
Press releases	▪ Information from local health departments
Damage control	▪ Increase in traffic on farm ▪ Increase discussion of consumers ▪ Find other outlets for product ▪ Increase in local demand (Farmers' Market) ▪ Non-implicated farms – what is your message
Industry investigations	▪ Looking for the source ▪ Discuss your distribution chain ▪ Exclude your farm with documentation ▪ Traceability
Recalls	▪ Categories of recalls ▪ How do you get the product back? ▪ Where did it go? ▪ What documentation do you need?
On-farm investigations	▪ NCDA and FDA ▪ Production and distribution records ▪ Where they might start looking? • Water, hygiene, animals
Recovery	▪ Starts immediately ▪ Market-wise ▪ Reach out to media about what you have changed ▪ What's next? ▪ Who is affected? ▪ What needs to be done to get things back on track?

Table 3. Outline of Media Coverage

Objectives	Descriptions
Dealing with media representatives	▪ Respect deadlines and find out about the story ▪ As safe as possible ▪ Never say no comment ▪ Don't over-promise ▪ Speak plainly ▪ Credibility ▪ Show compassion and express concern ▪ Lessons learned
Local and national news outlets	▪ Findings • Onsite interviews with producers, comparisons to previous outbreaks ▪ Human interest stories

	• Mothers shopping at grocery store, children sick in hospital ▪ One year anniversary
Social media	▪ Search engine news (Yahoo, Google) ▪ Wikipedia ▪ YouTube ▪ Twitter ▪ Blogs
Comedians and celebrities	▪ Late night television show commentary ▪ Celebrities with illness

Table 4. Outline of Discussion Topics

Objectives	Descriptions
Handouts	▪ Individual group sheets ▪ Hot topic ▪ Pathogen information
Know who to call for help	▪ Commodity associations ▪ Extension agents ▪ University representatives
Outlets for product	▪ Secondary markets ▪ Farmers' markets ▪ Processors
Dealing with media	▪ Be proactive ▪ How much information to divulge ▪ As safe as possible ▪ Key talking points ▪ Spokesperson
Dealing with regulators	▪ Timeframe to produce documents ▪ Investigation ▪ They want to help
Proactively marketing food safety	▪ Connections with media before outbreak ▪ Talk about food safety practices not only during crisis

C. Goals and Outcomes Achieved

Role-play evaluation

Before the simulation began participants were asked to complete a pre-questionnaire containing open-ended questions and questions on a 7-point Likert scale (1-7). The total questions answered by participants varied from question to question (N=157). Open-ended answers were categorized appropriately and ranked. After the role-play, all participants were asked to complete a post questionnaire (similar to the pre-questionnaire, N=126), with an option to be part of the follow-up process by including their contact information. Only 80% of the post-questionnaires were completed due to participants leaving early. Participants were self-selected for the follow-up interview by reporting their contact information on the bottom of the post-questionnaire. There was a reduction in the number of respondents (N=25) compared to the workshop questionnaires due to difficulties in contacting participants and a decrease in self-selected participation. The follow-up questionnaire contained a majority of open-ended questions and was completed via telephone.

Participants were asked about their food safety plans and crisis management background in the pre-questionnaire and the results are shown in Table 5 and 6. Results indicated that only 21% (26) of participants had a crisis management plan in place prior to attendance compared to 79% (108) who employed good agricultural practices. Only 21% (15) of participants knew of a foodborne illness outbreak linked to their products. Following the workshop, there was a significant increase in the participants' perception of the likelihood of their products being contaminated with microbial hazards. Regardless of participation in the role-play, participants felt fairly confident in their ability to trace where their product went in the event of an issue (5.01 $\pm$ 0.35 as based on a Likert scale, 1 not confident – 7 confident), ready to deal with a crisis (4.20 $\pm$ 0.77), their business could recover from a crisis (4.12 $\pm$ 0.39). Overall participants felt this session made them more prepared (5.98 $\pm$ 0.28).

Participants' responses to open ended questions are shown in Table 7. Before the workshop, participants identified education/training, plans, and traceability as the top three areas they needed to improve in the area of crisis management. The top three areas identified by participants that worried them the most about an outbreak situation before the workshop were financial loss/sales, whole production system and reputation/recovery compared to whole production system, financial loss/sales, and media/public relations after the workshop. After the workshop, participants identified plans, records/ documentations, education/training, and traceability as areas where changes could be made to improve their ability to respond to an outbreak with their product. Upon completion of the workshop, participants reported learning about dealing with media/public relations, plans, and the process and timeline of an outbreak.

Table 5. Participants' Responses to Demographic Questions

Questions	No. of respondents (%)			
	Pre-questionnaire		Follow up questionnaire	
	Yes	No	Yes	No
Are you aware of any foodborne illness outbreaks linked to the products you grow?	15 (12)	111 (88)		
Do you employ good agricultural practices or have a food safety program in place?	108 (79)	21 (21)		
Do you have a written crisis management plan in place?	26 (21)	100 (79)	11 (44)	14 (56)
Are you doing anything different now, with respect to preparing for a crisis, that you were not doing before the session?			13 (52)	12 (48)
Do you feel that the session impacted your ability (positively or negatively) to deal with a crisis?			25 (100)	0 (0)

Table 6. Participants' Responses to Pre- and Post-questionnaire ($P < 0.05$)

Question	Likert scale response (mean ± SD)[a]		Significant difference
	Pre-	Post-	
How important is it for you to prepare for a crisis?	5.76 ± 0.60	6.37 ± 0.28	NS
How would you rate the likelihood of the products you grow being contaminated with microbial hazards?	3.59 ± 0.50	4.44 ± 0.62	S
How would you rate your business' ability to recover from a crisis?	3.91 ± 0.49	4.12 ± 0.39	NS
Are you confident in your ability to trace where your product went in the event of an issue?	5.04 ± 0.60	5.01 ± 0.35	NS

How would you rate your readiness to deal with a crisis?	4.07 ± 0.24	4.2 ± 0.77	NS
Do you feel this session made you more prepared (7) or no more prepared (1)?		5.98 ± 0.28	

Table 7. Participants' Responses to Open-ended Questions

Question	Pre-questionnaire[a]	Post-questionnaire[a]	Follow up questionnaire[b]
When thinking of a crisis or outbreak situation, what areas of your business do you worry about the most?	1. Financial Loss/Sales (28%) 2. Whole Production System (18%) 3. Reputation/Recovery (12%)	1. Whole Production System (28%) 2. Financial Loss/Sales (17%) 3. Media/Public Relations (8%)	1. Financial Loss/Sales (27%) 2. Reputation/Recovery (19%) 3. Customer/Patrons/ Consumers and Traceability (15%)
Can you identify areas where you need to improve your crisis management?	1. Education/Training (17%) 2. Plans (15%) 3. Traceability (13%)		1. Plans (34%) 2. Traceability (28%) 3. Education/Training, Media/Public Relations, and Communications (10%)
What changes can you make to address your ability to respond to an outbreak associated with your product?		1. Plans (22%) 2. Records/Documentation (21%) 3. Education/Training (14%) 4. Traceability (11%)	1. Traceability (27%) 2. Plans (23%) 3. Records/Documentatio n and Communications (12%)
What did you learn that you did not know before?		1. Media/PR (29%) 2. Plans (10%) 3. Process of an outbreak and timeline (8%)	

[a] Pre-questionnaire N=157, Post-questionnaire N=126

[b] One month follow up N=25

One month after the workshop, participants were surveyed regarding changes in crisis management practices that could be attributed to their participation in the tabletop simulation. Participants felt the session impacted their ability to deal with a crisis and described the experience as eye opening, overwhelming, and helpful. One month after the simulation, 44% of participants had a crisis management plan in place (Table 5).

Following the workshop, participants identified having crisis plans in place (34%) as the top area where they could improve their crisis management capacity. Participants identified financial loss/sales as an area they worry about the most when thinking of a crisis (pre- and follow-up). In follow up interviews, traceability was the number one change participants reported they could make to address their ability to respond to an outbreak. The top five areas participants identified were they could improve in crisis management was plans (34%), traceability (28%), and education/training, media/public relations, and communications (10%). After participation in the role play, participants reported learning for the first time about media/public relations (29%), crisis plans (10%), and the process and timeline of an outbreak (8%, data not shown).

D. Beneficiaries

The prime beneficiaries of this project were members of the specialty crop industry within North Carolina. Ultimately, the goal of this project was to impact the safety and response during a foodborne illness outbreak making consumers within North Carolina and elsewhere that NC specialty crops are sent ultimate beneficiaries.

E. Lessons Learned

Environmental scan: It was very difficult to reach industry members because their positions are not full time and are often held by growers.

Role-play: Each workshop was different based on the participants but all workshops addressed these main themes: dealing with media and government representatives; process and timeline of an outbreak investigation; traceability and documentation; and, recovery. Participants' consulted the panel on several issues related to government

representatives, specifically concerning access to documents and past experiences with recall situations.

There was no data collected on the characteristics of the participants such as farm size, revenue, location, etc., which could have provided further insight.

The table-top simulation design is limited by a large number of participants and panelists. The minimum number of panelists is five people this can be difficult in certain areas where there may be only one representative with knowledge about foodborne outbreaks. The workshop is not as effective if there are not enough participants to fill the groups. Each of the main roles is necessary to complete an effective workshop.

Follow Up Interviews: There was a significant decrease in voluntary participant of follow up interviews. It was difficult to reach the growers at a reasonable time.

F. Contact Person

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Project Title: Enhancing Sustainable Specialty Crop Production in the Piedmont

A. Project Summary

Current retail and wholesale demand for local and sustainable vegetables, fruit, and greenhouse crops justifies enhanced programming that provides training on production, post-harvest handling, and marketing of locally produced farm products. The WC Breeze Family Farm Extension & Research Center and its flagship PLANT @ Breeze Farm Enterprise Incubator utilized grant funds to enhance its program offerings of an intensive 8-week workshop series and special topic workshop for farmers in a 22-county area in the North Carolina Piedmont.

The grant funds supported training and field activities including sustainable soil and water management, insect, disease, and weed management, fruit and berry applied research, and business planning. Training supplies and hiring of a mentor farmer permitted program expansion to better serve apprentice farmers and workshop participants. Program offerings were disseminated through the cooperative extension service network, and local and regional grower listservs.

Since its inception in 2008, the PLANT @ Breeze program has trained 239 aspiring farmers, many of whom have proceeded to sell at local farmers markets, open farm stands, and / or initiate value added specialty crop production. In an era when the economic climate presents challenges for entrepreneurs and new businesses, this program has a five year track record of providing needed support for launching and diversification of new and / or diversified farm enterprises.

B. Project Approach

This project involved providing the opportunity to expand and grow the resources available to a new farmer training program in the Piedmont of North Carolina.

Through a collaborative effort between orange cooperative extension and economic development, the PLANT @ Breeze farm Enterprise incubator was launched in 2007 and has established itself as a model program for training new farmers and providing diversification opportunities to existing farmers.

The farm mentor position description was developed from meetings of the Breeze Planning Committee that meets monthly. The final job description was circulated among Breeze program participants.

Topics for the workshop series were chosen based on previous year surveys as well as pre- and post-workshop self-assessments. Key to the series is the inclusion a successful long term and new farmers in each of the 8-week sessions.

Specialty crop funds can only be used to enhance the competitiveness of specialty crops because that is all that is grown at the incubator farm.

C. Goals and Outcomes Achieved

Over the course of this project, the PLANT @ Breeze Farm Enterprise Incubator conducted three annual training on eight Wednesday evenings in January and February in 2010, 2011, and 2012. Approximately 145 aspiring new or diversifying farmers from five counties completed the workshop series. Some participants submitted business plans to program staff and 18 apprentice farmer entities cultivated land at the Breeze Farm. Apprentice farmers have been admitted as vendors at four local farmers markets and also sell direct to restaurants and through community supported agriculture programs.

Over the three year period, workshops were held on farmland access, hoop house management, small farm energy efficiency, integrated pest management, and innovative marketing, with over 100 individuals receiving information relative to specialty crops.

A mentor farmer has provided continuous service during calendar years 2010, 2011, and 2012. Equipment for specialty crop production as well as post harvest processing was made available to the program through use of grant funds. The walk in cooler and post harvest processing area was highlighted during a food safety workshop in summer 2012. A bedder-mulcher has been purchased and will be available for the 2013 production year. Two hoop houses were constructed and are now available for apprentice farmers. Plastic and biodegradable mulches were used during the past few years in the apprentice farmer plots. A mower was used during the past two years for managing vegetation and cover crops. Irrigation at the site was upgraded to an electric pump to provide more reliable service for apprentice farmers.

Goals of the project were far surpassed, facilitated in part by the extension granted by the specialty crops program staff.

D. Lessons Learned

The success of the Breeze Farm is based on a strong demand from the 40 to 60 participants who have enrolled in the course each year. With only $10,000 provided by Orange County government, this program has leveraged an additional $50,000 from local grant programs. This program would not be able to continue without the staff support from Orange Cooperative Extension Center and the Orange County Economic Development department.

Challenges that might be anticipated in a similar project would include communication among project leaders and participants. Efforts for ongoing interaction and sharing of concerns can be programmed to ensure effective program development and implementation.

E. Beneficiaries

Since 2007, the 239 individuals from eight counties receiving training on specialty crop production and related enterprise development, we provide some examples below for the purposes of this report.

Breeze Apprentices

Tom & Linda Savage	Allied Organic Farms	Person County
Marcia Tice	Cut & Carry Bouquets	Orange County
Will Cramer & Sam Hummel	Ever Laughter Farm	Orange County
David Heeks	Heeks Farm	Durham County
Robert Jones	Jones Farm	Greene County
Becca Wait	Little Sprout Farm**	Orange County
Ross & Jillian Mickens	Open Door Farm**	Orange County
Gretchen Hurley	Reachfar Enterprises	Orange County
Kent Duke	Willow Ridge Farm	Orange County
Alan & Chris Green	Woodcrest Farm	Orange County

Farm on their own land

Alfred Loeblich	Alfred's Farm	Orange County
Veronica Summers	Argosy Farm	Orange County
Austin Genke	Boxcarr Farms	Orange County
Jonathan Ray	Cates' Corner Farm*	Orange County
Cecelia Redding	Down 2 Earth Farms	Orange County
Tom Hurtgen	Hurtgen Meadows Farm	Orange County
Aaron Ward	Ladybug Farm	Orange County
Michael & Caroline Lang	Let It Grow Farm	Johnston County

Reggie Oakley	New Oaks Farm *	Person County
Ashley & Jason Conway	Parker Farm & Vineyard	Orange County
Sally Slusher	PlowGirl Farm	Orange County
Darrin Knapp & Jane Saiers	Ramble Rill Farm	Orange County
J. Ed & Stephanie Hall	Sassafras Fork Farm	Granville County

Other Graduates Who Started Local Food Businesses Or Are Involved in Local Food Work

Katie Bergeron	The Urban Farmers' Market (Mebane)	Alamance County
Sun Butler	Inter-Faith Food Shuttle Farm Educator	Wake County
Alice Hinman	Wake the Farm Project	Wake County
Joanna Lelekacs	CEFS Community-based Food System	Wake County
Tate Little	Carrboro Elementary School Garden	Orange County
Kelly Owensby	OCPYC Refugee Ag Partnership	Orange County
Abraham Palmer	Box Turtle Bakery	Orange County
Amanda Soltes	Inter-Faith Food Shuttle Gardens	Wake County
Tes Thraves	CEFS Community-based Food System*	Wake County
Cindy West	Hillsborough Cheese Company*	Orange County

*Had established their farm or business or in their current job before enrolling in the PLANT Program

**Farmed at Breeze Farm in 2012

F. Contact Person

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G. Additional Information

Related Websites

www.orangecountyfarms.org

http://orange.ces.ncsu.edu/

Photos and press items available by request.

(Previously Approved)

Project Title: The Johnston County Nursery Marketing Association's Website: A Valuable Educational Resource and Industry Tool for the Green Industry of the Mid-Atlantic States

A. Project Summary:

There are many working in the Mid-Atlantic Green Industry that do not have sufficient knowledge of nursery crops currently grown in North Carolina. Many nursery owners and managers, whether a landscape, retail, or re-wholesale business, desire a more efficient method in which to educate their employees on plant habits and identification. Currently, there is no accurate, reliable, comprehensive, and efficient method of gaining that knowledge for those in the Green Industry specifically focusing on nursery crops grown in North Carolina. Due to the fact that today's Green Industry is internet driven, there must be one website dedicated to providing useful and relevant information for Green Industry professionals to gain knowledge of nursery crops grown in North Carolina. JCNMA proposed to provide a solution to this problem: a website which includes a searchable and dynamic plant database. This database is now built and is aptly named "JocoPedia". It includes information such as botanical name, common name, general description, pictures, and more detailed information such as type, sun requirements, mature size, habit, flower color, unique features, possible substitutes, and site requirements. The database, which is still in progress, will consist of over 3,000 plants grown by members of the Johnston County Nursery Marketing Association. The JCNMA promoted the www.jocoplants.com website through a Public Relations campaign and demonstrated the upcoming JocoPedia at trade shows.

The JCNMA Technology Committee was responsible for managing all projects as described within this report. Members of the Technology Committee are as follows: Heather Rollins (JCNMA President), Ruth Currin Holcomb (JCNMA Vice-President, Chair of the Technology Committee), Danielle Stephenson (JCNMA Treasurer), Nick Sagan (member), Chris Hardison (member), and Amie Newsome (Johnston County Extension Agent and advisor to Technology Committee).

B. Project Approach:/ Operating Expense:

These funds were spent on items for use at promotional trade shows: computers, chairs, table, flat screen TV, promotional print materials, and other items to ensure investments are properly cared for such as computer carrying cases, flat panel carrying case, etc. Each item was researched and voted upon by each member of the Technology Committee before purchases were made. Chris Hardison, member of the Technology Committee, was responsible for care and storage of these items. The results and accomplishments for these funds spent are concurrent with those in the "Other: Trade Show" category. Please see below for further explanation of items purchased:

) Two portable touch-screen computers: Attendees at trade shows used these computers to browse and learn how to use the website, www.jocoplants.com, and view the online plant directory, JocoPedia. Some attendants were asked to give informal feedback regarding the design and function of the JocoPedia, which was used during revisions of the JocoPedia.

a) Flat Screen TV: used to present slideshow of features and functionality of www.jocoplants.com, including progress of the online plant directory, JocoPedia. Slides featured screenshots and instructions on how to use www.jocoplants.com along with screenshots of the future JocoPedia. Slides of JCNMA members and their nurseries were also featured.

b) Flat Screen TV Stand: used to mount the flat screen TV in the various booths.

c) Table: bar-height table used to hold the two computers, two mice, and two keyboards so that trade show attendants can conveniently browse information on computers.

d) Flat Screen Carrying Case: used to protect flat screen TV while in transport.

e) Surge Protector & Power Adaptor: used to protect portable computers and flat screen TV while plugged in.

f) Table skirt for SCHI 2010 show: The JCNMA voted on a certain bar height table, but that particular table could not be shipped in enough time for 2010 SCHI show. Therefore, table skirt had to be rented for table provided by SCHI show hosts (South Carolina Nursery & Landscape Association).

g) Promotional Print Materials: cost of printing promotional materials that include tri-fold brochure explaining history of JCNMA and www.jocoplants.com (including the JocoPedia), business cards, and booth directories (that direct attendants to member nurseries' booths also showing). These were handed out to show attendees as they visited the JocoPlants booth at each trade show. Each member nursery also handed out the promotional literature at their booths.

Contractual:

These funds were spent on planning, developing, coding, and testing the JocoPedia; design and copyrighting of promotional items; and a PR campaign. The contractor, Goodtree & Co., provided services related to the construction of the JocoPedia and design and copyright services for promotional items. Goodtree & Co. also provided a one-time public relations assessment and advisement to the JCNMA, which is categorized as cash matching funds. All other public relations charges relate directly to various industry advertisement fees. Heather Rollins, JCNMA President; Ruth Holcomb, JCNMA VP and chair of the Technology Committee; and other members of the Technology Committee, were all in frequent communication with Goodtree & Co. representatives to ensure all projects were running in a smooth and consistent manner. Each project's approach is described below:

JocoPedia:

After completion of www.jocoplants.com by Goodtree & Co. in November of 2009, work on the JocoPedia began in December of 2009. Please see steps taken to complete the JocoPedia below:

a) Research and review other plant directories already currently available on the internet to gain knowledge of informational gaps that can be fulfilled within the JocoPlants online plant directory.
b) Meet with contractor, Goodtree & Co., to discuss and visualize both design and functionality of online plant directory. Supply Goodtree & Co. with list of needs for online plant directory, including backend functionality flow chart.
c) Compile list of all plants grown by members of the JCNMA.
d) Delete duplicates from list.
e) Send out survey to member nurseries regarding new varieties of plants that they may grow in the future.
f) Added new varieties to list.
g) Met with NCSU Horticulture professor, Dr. Brian Jackson, to revise and update botanical and common names. Many plants' taxonomies had changed due to disputes within horticultural research. Steps 1-7 took much more time than expected due to the large amount of plant taxonomy disputes/questions.
h) The "Master List" was officially created and sent out to all member nurseries.
i) Name online plant directory "JoCoPedia" as voted upon by members.
j) Met and communicated via e-mail/phone/fax with Goodtree & Co. to discuss and approve design of JocoPedia home page, advanced search page, and backend functionality (which includes administrative pages).
k) All member nurseries changed taxonomy on availabilities so that their list will match JocoPedia.

l) Continually communicated and met several times with Goodtree & Co. regarding design and functionality.
m) On October 27, 2010, the development, a.k.a “dev” site for the JocoPedia was created.
n) From that point, the JocoPedia was tested and commented upon by the JCNMA Technology Committee, the JCNMA members, and other industry professionals who were invited by the JCNMA Technology Committee.
o) On February 8, 2011, the Technology Committee met with Goodtree & Co. for a “live coding” session to resolve some reoccurring functionality issues of the JocoPedia. All issues were resolved within two weeks of meeting.
p) Chris Hardison contacted the J.C. Raulston Arboretum and was granted permission to use photos taken at the Arboretum for use in the JocoPedia.
q) As of March 5, 2011, the JocoPedia is complete and functional, but not “live”.
r) As of March 5, 2011, the JocoPedia contains 21 completed plant data entries. With the help of the 2011 SCBGP cycle, the JocoPedia will be populated by student interns. The goal is to have a 90% populated database by the Fall of 2011.
s) The JoCoPedia, however, will always be a work in progress to accommodate the ever growing and ever changing list of plants grown within our association.

Design & Copyright Services:

Goodtree & Co. designed and copyrighted promotional items for the JCNMA to be used in different advertisement campaigns and promotional materials to be handed out at trade shows. Specifically, a generic advertisement (1/2 page and full page), business cards, and two versions of a promotional brochure were designed and copyrighted. All designs were presented to the Technology Committee by Goodtree & Co. and voted upon and approved by committee members. Results and accomplishments of these services are seen in the following public relations campaign category.

Public Relations Campaign:

In December of 2009, Goodtree & Co. assessed the JCNMA’s current (almost non-existent) public relations campaign. It was found that the JCNMA was targeting the correct audience (Mid-Atlantic States = NC, VA, MD, SC), but that the association was not “catching the eye” of that audience nor was the association in “front” of that audience enough to make an impact. Therefore, larger color advertisements were put in place in the North Carolina Nursery & Landscape Association’s (NCNLA) “Nursery Notes” bi-monthly magazine and the Virginia Nursery & Landscape Association’s (VNLA) bi-monthly newsletter. A full page color advertisement was also put in place in the 2011 NCNLA’s “Buyer’s Guide” and an advertisement link to www.jocoplants.com was purchased to put on the Mid-Atlantic Nursery Trade Show’s website.

A subscription to Constant Contact was also purchased. A Constant Contact subscription allows the JCNMA to connect personally with contacts via an e-mail newsletter giving contacts updated news regarding the JCNMA, including progress on JocoPedia. This serves as an advertisement via e-mail as well as being informative. An article in the NCNLA's Nursery Notes magazine regarding jocoplants.com and the JocoPedia was released for the 2011 March/April issue. The Nursery Notes magazine is sent to all NCNLA members across the Mid-Atlantic States.

Results and accomplishments of this public relations campaign can be seen quantitatively through the number of visitors to www.jocoplants.com counted by Google Analytics. The number of visitors to jocoplants.com has risen steadily since the campaign was launched from 0 visits on Friday, January 1, 2010 to a peak of 100 on Thursday, March 3, 2011.

Other: Trade Show

Booths at various regional trade shows were purchased to promote the JCNMA, jocoplants.com, and the JocoPedia located within jocoplants.com. Members of the Technology Committee represented the JCNMA at the different trade shows. Booths purchased at trade shows are as follows:

- 2010 NCNLA (North Carolina Nursery & Landscape Association) Green & Growin' Trade Show – Jan. 15 & 16. Greensboro, NC. 3,899 exhibitors and attendees. Representatives: Amie Newsome with support from all Technology Committee members.

- 2010 South Carolina Horticultural Industry (SCHI) trade show – Feb. 4-6. Myrtle Beach, SC. 1,890 exhibitors and attendees. Representatives: Ruth Currin Holcomb and Heather Rollins.

- 2010 JocoPlantShow – matching funds used for this show. July 14. Raleigh, NC. 191 attendees. Representatives: Amie Newsome with support from all Technology Committee members and JCNMA members.

- 2010 Summer Green Show – matching funds used for this show. Aug. 13-14. Greensboro, NC. 1,420 attendees. Representatives: Amie Newsome and Danielle Stephenson.

- 2010 International Plant Propagator Society (IPPS) show – matching funds used for this show. Oct. 14. Number of attendees cannot be determined as booth was at a nursery tour location (Panther Creek Nursery, a JCNMA member) where attendance was not recorded. Representative: Ruth C. Holcomb.

- 2011 Mid-Atlantic Nursery Trade Show (MANTS) – Jan. 5-7. 10,432 attendees and 969 exhibitors. Representatives: Ruth C. Holcomb and Heather Rollins with support from Danielle Stephenson.
- 2011 NCNLA Green & Growin' Trade Show – Jan. 12-14. 4,045 attendees and exhibitors. Representative: Amie Newsome with support from all Technology Committee members.
- 2011 SCHI trade show – Feb. 3-5. 1,758 attendees and exhibitors. Representatives: Danielle Stephenson and Ruth C. Holcomb

The above tradeshows are for Green Industry professionals in which Green Industry plants, products, equipment, and services, etc. are showcased. Each company showcases their products in a pre-determined booth space. Visitors to the JocoPlants Booth were able to browse the www.jocoplants.com site and give feedback on a preview outline of the JocoPedia. Fully-featured screenshots were unveiled and shown to attendees at the 2010 JocoPlantShow, 2010 IPPS, and 2011 MANTS, Green & Growin', and SCHI shows. Booth visitors were invited to give comments on the design and functionality of the JocoPedia. These comments were taken into consideration when editing the design and functionality of the JocoPedia. Visitors were also encouraged to register on the website to receive updated news regarding JocoPlants and the JocoPedia. The project staff potentially impacted up to 95% of attendees at each show. The number of registrations on jocoplants.com increased during and after each trade show as well as the number of visitors to the site. Please see attachment "customer registrations" for the number by date of website registrations and "Analytics: jocoplants.com" for a complete breakdown of number of visitors to the site.

C. Goals and Outcomes Achieved:

Goal: To educate Green Industry Professionals on North Carolina grown nursery crops as grown by members of the JCNMA.

Outcome: This is a long-term goal of the JCNMA through its development of www.jocoplants.com along with the companion searchable plant database "JocoPedia". The outcome of this goal is yet to be seen because the JocoPedia is not "live" and available to industry professionals yet. However, smaller outcomes

can be seen through the following goals below, which show progress toward this larger goal.

Goal: To provide a website that includes a searchable and dynamic plant database.

Outcome: As of March 5, 2011, the "JocoPedia" is completely designed, built, and coded. The advanced search function is still a work in progress. Several plants have been entered to date and many "kinks" are being resolved. Please visit http://dev.jocoplants.com and click on "JocoPedia" to view the work in progress. Screenshots of the JocoPedia are seen below:

JocoPedia Home Page: Simple Search Function

Plant Specs Tab

Advanced Search Page **Advanced Search Results (pink blooming shrub)**

As seen in the above screenshots and with a quick tour of the Jocopedia on the http://dev.jocoplants.com website, it is evident that the database is an informative and functional source for information on North Carolina grown plants. The only function still to be fixed is the advanced search of mature plant size. After the majority of plants are entered into the JocoPedia by interns made possible through the 2011 SCBGP cycle, it will become live on the www.jocoplants.com website. The ultimate goal of a fully completed JoCoPedia will not be realized until the Fall of 2011. At which time data pertinent to the almost 3,000 plants that are grown by our association members will be input by the interns. The JoCoPedia, however, will always be a work in progress to accommodate the ever growing and ever changing list of plants grown within the JCNMA.

Goal: To implement and execute a marketing plan of action for promoting the beneficial website.

Outcome: Several key pieces of a marketing plan were executed by the JCNMA to promote the website and the JocoPedia, including website demonstrations at various industry trade shows and a comprehensive public relations campaign. The results of this marketing plan can be seen through Google Analytics, which analyze website traffic by the day. Starting on Jan. 1, 2010, visitors to the website stood at 0 per day and have grown to a peak of 100 per day on March 3, 2011. Targets for number of website visitors and actual number of website visitors per quarter can be seen below:

First Quarter 2010 (Jan.-March):
Target: average of 100 unique visits per month
Actual Outcome:

Jan.	66
Feb.	65
March	66
Total:	197
Average:	**65.66667**

Second Quarter 2010 (April – June):
Target: average of 250 unique visits per month
Actual Outcome:

April	37

May	54
June	130
Total:	221
Average:	**73.66667**

Third Quarter 2010 (July – Sept.):
Target: average of 350 unique visits per month
Actual Outcome:

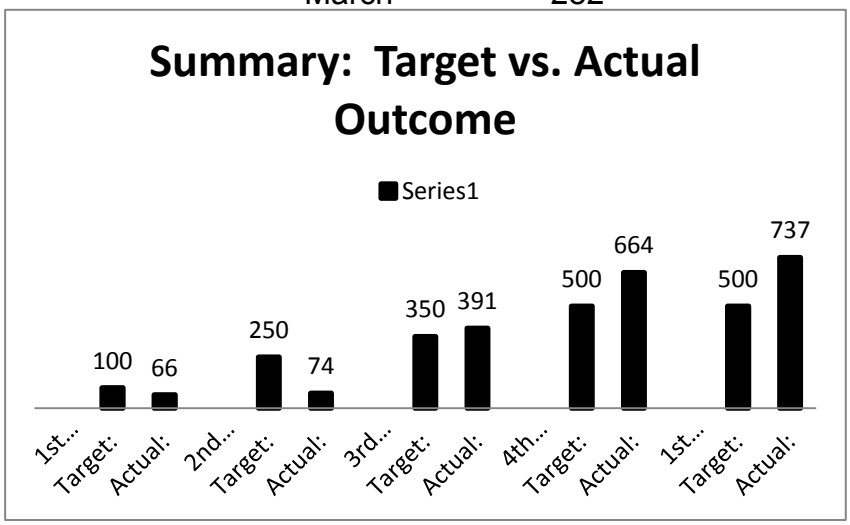
July	130
Aug.	529
Sept.	513
Total:	1172
Average:	**390.6667**

Fourth Quarter 2010 (Oct. – Dec.):
Target: average of 500 unique and returning visits per month
Actual Outcome:

Oct.	747
Nov.	760
Dec.	486
Total:	1993
Average:	**664.3333**

First Quarter 2011 (Jan. – March):
Target: maintain average of 500 unique and returning visitors
Actual Outcome:

Jan.	859
Feb.	1071
March	282



As evident in the data to the left, targets were not met until the third quarter of 2010 and goals were exceeded in the following quarters. For a more detailed look at number of website visitors per day, please see document titled "Analytics: www.jocoplants.com".

D. Beneficiaries:

This project has directly impacted the member nurseries of the Johnston County Nursery Marketing Association and other Green Industry businesses connected to JCNMA members. At the start of this project, there were 27 member nurseries located in 8 counties. However, due to the recent devastating economic events, the JCNMA currently consists of 24 nurseries in seven counties. This project's other beneficiaries are customers of the JCNMA nurseries, other North Carolina nurseries, industry suppliers, and others working in the Mid-Atlantic Green Industry including landscapers and landscape architects.

In 2008, gross sales of JCNMA nurseries were $39,215,896.00. Although sales for all Green Industry business have decreased in the current economy, this project will continue to increase sales through the use and promotion of www.jocoplants.com and the JocoPedia. The project's goal is to educate Green Industry professionals on the current nursery crops grown in North Carolina while saving them both time and money. Although the JocoPedia is not "live" on the JocoPlants website yet, industry users are already gaining knowledge of crops grown locally by JCNMA members through the listing of each nursery's available plants. As the JocoPedia goes "live" in the Fall of 2011, the number of those that benefit will grow exponentially.

E. Lessons Learned:

Many unexpected delays and unforeseen challenges occurred while completing this project. The first delay seen by the project, which affected the entire project's timeline, was that the estimated contract date was delayed and therefore our start date was also delayed. This delay, however, was quite minor compared to the delays and unforeseen challenges presented by the task of the online plant directory. The technology committee began compiling a "master list" in January of all plants grown by member nurseries. This first task was delayed due to the fact that some members were using incorrect botanical and common names. For example, Blue Ice Cypress was shown as Cupressus arizonica 'Blue Ice' by some members and as Callitropsis glabra 'Blue Ice' by other members. Over the years, many botanical and common names have changed several times due to

discrepancies of their genetics by horticulture researchers, which are not readily publicized to the industry.

For the search engine on the online plant directory to function correctly, all member nurseries must list their plants using the same up-to-date and correct terminology. The technology committee then consulted with Dr. Brian Jackson, horticulture professor at NCSU, to obtain and identify correct botanical and common names. This task took roughly three months to complete. The membership of JCNMA voted on the name "JoCoPedia" for the online plant directory.

The third largest unforeseen challenge was communicating and deciding upon the design and functionality of the JoCoPedia. Since this particular plant directory is the first of its kind (due to the fact that it contains plants grown by an association and are directly linked to the member nurseries that grow those plants in the directory), there were many time consuming discussions and design sessions between the technology committee and the contractor, Goodtree & Co. Feedback from industry trade show attendants were heavily considered during this process. The time to complete this task as a whole was underestimated by all involved. By March 5, 2011, the JocoPedia is functioning with the exception of the "mature height" category in the advanced search feature.

The task of entering plant data and information into the directory presents the next large challenge to the project. The JCNMA decided that this task is too large to complete on a voluntary basis by members. Through funding from the 2011 SCBGP, the JCNMA will hire interns from North Carolina State University Horticulture majors. This task is on track to be completed, making the JocoPedia "live" by the fall of 2011.

The industry trade show component of the public relations campaign proved to be invaluable in more than just a promotional aspect. One unexpected result of the trade shows was that we were able to get direct feedback from industry members regarding what information will be the most useful for them in the plant database. At each trade show, industry members were presented with different aspects of the JocoPedia, from design to function. Their comments and feedback were recorded and taken into consideration when designing and coding for the JocoPedia. Therefore, the face-to-face aspect of the trade shows served as a dual function for the project. The first function being to promote the website and the upcoming JocoPedia and the second function being the priceless feedback gained to make the JocoPedia a useful and effective educational tool for its intended audience.

If others would like to attempt a similar project, recommendations can be made. Plenty of time must be allowed for design and functionality. Before attempting either the design or functionality phase, it is recommended that a formal survey of your intended audience be given to understand what they hope to gain from your project. For example, the JCNMA never conducted a formal survey. Instead, we pulled

together comments and feedback gained from trade show attendants and our own customers. This became time consuming to put together notes, etc. from all involved in the project. However, it is recommended that in the future, a formal survey of the intended audience be given by one to two people so that the information can be easily organized and will be more time-efficient.

Another recommendation is to conduct more face to face meetings. In the light of the current economic situation, every nursery in the JCNMA was forced to cut their workforce back. All JCNMA members are working more hours to cover the loss of productivity from the loss of employees. Therefore, time for face-to-face meetings became difficult to find. Many communications for the project were done via e-mail and phone conferences. Face-to-face meetings, of course, were still held. All members of the Technology Committee wish that there was more time for these meetings because they are much more productive than e-mails and phone calls. In retrospect, it is agreed upon that a once weekly progress meeting is recommended and that a "live coding" meeting with the contractor be held bi-weekly if possible.

Conclusion:

In light of the setbacks and delays seen by the project, the JCNMA members are pleased with the progress so far. We feel like we have a high quality, useful and efficient plant database that can be used by Green Industry Professionals. An informative database linked to the availabilities of all plants grown by 24 nurseries has never been attempted before. Challenges to the project were expected and we feel like those challenges were met and problems were resolved in an efficient manner. The JocoPedia is on track to be unveiled in the Fall of 2011 when student interns have completed most of the plant information entries.

Promoting the website and the JocoPedia has also been a success. The public relations campaign proved successful in many ways. The timing of advertisements in various industry publications, the placement of an article featuring JocoPlants and the JocoPedia in the NC Nursery Notes magazine, and the use of an e-mail campaign through Constant Contact, helped in increasing website visits and returning visits. The purchase of supplies for and the participation in Green Industry trade shows enabled the JCNMA to showcase and demonstrate www.jocoplants.com and the JocoPedia directly to the intended audience.

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Project Title: Developing Infrastructure to Secure New Enterprises for Small North Carolina Farmers

A. Project Summary:

Many socially disadvantaged North Carolina Farmers were traditionally row cropping, which did not require the same type of infrastructure. The purpose was to put into place the tools needed by small socially disadvantaged farmers to diversity into production of fresh fruits, vegetables. This was and over-sight on Operation Spring Plant, Inc. We did not use any of the programs funds for free range animals. Operation Spring Plant does not have the capacity to produce and or process free range animals. Operation Spring Plant, Inc. (OSP) developed and is presently developing markets for small farmers' local products. As OSP developed those markets, market requirements come with it. An example, fresh rutabagas require waxing before the stores will purchase them. Grocery stores require that fresh produce is cooled eight hours in advance, packaged in regulated boxes and delivered in a refrigerated truck. With the recent food scares of salmonella and e coli, many buyers are requiring that farms and packaging facilities are GAP and GHP certified. These barriers prohibit socially disadvantaged farmers from participating in the market place.

B. Project Approach:

African American farmers can better compete in the market place by pooling production. We purchased vegetable washing and grading equipment to prep and package fresh fruits and vegetables for market. The equipment was delivered and set up in Oxford, NC on Highway 15 North in a 4000 Square foot building. The equipment was chosen and purchased by networking with other businesses, visiting other operations and viewing it on line. We also chose the equipment based on the crops that associations and co-op members are having success growing and marketing. We also were having the most problems grading them on each individual farm. Therefore, the farmers agreed and Operation Spring Plant, Inc.'s Board approved the purchase of this equipment. We looked at several industrial size graders and conveyors that were new, used and reconditioned. Most of the equipment was purchased from Market Farm Implement companies based on price and the company's reputation. In order for Operation Spring Plant to compete in today's market place, infrastructure plays a major part of the equation. The funds allotted for this project went only to the freight and the actual equipment purchased and installation of the equipment and to purchase the supplies to wax requested products. The other items not obtainable from that company were purchased from local farm surplus dealers. The first crop processed on it was rutabagas which was a new product added to our market list. Farmer partners are making plans to increase production of saleable crops

therefore, we are continuously developing markets. Farmers were recruited based on farm location, access to clean water and their commitment to production.

C. Goals and Outcomes Achieved:

GAP and GHP Certificates remain important to growers and markets. Infrastructure being developed to spur agricultural business growth in disadvantaged farm communities. OSP has been able to employ and maintain an outreach person to work with us and "Prize of the Harvest", the marketing arm of OSP. Participating farmers have hired or maintained additional employees. This is a long term project with the goal of making the playing field more balanced for small farmers. This project will also serve all small farmers in its service area but the emphasis of the project is to serve the African and Native American farming communities who fight to stay a step ahead of extinction. OSP's staff feels that the development of a vegetable handling facility with the ability to create jobs on site, wash, prepare, package, market and transport small farmers' products will be an invaluable asset to any community. "Prize of the Harvest, the marketing arm of OSP, will market these crops during the farming season of 2012: rutabagas, squash, watermelons, greens, tomatoes, and potatoes. The machinery needed to handle these crops after being picked we have in inventory. Operation Spring Plant partnered with CFSA for GAP and on farm certification cost share, advocacy for local foods system development and North Carolinas food policy. In these very stressful and economic times farmers have found it difficult to maintain their agricultural operations with the many changes they are facing i.e. fuel price escalation, packaging materials and new certifications. We are adding the infrastructure to wash grade package and cool in order to enter high end markets. Pooling production and resources we can capture and hold markets longer while enhancing sustainability for small NC farmers. We used it as a marketing tool to educate farmers as we move into the 21st Century of agriculture and high scale markets that require proper sizing and value added products as a business tool. We hosted a number of training sessions for small farmers in partnership with North Carolina A&T State University and also partnered with CFSA and NC State University to be able to better serve small farmers on GAP and GHAP Certifications. Factors such as the scorching sun and continuous drought along with the equipment arriving in late September early October, there were very little products to be harvested. What was left gave Operation Spring Plant an opportunity to test the equipment and market to local buyers and on our retail markets. The volume was not enough to hold that market for the season. At the same time we were hosting meetings and referring farmers to NRCS, for tools on water conservation and how to qualify for the EQIP Program (hoop houses).NCA&T State University was brought in on plant and seed selection. The executive director, along with other staff members coordinated meetings and visited production sites for pest management and best management practices. That part of the project was handled by Phillip Barker the Farm Technician and the outreach Coordinator. The rest of the staff sent emails, made calls and did general office duties to make the project run smoothly. Buyers came

to the facility per the farm technician request to explain to farmers the buying process, grade of products and to see sample of products since we were in a drought at the time. No new farmers have been added but sweet potatoes and rutabagas were added to the products to be grown and waxed. The present farmers will grow those products that were never grown before because of the lack of infrastructure. The use of this equipment had to be delayed because of the lost of the site we had hopes of operating from. This put the project on a slow pace for several months. The original site was about a two-hour drive from our employees to work and manage the facility. Although most of the farmers were producing in the Sampson and Duplin County area, a building was found in the Granville County area near Oxford. We now have space and a building to grow from a number of small farmers with land and equipment from the tobacco era still depending on Sampson and Duplin Counties for the bulk of production while we grow a local food system near home for most of our employees. No one has used the equipment but OSP's Farm Tech and Outreach Coordinator who demonstrate the mechanics of it to the farmers. We also showed the equipment to others as a grading and packing out facility. Currently we are still building the infrastructure capacity to have a full fledge operation by the end of 2012. We have not reached full capacity and did not make any requests for farmers to increase their production for this season. OSP estimate, being able to start in early spring and weather permitting our facility and farmers will be able to harvest and ship 500 boxes or more of specialty crops per day. The increase will come as a result of bringing in more community farmers from Granville, Vance and Warren Counties.

D. Beneficiaries:

OSP and its partners know that the work really begins from this point on with infrastructure in place and the opportunity to provide jobs on individual farms and additional jobs created by the vegetable packing house. The socially disadvantaged farmers who became our partners are the primary beneficiaries of this project. The total number of farmers that attended the training was 375 in 2011 and 300 in 2012 respectively. The annual conference and community trainings were put together per the needs coming from small farmers and landowners at meetings on the farm, and in community forums. Power point presentations handouts and farm tours were a big part of the training. Our Youth in Today's Agriculture, The New and Beginning Farmers and Women were also a part of the planning and facilitation of workshops and conferences. The processed produce has been purchased by residents in rural communities, families, Mom and Pop Stores, and local Chinese and Mexican Restaurants. The project informed the participants about good agricultural handling and production practices. It also provided a roadmap for steps to take when assembling their production and marketing of fresh fruits and vegetables. The equipment afforded this group a hands-on and a vision image of items needed to produce safe and value added products. Moreover, it is a good place for local small farmers to bring their produce and also serves as a community outlet enabling all of us to grow together.

E. Lessons Learned:

We have learned that training, along with proper infrastructure, is needed for the success of the project. The market demands that we produce in a cooperative manner to ensure that all products are uniform in size, variety; color and the amount ordered delivered.

Additional lessons learned include, but are not limited to:

(1) No one farmer can capture and hold his their in the market place.

(2) The same wax for cucumbers cannot be used to wax rutabagas.

(3) Different ethnic cultures desire produce in a wide range of different varieties and color especially larger sizes.

(4) Haggling or bartering are used to secure products as cheap as possible.

(5) Farmers coming out of traditional tobacco markets understand that we need to have marketing dues to continue the program. It really is the same concept as the tobacco marketing system.

(6) The GAP and GHP are new barriers and programs that many small farmers are trying to get certified for.

(7) Training classes conducted, along with NC A&T University, will be a continuing educational piece of the overall project.

(8) This training is very costly and will require a lot of retrofitting resulting in new expenses to small farmers.

There were some unexpected changes to the project. A request for an extension was made for the following reasons: (1) the equipment was not delivered until late in the season, (2) but that was ok since the planting season was late from a cold Spring, (3) then the excessive dry and hot days of Summer cooked the squash and cucumbers on the vines, (4) the continual drought in the Fall planting season had many farmers waiting for rain, and (5) the farmers did not want to put seeds or transplants into the ground with no water. For those who were able to plant because of irrigation, the tender plants were later hit by flooding and many of the farmers disked these crops into the ground.

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Project Title: Expanding Regional Markets for Specialty Mountain Crops from Madison County, North Carolina

A. Project Summary

Madison Family Farms (MFF) was created in 2006 to try to fill a void in the marketing opportunities that Madison County farmers experienced. From its beginning there was recognition that there were crops produced in the county that would benefit from greater exposure in a variety of markets that oftentimes farmers can't readily enter as individuals. MFF, by providing a professional sales and distribution system, product liability insurance, GAP certification and cooler/freezer facilities, helps remove part of the marketing risk for farmers. These were the specific circumstances that were to be addressed by this project (assistance with production, marketing and distribution, assistance with product liability insurance, and assistance with adequate facilities to successfully enter commercial markets). The initial purpose of this project was to provide additional funding for MFF staff to allow for increased market development for four specialty crops: Christmas trees/wreaths, shiitake and oyster mushrooms, trellis tomatoes, and potatoes).

MFF began doing business in 2006 and by 2009 it was becoming clear that we needed to place additional emphasis on four specific crops that showed very good growth potential if we could reach new markets with a greater volume of production. This project came at just the right time to ensure the growth we needed and expected.

Madison Family Farms requested funding for this project for the purpose of developing regional markets for the four commodities: Fraser fir trees (wreaths/garland), shiitake and oyster mushrooms, trellis tomatoes and red and Yukon gold potatoes. The specific need that was addressed by the project was that the local market for these products was not adequate to satisfy the production capacity of Madison County farmers.

In regard to Christmas trees, timeliness in market development was essential. At a time when many local growers were struggling to find new markets that retained higher value (and at a time when a serious glut existed in the tree market), the effort to build a solid marketing relationship with large out-of-area retailers was important. In Madison County, many tree farmers were on the verge of abandoning their fields and no longer planting for future sales. To a lesser degree, mushroom, potato and tomato producers were facing the same problem, dependable higher value markets.

The project was not built on a previously funded project with SCBGP.

B. Project Approach

Madison Family Farms owes its existence to the commitment made by Madison County Government to help provide the essential infrastructure for the development of this business. Our Commissioners recognize that facilities that benefit agriculture can forever make a difference in whether farms succeed or fail in Madison County. Much of the success of this project rests on the supporting work of Madison County Extension personnel. Ross Young and Jenn Beck were intimately involved providing technical assistance in the production of crops, the production of supporting materials for marketing those crops and providing guidance for MFF staff in decision-making related to business development.

Madison Farms identified the focus crops for this project based on meetings with farmers, meetings with buyers and discussions with Extension personnel regarding technical expertise that could underwrite the production of those crops. The result of these meetings was an assessment of the current production of those crops and the needed market development. This assessment applied to Fraser firs, shiitake/oyster mushrooms, trellis tomatoes and red and Yukon gold potatoes.

Based on the assessment described above, we identified specific target-markets for these commodities. Whole Food Stores were targeted for Fraser firs and mushrooms, the NCDA Farm to School program was targeted for tomatoes, and Mountain Food Products and Leading Green Distributors were targeted for potatoes. Madison Farms provided logistical support for handling, packaging and delivery of these products. In the case of Fraser firs, Madison Farms developed print material for Whole Foods to use in advertising, tree tags for the product sold at their stores, bar codes for these products, and tree handling information for the Whole Food stores (26 stores in all). Madison Farms worked with Whole Foods on new, value-added packaging to identify mushrooms as a Madison County product. Madison Farms worked with tomato producers toward GAP certification required to qualify for participation in the NCDA program. Madison Farms worked with potato growers on planting dates, harvest dates, grading and packaging and coordinated harvest dates to satisfy market timing.

Madison Farms worked with Frasier fir producers on pricing and packaging for wreaths and garland (again going specifically to Whole Foods Stores).

Madison Farms provided on-farm training on GAP certification with tomato producers (4) and safe-handling requirement for mushroom (5) and potato growers (5) using the Madison Farms wash/grade/pack line and coolers. Madison Farms

provided traceability on these farmers' products, which further ensured access to markets.

Madison Farms operates a GAP certified facility and is available for all county producers to learn about the requirements for on-farm GAP certification as well as the requirements to use the Madison Farms facility.

During the granting period, Madison Farms had quarterly Board of Directors meetings.

Madison Farms provided continual feedback to Madison County Government and Extension on progress in the project. Also, specific financial information was provided in an attempt to show economic impact to the county.

Madison Farms personnel were always available to meet with Madison County government to update them on project progress and outcomes.

C. Goals and Outcomes Achieved

1) Fraser Fir Christmas Trees and Wreaths: MFF has been building a relationship with Whole Foods Markets since the summer of 2010 when we hosted an on-farm visit to evaluate the quality of trees and wreaths for their markets. In the process, promotional and sales materials were developed for use in WFM stores and in the fall of 2010, MFF received its first tree/wreath order from WFM for one store. Having proven ourselves as a reliable vendor, in 2011MFF received orders from WFM totaling more than $46,000, sending trees and wreaths to WFM in Memphis, Nashville, Franklin, Chattanooga, Asheville, Winston-Salem, Greenville, and Charleston. As our goal was to develop new markets for Madison County Christmas trees/wreaths, we feel as if we have successfully achieved that goal and expect to build on that success in 2012.

2) Shiitake and oyster mushrooms: MFF has hosted several shiitake and oyster mushroom demonstrations and educational workshops since 2010, leading to an increase in the number of farmers producing mushrooms and an increase in the volume of their production. The largest shiitake producer in 2010 failed to continue production in 2011,leading to less overall sales in 2011(though more farmers are now producing).MFF now sells mushrooms to a variety of accounts including area grocers, restaurants and other area distributors. Value-added packaging development is now occurring which should lead to an additional increase in sales to grocers in 2012.

3) Trellis tomatoes: Madison County has a history of quality tomato production but there is always a need to continue developing new markets for farmers.MFF has been working with the statewide NCDA Farm to School Program for three years, successfully moving tomatoes to school districts throughout the state. With new "Good Agricultural Practices" (GAP) regulations required, MFF (with the assistance of Madison County Extension) has helped farmers complete the GAP certification requirement. Other area farmers are now seeing the benefits of that certification and are proceeding with their own farm certification. MFF, as a GAP certified distribution facility, helps increase the opportunity for farmers to participate in a variety of new markets.

4) Madison County Potatoes: Madison County also has a long history of potato production but not a history that includes commercial production on any sizeable scale. MFF has attempted to raise the aware of the quality of potato production in the county and has been successful in increasing production as well as increasing the value to farmers over the last two years. Though we increased production acreage in 2011, it was not enough to keep pace with our developing market, so 2012 production will be significantly increased.

The availability and use of grant funds related to developing our specialty crop focus helped us move significantly toward sustainability. The growth in sales moved us further along towards a successful commission-based business (not grant-funding based).
The actual accomplishments attained during the grant period exceeded the expectations we had set regarding Christmas trees/wreaths, potatoes and tomatoes. We did expect a significant growth in the mushroom sales, which were not attained, but we were able to increase the number of participating farmers in that category.

The MFF bookkeeper (Carolina Bookkeeping Service) has continually tracked the sales of the targeted specialty crops and documented the changes in the activity of sales during the two year period of the grant.

Madison Farms monitored the outcomes of the project looking at the number of farmers reached (30), the number of consumers reached (29 accounts plus all the consumers they service), and the money paid to county farmers through the successful marketing and distribution of their crops ($60k in 2010, $100k in 2011 and $200k in 2012).

MFF contracts with Carolina Bookkeeping Service for bookkeeping services. All invoices, purchase orders, Accounts receivable and Accounts payable are provided to the Manager, and all Financial Reports, which includes A/R and A/P, Profit/Loss

and Balance Sheet, are provided to the Board of Directors and Extension personnel (representing county government).

Farmer payments were made in a timely manner (based on agreements reached with farmers related to their particular product) and included a purchase order of the product, unit and pricing minus commission. QuickBooks software was used to document all sales and payment transactions.

(Note: As of 2012, $290,000 has been paid to farmers due to expansion within this project)

D. Beneficiaries

Madison Family Farms most clearly benefited from this project in that it broadened its outreach to area farmers, increasing the number of farmers involved, increasing the production acreage of specific specialty crops, increasing crop diversity of participating farms, and increasing the volume of product to send into the market.

- Madison County farmers, as well as farmers in Buncombe and Yancey, benefited from having access to very active, higher-value markets. All participating farms intend on increasing their production in 2012.

- Mountain Food Products (a primary buyer in 2011 of MFF's products) increased its "local foods" offering to the area (MFP is a local distributor to restaurants, area hospitals, and other institutions).

- Whole Foods Markets benefited by ensuring very fresh cut Fraser fir trees in eight of their stores in three states. WFM received excellent feedback on the quality and freshness of the trees they carried in those stores and relayed that feedback to MFF and the farmers.

Madison County Extension Service benefited from this project by having farmers rely on Extension to answer a host of questions specific to the production and marketing of these specialty crops (including production guidelines and value-added packaging for mushrooms, UPC's for Fraser Fir trees and wreaths, GAP certification for tomatoes, and grading demonstrations for potatoes).

Madison County farmers were the greatest beneficiaries affected by the project's accomplishments. Of the $78,808 in sales for project crops, $71,437 was paid to the farmers themselves.

- Fraser Fir Trees/Wreaths sales 2011:$46,600 (up from 2010 which was $3,563)

- Trellis tomatoes sales 2011: $12,370 (up from 2010 sales) Potato sales 2011: $11,823 (up from 2010 sales)

- Mushroom sales 2011:$8,016 (down from 2010)

Success in this project has not only affected Madison Farms and the specific growers whose products were sold but has benefitted other stakeholders as well. 1) Madison County growers benefitted by having a local marketing organization dedicated to the sale and distribution of these specialty crops as well as other crops produced in the county. Growers benefitted by having instruction on GAP certification, packaging, pricing, and barcoding and labeling of products for the different markets. Based on the requirement of GAP certification, growers benefitted by having "traceability" built into all their sales so if ever there was a problem with their product, they would find out quickly from Madison Farms. Growers also benefitted from a professional bookkeeping system that allowed farmers to always have access to information about what they sold, when it sold and what its value was. Growers always received a purchase order with their payments so they understood what they were being paid for. 2) Madison Farms benefitted by having a better understanding of the production capacity of farms, by retaining the commission generated from the sale of their products and by the desire for collaboration between farmers as the project developed. (e.g. by 2012, five county tree farmers participated in sales to Whole Foods Stores with $170,000 returned to the growers). 3) Madison County government has benefitted through the return-on-investment that they made in the Madison Farms facility, including coolers, wash line, and other equipment. They also benefit through increased agricultural revenue into the county which shows farming to be a profitable enterprise and ensuring that Agricultural Extension continues to have a vital role in the county. 4) Whole Foods Stores has benefitted by identifying an organization to work with to provide local/regional, high-quality trees, wreaths/garland in their stores, thus fulfilling an obligation they make to their customers (e.g. 5000+ trees went to their stores in 2012). 5) The NC Christmas Tree Association benefits by having its member farmers sell successfully into a major corporate outlet. 6) NC State University benefits in having its Extension arm closely associated with and assisting in the successful development of additional specialty crop markets.

In 2010, gross sales of these specialty crops were at $60,000. By 2011, the sales for the same crops had grown to $118,000 and by the end of 2012 the sale totals for these crops were $218,000. (In 2012 Fraser fir trees, wreaths and garland accounted for $187,000 of those sales)

Five mushroom farmers have continued to show growth in sales between 2010 and 2012 ($9,000 in total sales in 2012).

Five potato farmers have also continued to show growth in sales between 2010 and 2012 ($16,000 in total sales in 2012)

Trellis tomato sales remained consistent from 2010 through 2012 (approximately $6,000) showing no growth in the NCDA Farm to School program for tomatoes.

Madison Farms continues to retain a 15% commission on the sale and distribution of products which contributes to the cost of operation.

Whole Food Stores generates approximately $310,000 in sales of Madison county Fraser fir trees, wreaths and garland.

E. Lessons Learned

Project Staff have learned that there is possibly a very bright future for farmers in Madison County who produce the diverse specialty crops that were the focus of this grant. Significant growth in production and marketing has led to increases in sales and increased dollars returned to farmers. Increased exposure of these farm products coming from MFF has helped produce a niche for MFF in several new markets (both local and regional)

In addition to these new gains, Staff has learned that there are new challenges facing farmers and marketing organizations as we move forward. In 2011 the NCDA Farm to School Program required both the handlers/distributors as well as the farmers to be GAP certified. As GAP certification is new to many small farms, Staff realized that there are not adequate support systems for farmers to readily achieve GAP certification. In addition to this new obstacle, some accounts are proceeding with greater expectations on traceability of farm products as a requirement for doing business with the account. MFF is working on a new bar-coding system to ensure that Product Traceability doesn't become a significant marketing issue next year. Staff recently moved the first red norland and Yukon gold potatoes to Whole Foods with this bar-coding on the packaging. By spring 2012, we should have all products leaving MFF with a professional system in place to ensure traceability (assuring accounts of their ability to access data instantly on MFF product).

Fraser Fir sales were far beyond our expectations and point to a very bright future for these sales next years and for years to come.

Potato sales: Quality of production and response of the market produced exceptional sales. Sold out for 2011and looking forward to 2012.

All goals were achieved!

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Project Title: North Carolina Greenhouse Vegetable Growers Consumer Awareness Campaign

A. PROJECT SUMMARY

The North Carolina Greenhouse Vegetable Growers Association (NCGVGA) was responsible for implementing a statewide media campaign to promote the Specialty Crop Program. The project was implemented from June, 2011 – June, 2012.

The marketing committee was assembled and developed the media campaign. The NCGVGA developed a request for proposal (RFP) and distributed it to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. The media campaign consisted of television, radio, and promotional materials.

This new project teamed up the North Carolina Greenhouse Vegetable Growers' Association with the NCDA Marketing Division to promote advertisements promoted the Greenhouse Vegetable Industry; educate consumers on why they should "Buy Local" and the extended season for various greenhouse grown vegetables. The advertisements will be place in key markets of the state during the month of April 2012. The NCGVGA was also responsible for measuring the expected outcomes of the project. To gauge consumer awareness of the Greenhouse Vegetable industry campaign, the NCGVGA survey growers in July, 2012.

What was the impetus or motivation for the implementation of this project? Specifically, describe the issue, problem, or need that was addressed by this project.

We did not do any Radio Advertising.

In April through May NC Greenhouse Vegetable advertising spots were ran on the following local TV stations:

WRAL-TV 5	Raleigh NC
WGHP	High Point, NC
WFMY-TN	Greensboro, NC

A Total of 186 spots were ran between the 3 stations over a 6 week span.

Greenhouse Vegetable advertising spots were developed and ran during April, May on NC public broadcasting system. These station's demographics seem to be a genuine audience who would search for North Carolina Greenhouse Vegetables. The WRAL-TV, Fox 8 WGHP, WFMY-TV broadcast system covers the majority of our potential audience.

B. Project Approach

The requested funds of $20,000.00 were used for a targeted marketing program of radio, television, and media promotion. The funds were used during the months of June 2011 to June 2012. Program funds were utilized for creative development, purchase of media, execution of the promotional program elements and related agency fees.

Mrs. Cathy Price-Horton, Executive Director, of the North Carolina Greenhouse Vegetable Growers Association, worked directly with North Carolina Department of Agriculture and Consumer Services Marketing Division on this project. Mrs. Price-Horton coordinated the execution of marketing agreements and monitored programs throughout the grant period. She worked together to make sure that the projects were on track.

C. Goals and Outcomes Achieved

The fund of $20,000.00 was used for a targeted marketing program of radio, television, and print media promotion. The funds were used during the months of June, 2011 to July 2012 funds were used for creative development, purchase of media, executive of promotional program elements and related agency fees.

Due to the newness of the NC Greenhouse Vegetable Growers Association Website we have no previous standard to measure however our initial visit for the months March through April of 2012 total of 1,094 hits, thereby we feel a sufficient consumer awareness has accrue

The unexpected result was a sharp increase in hits on the NC Greenhouse Vegetable Growers website and phone calls received at the Association office shows a big interest in greenhouse production and vegetables stronger than any years in the past. This demand help drove the success of the project and expanding sales. The close relationship between the NCDA&CS and the NCVGA allowed for strong communication and hence a successful project.

In April and May the NC Greenhouse Vegetable Growers Association ran the spots and we feel like the spots were beneficial to the audience and that they succeeded in educating the consumers on why they should “Buy Local” and the extended season for various greenhouse grown vegetables.

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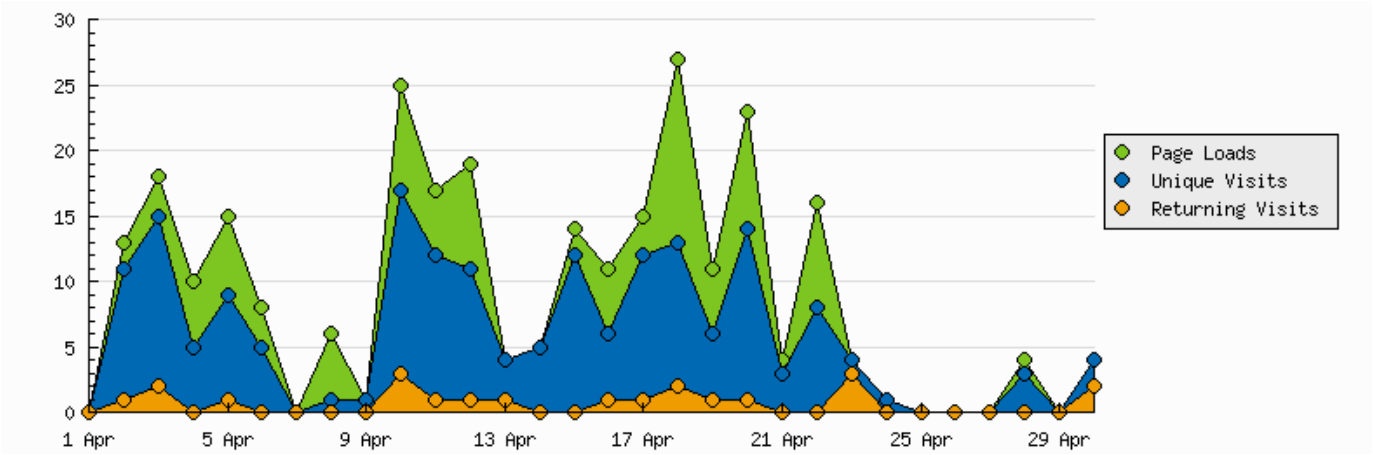
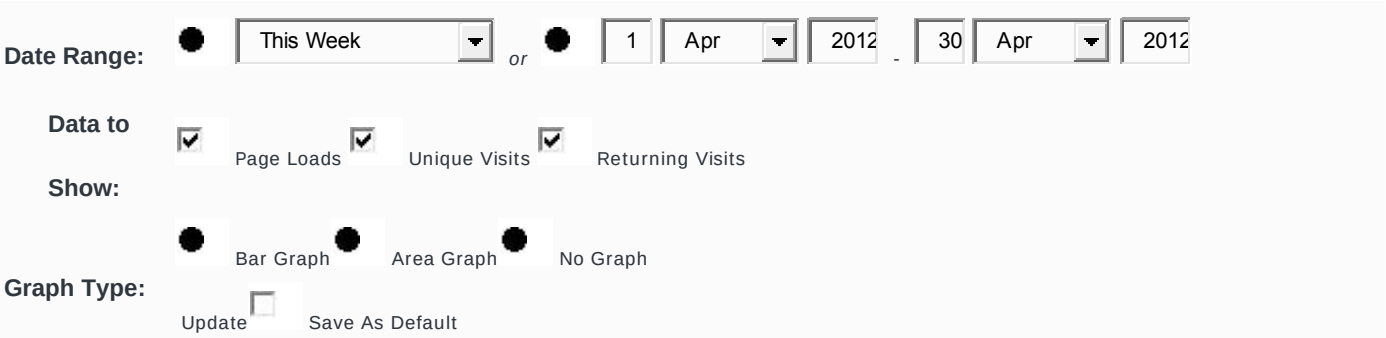
An example of out hits for a month is below for the month of April 1, 2012 thru April 20, 2012

April 1, 2012 - April 30, 2012





	Page Loads	Unique Visits	First Time Visits	Returning Visits
Total	275	182	161	21
Average	9	6	5	1

Day	Date	Page Loads	Unique Visits	First Time Visits	Returning Visits
Monday	30th April 2012	4	4	2	2
Sunday	29th April 2012	0	0	0	0
Saturday	28th April 2012	4	3	3	0
Friday	27th April 2012	0	0	0	0

		Page Loads	Unique Visits	First Time Visits	Returning Visits
Thursday	26th April 2012	0	0	0	0
Wednesday	25th April 2012	0	0	0	0
Tuesday	24th April 2012	1	1	1	0
Monday	23rd April 2012	4	4	1	3
Sunday	22nd April 2012	16	8	8	0
Saturday	21st April 2012	4	3	3	0
Friday	20th April 2012	23	14	13	1
Thursday	19th April 2012	11	6	5	1
Wednesday	18th April 2012	27	13	11	2
Tuesday	17th April 2012	15	12	11	1
Monday	16th April 2012	11	6	5	1
Sunday	15th April 2012	14	12	12	0
Saturday	14th April 2012	5	5	5	0
Friday	13th April 2012	4	4	3	1
Thursday	12th April 2012	19	11	10	1
Wednesday	11th April 2012	17	12	11	1
Tuesday	10th April 2012	25	17	14	3
Monday	9th April	1	1	1	0

		Page Loads	Unique Visits	First Time Visits	Returning Visits
	2012				
Sunday	8th April 2012	6	1	1	0
Saturday	7th April 2012	0	0	0	0
Friday	6th April 2012	8	5	5	0
Thursday	5th April 2012	15	9	8	1
Wednesday	4th April 2012	10	5	5	0
Tuesday	3rd April 2012	18	15	13	2
Monday	2nd April 2012	13	11	10	1
Sunday	1st April 2012	0	0	0	0

Returning Visits - Based purely on a cookie, if this person is returning to your website for another visit an hour or more later

First Time Visits - Based purely on a cookie, if this person has no cookie then this is considered their first time at your website.

Unique Visitor - Based purely on a cookie, this is the total of the returning visits and first time visits - all your visitors.

Page Load - The number of times your page has been visited.

D. Beneficiaries

The North Carolina Greenhouse industry involves over 50 growers with salary $1.5 million and it is estimated there are greenhouses throughout the state in use for early produce and season extension. In North Carolina, greenhouse vegetable production occurs in almost every country in the state. The economic downtown coupled with higher fuel cost has had severe consequences of negatively affecting the income of these producers. The promotional campaign helped stabilize this industry and increase the sales of greenhouse vegetables.

The North Carolina Greenhouse industry involves over 50 growers with salary $1.5 million and it is estimated there are greenhouses throughout the state in use for early produce and season extension. In North Carolina, greenhouse vegetable production occurs in almost every country in the state. The economic downtown coupled with higher fuel cost has had severe consequences of negatively affecting the income of these producers. The promotional campaign helped stabilize this industry and increase the sales of greenhouse vegetables.

E. Lessons Learned

The unexpected result was a sharp increase in hits on the NC Greenhouse Vegetable Growers website and phone calls received at the Association office shows a big interest in greenhouse production and vegetables stronger than any years in the past. This demand help drove the success of the project and expanding sales. The close relationship between the NCDA&CS and the NCVGA allowed for strong communication and hence a successful project.

F. Contact Person

Cathy Price Horton, Executive Director

Telephone Number: 919-334-0099, mobile 919-413-9544

Email Address: cathypricehorton@yahoo.com

Project Title: North Carolina Vegetable Growers Consumer Awareness Campaign

A. Project Summary

The North Carolina Vegetable Growers Association (NCVGA) was responsible for implementing a statewide media campaign to promote the Specialty Crop Program. This project was implemented from June2010 –September 2011. The marketing committee was assembled and developed the media campaign. The NCVGA developed a request for proposal (RFP) and distributed it to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. The media campaign consisted of television, radio, printed ads and promotional materials. The advertisements promoted the Fruit and Vegetable Industry, educated consumers on why they should "Buy Local". The advertisements were placed in key markets of the state during the months of June through September 2010 and 2011. The NCVGA also measured the expected outcomes of the project. Expected outcomes were measured from certified audited reports from the various media outlets.

This new project teamed up the North Carolina Vegetable Growers' Association with the NCDA Marketing Division to promote NC fruit and vegetable crops thereby changing the purchasing behavior of consumers and retailers to buy North Carolina fruit and vegetables. Increasing consumer purchases were increased and as a result the economic vitality of the fruit and vegetable industry in NC became stronger.

The North Carolina fruit and vegetable industry generated in 2006 an estimated $350 million in farm income according to the Agricultural Statistics from the NCDA&CS. The economic downturn coupled with higher fuel costs had severe consequences of negatively affecting the income of these producers. A promotional campaign helped to stabilize this industry and increase the sales of locally grown fruits and vegetables .This campaign built upon recent US domestic consumer trends and growing interest in sourcing local food industry.

This project did not build upon a previously funded project.

B. Project Approach

The requested funds of $20,000.00 was used for a target mixed media marketing program that included radio, television and print media promotion, along with development of promotional materials and a new shipper directory. The funds were used during the months of June through September in 2010 and an equivalent amount of funding was applied for use during the same time frame in 2011. Program funds were utilized for creative development, purchase of media, execution of the promotional program elements and related agency fees.

a. Radio Advertisements:
How many radio advertisements were purchased? Describe the content of these radio advertisements? What was the audience that the North Carolina Vegetable Growers Association chose in the development of these advertisements? Where and when did the advertisements air? Did the project staff attain an evaluation of the airing of these radio advertisements?

Radio Advertisements:

In June, July and August fruit and vegetable advertising spots were ran on local radio stations WRNS-FM and WWQQ-FM. A total of 214 spots were run on both stations over a 6 week span.

On radio station WRNS the ad ran from 6/14/2010 – 8/1/2010 on station WWQQ the ads ran from 16/14/2010 – 7/25/2010. The audience was the general population of North Carolina with an emphasis on Eastern NC to target tourist visiting the state beaches.

The following is the Total Impressions that were achieved.

Radio Audience

Station	**Total # of Impression**
WWQQ-FM	340,022
WRNS-FM	8,837*
Total # of Impressions	**348,857**

*** Not audited by Arbitron**

AD COPY

Rotate spots 50/50 entire length of schedule

- **Female voice**
- **Upbeat music bed appropriate for station format**

1.

Summer is back! And that means locally grown fresh fruits and vegetables are back too! Did you know there are almost 140,000 acres of fruits and veggies grown right here in North Carolina? That means lots of locally grown produce is available right now just for you. Look for them at your local roadside stand, farmers market and retail store today. Log on to NC Farm Fresh dot com to find some near you and remember when you want the best, it's got to be NC produce…

2.

Looking for a great way to freshen up your diet this summer? Try North Carolina fruits and vegetables. North Carolina is the third-most diversified agricultural production state. That means you've got a lot to choose from. From arugula to zucchini and everything in between, you'll find it all right here. Visit your local roadside stand, farmers market, or retail center today. Log on to NC Farm Fresh dot com to find some near you. Remember, when you want the best, it's got to be NC produce….

o Television Advertisements:
How many television advertisements were purchased? Describe the content of the television advertisements? Could you provide hyperlinks to the actual advertisement? What was the audience that the NCVGA chose in the development of these advertisements? Where and when did the advertisements air? Did the staff attain an evaluation of the airing of these television advertisements?

Television Advertisements:

Fruit & Vegetable advertising spots were developed and ran during June, July and August on North Carolina's public broadcasting system. This station's demographics seem to be a genuine audience who would search for North Carolina grown produce. The UNC-TV broadcast system covers the entire state and parts of VA.

The ads ran from June 15-September 15, 2010 – 3 Month Flight. We picked two types of programming. We used the How To Programming on week-end and also used Children's Programming.

1 Credit = a 15 second spot

How-To/Weekend Programming	*24 credits*	*@ $130 each*	=	*$3,120*
Children's Programming	23 credits	@ $80 each	=	$1,840
	47 Credits		=	***$4,960***

Program	Average # of HHs/week	Weeks Run	Total # of HHs/Show
How-To/Weekend Programming	4,700,000	13	61,100,000
Children's Programming	4,700,000	13	61,100,000
Totals Households:			122,000,000

- Print Media Promotion:
  Provide a description of the activities associated with the media promotion. What did this effort include?

Print Media Promotion:

Magazine ads were run in the Sunbelt Foodservice Magazine. The Sunbelt Magazine is a monthly publication. The Association ran the ad in June, July and August issues of the magazine. Sunbelt is a monthly business publication dedicated to the service of the food

distribution industry and all its varied elements. It is a totally independent publication, completely free of any connection whatsoever with any particular segment or group within the industry or without. This magazine is distributed to chefs in Alabama, Arkansas, Colorado, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia.

Estimated readership	Months	Total Readership
28,329	**3**	**84,987**

This year the association also ran a display ad in Our State Magazine. Their mission is to reflect the beauty of North Carolina, to tell the stories of its amazing people and its remarkable history, and to suggest wonderful places to visit.

Estimated readership	Months	Total Readership
720,000/month	1	720,000

- Could you provide a copy of or a hyperlink to the new shipper directory?

NC Shipper Directory

This directory consisting of growers and shippers was mailed to approximately 450 produce buyers on the East Coast promoting NC fresh fruits and vegetables. The NC Shippers Directory is available in both hard copy and CD-ROM. Updates will be posted on the web site found at http://www.ncfreshlink.com/shipperdirectory/welcome.htm

Mrs. Bonnie Holloman, Executive Director, of the North Carolina Vegetable Growers Association, worked directly with Nick Augostini of the North Carolina Department of Agriculture and Consumer Services Marketing Division on this project. Mrs. Holloman coordinated the execution of marketing agreements and monitored programs throughout the grant period. She along with Nick Augostini worked together to make sure that the projects were on track.

C. Goals and Outcomes Achieved

The fund of $20,000.00 was used for a targeted marketing program of radio, television, and print media promotion. The funds were used during the months of June through September in 2010 and 2011. Program funds were used for creative development, purchase of media, executive of promotional program elements and related agency fees.

We increased consumer exposure to add campaigns of 3 million plus impressions. Through this media campaign there was a potential of reaching 124,947,094 people who could have seen these advertisements. To increase sales by 2% over 456 million. The campaign also included the NC Farm fresh website which brought over 175,000 visits during the 2 years of promotion.

The goal was an increase in visits to the NC Farm Fresh Website (www.ncfarmfresh.com) of 25% over the number of visits during the months of June through September of 2010 (61,843) with reference to the number of hits in June through September 2009 (58,813) this represents a total of a 5% increase between the 2 years.

The North Carolina fruit and vegetable industry generated in 2007 an estimated $316 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2009 year NC Ag Statistics reported an estimated an $410 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown fruits and vegetables.

An estimated 124, 000,000 views on the advertising campaign was generated according to the reports from the media outlets.

The 5% increase in hits on www.ncfarmfresh.com (Google Analytics) was also a result of the campaign.

D. Beneficiaries

This project benefitted growers throughout North Carolina. There are approximately 30,000 farms in North Carolina that have fruits or vegetable production and all have been affected by this project in terms of potential increase in sales and a definite awareness of NC's relevancy in agriculture.

The North Carolina fruit and vegetable industry generated in 2007 an estimated $316 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2009 year NC Ag Statistics reported an estimated an $410 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown fruits and vegetables.

E. Lessons Learned

The project allowed the staff to examine the close relationship of supply and demand and "demand creation" through the awareness campaign and resulting success of the project as a whole. The increase in sales was a dramatic experience for all involved including growers, shippers and brokers. The close relationship between the NCDA&CS and the NCVGA allowed for strong communication and hence a successful project.

The unexpected result was a sharp increase in demand for local foods even stronger than previous years. This demand help drove the success of the project and expanding sales.

F. Contact Person

Bonnie Holloman, Executive Director

Telephone Number: 919-334-0099

Email Address: bonnie.holloman@yahoo.com

Project Title: An Ongoing Program to Increase Demand, Product Quality and Production for North Carolina Grown Turf Sod

A. Project Summary

The North Carolina sod industry, like other segments of the turf industry, was adversely affected by the recession of 2008. At that time, very little information was available regarding the status of the industry. Using research and communication tools, the North Carolina Sod Producers Association along with some influential producers felt the need to identify production deficiencies and hurdles, business and production issues along with North Carolina Sod Producers Association (NC SPA) member satisfaction and needs. In addition, information was generated and the reach of messages expanded for end users of sod. Emphasis was placed on the health, safety, environmental and aesthetic benefits of sod to targeted purchasers in an effort to increase demand.

B. Project Approach

(It should be noted that the NC Sod Producers Association had a change in Executive Directorship and staff in February, 2011. *For this reason, please note answers will be based on the working knowledge of board members as well as notes and records of the former administration. The current administration of the NC Sod Producers Association began in March, 2011 and was not involved with the association until after the execution of the 2009 specialty crops grant was completed.)*

This project used both research and communication strategies as the first steps in an ongoing program to increase turfgrass sod production and demand in North Carolina.

A survey tool was used to disclose information regarding farm efficiencies, production, crop forecasts, research needs, marketplace experiences, promotion strategies, and the general availability of resource information.

Developed with the assistance of NC State University's Department of Agricultural Economics, a "blind" survey tool was mailed to turfgrass sod growers throughout North Carolina during spring 2010.

Activities performed were as follows:

Aug/Sep 2009: The NC Sod Producers Association's. (NC SPA) Executive Committee and NCDA Marketing staff met to review the application and finalize the work schedule. This included development of materials, distribution, budget requirements and timeline in accordance to the grant's specifications.

Aug/Sep 2009: The Committee met with Dr. Charles Safley, the NCSU Ag Econ Specialist, to review the scope of the survey, develop specific questions, and provide a timeline and budget in accordance to the grant's specifications. It was decided that the survey would be accomplished through the support of a graduate student.

Sep/Oct 2009: The NC SPA Executive Committee and the NCDA specialty crops Marketing Specialist met to review previous marketing campaign efforts. There was continuing discussion on which questions should be posed to the producers in the survey so the survey questionnaire distribution was delayed until the spring of 2010.

Sep/Dec 2009: The NC SPA executive committee and the NCDA specialty crops Marketing Specialist worked together on the development and distribution of printed marketing materials. It is believed that It was determined at this time that television media was not feasible with the funds available and for that reason the focus was shifted to a printed campaign.

Sept 2009/Apr 2010: The Marketing Staff identified and scheduled Fall, Winter and Spring seasonal print. It is felt that the NC SPA executive committee and the NCDA specialty crops Marketing Specialist worked together on the development and distribution of printed marketing materials for a fall, winter and spring campaign. Booking ads and development of print ad materials would need to happen weeks if not months ahead of ad deadlines for printed materials. An advanced schedule would be vital to determine content, cost and timing of ad purchasing and placement. Marketing staff would likely have examined and chosen the best price and point of distribution to target key sod consumer groups like the Turfgrass Council of NC.

Sep/Dec 2009: The NCSU Ag Econ specialist continued to develop the survey questionnaire; the questionnaire was finalized in the spring of 2010.

Nov/Dec 2009: The NC SPA Executive Committee met to review the progress up to that point in time and scheduled an ongoing progress review schedule. The Committee also met with NCSU Crop Science Specialists to implement appropriate revision and reprinting of selected consumer turfgrass publications and TurfFiles website sections. Faculty members of NCSU's Turfgrass Program along with Cooperative Extension agents were approached by NC SPA about the possibility of reprinting publications and other material on NCSU's TurfFiles website that receives over 1 million hits annually.

Due to copyright issues, permission for use was limited to distribution of TurfFiles links. No duplication of effort was necessary on behalf of NC SPA.

Dec 2009/Aug 2010: The marketing Staff developed additional consumer education website materials for the NC SPA website and linking capability to producer and other appropriate websites. It is believed that the www.ncsod.org website was slightly updated at this time to include external links to educational associations including: www.turffiles.ncsu.edu, www.tarheelgardening.com, and www.ncnla.org among others. (*Content updates were revised again in 2011 as a result of funding from the 2010 Specialty Crop Block Grant Program.)*

Mar/Apr 2010: NC SPA's Executive Committee was scheduled to evaluate/revise current program and develop a strategic plan for the anticipated 2010-2011 grant cycle; solicit. The Committee was to evaluate and seek private funding for research proposals from NCSU faculty based on producer input priorities.

May 2010: The much anticipated survey was completed and sent to producers requesting that all responses be received no later than July, 2010.

Aug 2010: NC SPA's Executive Committee met during the Summer Membership Meeting to update the members attending, regarding the status of the project. The Committee received input and promoted continuing producer participation. Results-in-progress are shared with attendees regarding ads, promos. Additional new committee volunteers were solicited in anticipation of the 2010-2011 cycle.

Aug-Dec 2010: Survey results were analyzed and final report was written.

December 2010: Survey was printed and ready for distribution to producers.

Jan 2011: NC SPA's annual winter conference program formally updated all NC producers to the program elements and provided an opportunity for Dr. Safley to present the survey results. The publication was distributed to the producers following the presentation. It was entitled *An Ongoing Program to Increase Demand, Product Quality and Production Efficiency for North Carolina Grown Turf Sod by Mr. H.* Tejeda & Dr. C. Safley,

> The project simultaneously enhanced consumer awareness of the significant environmental, economic and aesthetic advantages of professionally-grown North Carolina turfgrass sod through a communications campaign that included print advertising, direct mailings and information placed on the NCSPA website (www.ncspa.org).
>
> Targeted audiences for these messages were identified as key sod purchasers such as homebuilders, landscape professionals, athletic field managers, golf course superintendents and others. Where possible, listings of North Carolina sod growers

were included along with educational information detailing the benefits of natural turfgrass sod to include comparisons to popular synthetic alternatives. A NC Sod Producers Association Membership Directory (printed and electronic versions) were produced that informed end users of available grasses in various regions of the state as well as contact information for North Carolina sod farms.

C. Goals and Outcomes Achieved

1. The previous administration stated that messages promoting the benefits of turfgrass sod compared to other alternatives, as well as contact information for North Carolina sod farms, reached more than 34,000 targeted purchases multiple times. It is believed that this figure was based on ad sales and demographic impacts.
2. A survey was created in 2009 by Dr. C. Safley in the Department of Ag Economics, NCSU. A graduate student was used in this process. A total of 44 sod producers were surveyed in late Spring 2010. The objective of the survey was to identify production deficiencies and hurdles, business and production issues along with NC SPA satisfaction and needs. The results were published (*An Ongoing Program to Increase Demand, Product Quality and Production efficiency for North Carolina Grown Turf Sod, Mr. H.* Tejeda & Dr. C. Safley, NCSU) and presented to the NC SPA membership in January 2011 at the annual meeting.

   The survey indicated:

   - The top production concerns for North Carolina turfgrass sod farmers include cash flow (37%); the costs of fuel, fertilizer and pesticides (33%); and concerns about the accessibility of water (20%).
   - The top business issues concerning North Carolina turfgrass sod farmers include “cut-throat pricing practices” (the sale of sod by a competing farm for less than it cost to produce), followed by government regulation.
   - North Carolina sod growers believe the top issues that will challenge farm efficiencies in 2015 include: cut-throat pricing practices (30%); government regulations (22%); and finally, accessibility to water and lack of marketing opportunities (each at 15%).
   - North Carolina sod growers believe they have access to a variety of expert resources for turf-related problems and view the NC Sod Producers Association favorably.

3. The 2009 Grant survey provided growers necessary insights into production acreage in North Carolina to help eliminate potential over-supply of certain grass types. Knowing how many acres of different types of grasses grown in North

Carolina allows growers the ability to assess the market and meet consumer needs by determining which grasses to plant in the immediate future.

4. Informal information was relayed to the executive committee via phone conference and meetings suggesting that producers were getting positive feedback from customers.
5. Informal discussions suggested that NC SPA grower members felt that the 2009 Grant survey was beneficial. Specifically the survey defined demand and sales predictions and would enhance product quality and production efficiency/profitability.
6. Many segments of the turfgrass industry, end user groups, and affiliates were targeted in printed media distribution by using the following marketing efforts:

PARKS & REC PERSONNEL: NC Recreation & Parks Magazine – Quarterly

- 1 full page/full color ad was developed and used in the first issue and three 50 word ads were used in the remaining three issues.

NURSERY PERSONNEL & LANDSCAPE CONTRACTORS: Nursery & Landscape Association "Nursery Notes" – 6 issues each year 6 full page ads, some B&W and some color

ATHLETIC FIELD PERSONNEL: Mailing to 386 NC High School Athletic Directors that included Turf Producers International's "Facts about Artificial Turf and Natural Grasses" as well as the NC SPA Directory.

LANDSCAPE CONTRACTORS: Mailed the NC SPA Directory to 842 NC Registered Landscape Contractors

ALL SEGMENTS OF THE NC TURFGRASS INDUSTRY:

NC Turfgrass Magazine – 6 issues annually

- March/April 2010 full color, full page ad
- Nov/Dec 2010 full color, full page ad
- Inserted NC SPA Directory via polybagging into Sept/Oct issue mailing.

TCNC Membership Directory ad (full page, full color)

7.Key grower members were informally surveyed during board meetings to discuss the status and satisfaction of the grant - including awareness and sales.

D. Beneficiaries

Beneficiaries of the project included all North Carolina turfgrass sod producers (about 44), their employees, residential and commercial property owners, users of parks, athletic fields, golf courses and other turfgrass sites. The economic impacts include increase recognition of sod's value. Messages promoting the benefits of sod compared to other alternatives, as well as contact information for NC sod farms reached sod consumer end users in targeted print and educational campaigns.

Survey results were presented to the growers that ranked their business/production concerns & problems; current and planned acreage of sod; grass types and which markets were being targeted. This information provided producers necessary insights into production acreage in North Carolina to help eliminate potential over-supply of certain grass types. Knowing how many acres of different types of grasses grown in North Carolina allows growers the ability to assess the market and meet consumer needs by determining which grasses to plant in the immediate future.

E. Lessons Learned

The cost associated with developing a high quality website that delivers consumer education and promotes sod is greater than originally anticipated, and also requires more time than planned. The previous www.ncsod.org website was designed as a grower membership portal. Information was based solely on promoting the NCSPA membership and did not reach out to sod consumers effectively. This target audience is the driving force behind sales. As a result, future efforts should focus on branding the member's products (the sod) and specifically target marketing efforts on product sales.

Changes in consumer perception can be fostered at the association level, but ultimately require actions and support by each sod farm, and each sod grower. Much progress can be made when all groups act toward solutions together. Using the results of the survey and working together with the grower members and board enabled a better understanding of evolving market needs and expectations. Communications were greatly improved thanks to the survey. As a result, discussions between administration, staff, and growers were improved. These discussions led to a better understanding and improvement of production efficiencies and future marketing opportunities. These lessons were critical for sod production in North Carolina going forward.

When resources and man-power are limited, it is a viable and effective solution to partner with existing agencies with similar interests. Specifically, adaptation and customization of externally existing consumer education materials is feasible and cost-effective. This removes the need and cost associated with developing "original"

materials. Using existing resources such as publications and websites that are applicable to the sod industry would be an effective and efficient way to proceed. Turf Producers International and NCSU have proven to be excellent resources for this type of material and are probably receptive to partnering with NC SPA.

F. Contact Person

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North Carolina Sod Producers Association
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Raleigh, NC 27695-7620
Phone: (919) 302-7971

G. Additional Information

Advertising/Consumer Education Summary

More than 34,000 purchasing decision-makers were reached with ads and direct mailings.

NC Parks and Recreation Magazine. Quarterly statewide publication reaching park administrators and decision-makers, athletic field supervisors and other decision-makers.

- One full page, full color ad
- Three 50-word ads

Nursery Notes. Magazine published by the NC Nursery and Landscape Association six times annually.

- Six full page ads, both black and white and color

NC Turfgrass Magazine. Published by the Turfgrass Council of North Carolina six times annually. Readers include lawn care and landscape professionals, golf course superintendents, city/state/municipal turfgrass professionals, sports and athletic turf managers and others.

- Two full page color ads
- Inserted NC Sod Producers Directory into the September/October issue

Turfgrass Council of North Carolina Membership Directory

- One full page, full color ad

Direct Mailings

- Directory of NC Sod Producers and a copy of Turfgrass Producers International publication “Facts about Artificial Turf and Natural Grasses.” Sent to 386 North Carolina high school athletic directors.
- Directory of NC Sod Producers and letter promoting sod benefits sent to 834 NC Registered Landscape Contractors.

Website (www.ncspa.org)

- Much of the printed information was put on the North Carolina Sod Producers website.

(Previously Approved)

Project Title: Specialty Crop producers, Community Supported Agriculture (CSA), and tailgate markets - taking a survey and tailgate market creation

A. Project Summary:

In 2010, Specialty Crop Producers in western North Carolina were surveyed to identify the issues impeding their farming and marketing operations. This survey sought producers input on how government and non-government agencies could assist them in making their farms become more competitive and profitable. The surveys were conducted face-to-face to collect economic and non-economic information from Specialty Crop Producers utilizing various marketing scenarios. These specialized marketing scenarios included marketing with Certified Organic and Certified Naturally Grown designations and producers utilizing Community Supported Agriculture (CSA) as a marketing tool. A total of thirty Specialty Crop Producers matching these criterions were surveyed.

The report submitted to you labeled as the final report is the final report. The results of the project (survey) are intended to be used as a reference for existing and/or new programs targeted to assist specialty crop producers.

The issue addressed was identifying the problems specialty crop producers say they are facing which prohibit their operations from becoming more profitable and competitive. Government and non-government entities can utilize the results of this project (survey) to develop assistance programs with the purpose of helping these producers become more profitable.

Key Findings:

1. Specialty Crop Producers utilizing conventional farming practices while utilizing CSA in their marketing farmed an average of 9.4 acres; 88% were connected to the internet; averaged $4,623 in gross sales per acre and received the largest portion of their farm sales (42%) through retail (direct to consumer) sales.
2. Specialty Crop Producers utilizing the Certified Organic or the Certified Naturally Grown designation farmed an average of 6 acres; 100% of the farms were

connected to the internet; averaged $5,795 in gross sales per acre and received the largest portion of their on farm sales (46%) from wholesale sales.

3. Both groups of producers surveyed stated the cost of labor, cost of infrastructure and expensive land prices are major challenges facing them in making their farm operations more profitable.
4. Both groups of Specialty Crop Producers stated that their primary needs of assistance were in knowing and complying with government rules and regulations.
5. The respondents said that having better access to consumer buying trend information and being able to attend local/regional food trade shows would make their marketing more effective.
6. Specialty Crop Producers utilizing conventional farming practices have been using CSA in their marketing for an average of 5.4 years, while producers who are Certified Organic and Certified Naturally Grown have been using CSA in their marketing for an average of 2.75 years.
7. The majority of respondents utilizing Community Supported Agriculture said they chose CSA as a marketing tool because the upfront money helped them manage their early season cash flow.
8. The stresses of pre-selling (obligation of fulfilling customer shares through the season) and knowing what and how much to grow were the major problems encountered by producers when they first chose to utilize CSA in their marketing.
9. Twenty of twenty-one respondents said the results of marketing through CSA are what they expected.
10. Nineteen out of twenty respondents said they would continue marketing through CSA.
11. Respondents thought NCDA&CS could assist Specialty Crop Producers by informing them of changes in government regulations, providing seminars and workshops on starting and running a CSA and educating the public on buying local.
12. Many Specialty Crop Producers utilizing the Certified Organic and Certified Naturally Grown designations chose these certifications because they expect certified crops to bring a premium price advantage over non-certified crops and they believe in the programs' safer environmental farming practices.
13. Many of the Specialty Crop Producers are satisfied with marketing under the Certified Organic and Certified Naturally Grown designations. The Certified Organic producers' major complaints involved the excessive time and the amount of paperwork required complying with the Certified Organic program.
14. Twelve of thirteen respondents plan to continue their Certified Organic or Certified Naturally Grown designations in the future.
15. The respondents were strongly in favor of NCDA&CS continuing its Certified Organic cost-share program and they requested the NCDA&CS help educate the public on the Certified Naturally Grown program.

B. Project Approach:

The North Carolina Department of Agriculture & Consumer Services surveyed thirty Specialty Crop Producers farming in the twenty-three counties of western North Carolina and Union and Stanley counties. These Specialty Crop Producers marketed under the designations of Community Supported Agriculture (CSA), Certified Organic and/or Certified Naturally Grown. Internet data bases were searched to find the names and addresses of farmers in western North Carolina selling Specialized Crops utilizing Community Supported Agriculture, Certified Organic and Certified Naturally Grown in their marketing. Initially, approximately 90 Special Crop Producers were identified as farmers utilizing the specialized marketing criteria. After reviewing the farmer data bases, the following farm listings were deleted from the sample size: duplicate farm listings, non-farmer owned CSA marketing organizations, producers no longer Certified Organic or Certified Naturally Grown, producers no longer utilizing CSA and first year producers. Additionally, producers declining to be surveyed and producers who could not be contacted reduced the sample size further. The producers meeting the specialized marketing criteria were mailed a letter detailing the goals of the project and requesting their participation in the survey. Survey appointment dates were made with producers via phone calls. For the Specialized Crop Producers who could not be contacted by phone, unannounced visits were made to their farms or to the tailgate markets where they sold their produce in order to ask for their participation in the survey.

A total of 30 Specialty Crop Producers meeting the specialized marketing criteria were surveyed face-to-face.

The survey instrument focused on the Specialized Crop Producers farming practices, income, sales resulting from their specialized farming practices, challenges facing their farming operations and the assistance they said they needed to make their marketing more competitive and profitable. Specialty Crop Producers utilizing conventional farming practices while utilizing Community Supported Agriculture in their marketing and Certified Organic/Certified Naturally Grown Specialty Crop Producers were surveyed on specific aspects of their production and marketing.

C. Goals and Outcomes Achieved

1. Identify the characteristics and marketing scenarios that Specialty Crop Producers are using to increase the value and sales level of their products.
2. Collect information on what Specialty Crop Producers said were hindrances and barriers which impede their farming operations from becoming more competitive and profitable.
3. Collect suggestions from the Specialty Crop Producers on the actions and services government and non-government agencies may be able to provide Specialty Crop Producers.
4. Utilize information from the producers' responses as a guide in determining what areas government and non government agencies can assist Specialty Crop Producers.

D. Beneficiaries

Government and non-government agencies have expressed interest in linking to the NCDA&CS' website to access the results of this survey (when available). One agency representative said they would use the respondents' answers to inform start-up Specialty Crop Producers of the difficulties other producers faced in their start-up farm enterprises. Other organizations plan to link to the survey information to assist producers with their production and marketing efforts.

There are numerous production and marketing problems preventing these Specialized Crop Producers from becoming more competitive and profitable. Taking note of these producers remarks on the hindrances impeding their farming and marketing operations should guide polices of the government and non-governmental agencies committed to assist them.

For the respondents requesting additional marketing assistance, the North Carolina Department of Agriculture & Consumer Services could research consumers' buying trends of specialty crops and make that information available to Specialty Crop Producers via the NCDA&CS' web site. Additionally, the NCDA&CS will continue to develop and offer management and marketing workshops to these producers.

Ultimately, the Specialty Crop Producers and consumers of specialty crops will be the beneficiaries of this survey. Management and marketing assistance provided by NCDA&CS and policies geared to assist Specialty Crop Producers by government and non-government agencies, should aid these producers in becoming more competitive and profitable.

E. Lessons Learned:

The Specialty Crop Producers surveyed are utilizing various marketing scenarios to increase the price and sales level of their crops.

These Specialty Crop Producers averaged $5,008 in gross sales per acre. Fifty-two percent of their household income comes from farming. The Specialty Crop Producers average just over two streams of income (farm income and non-farm income) per household. The overall picture of these specialty crop producers indicates that with the addition of off-farm income, they can continue farming specialty crops.

Specialty Crop Producers need assistance with their marketing. Not having information on the future trends of consumer purchasing patterns makes their production and marketing efforts less effective and more costly.

Choosing to utilize Community Supported Agriculture as a marketing tool creates its own problems. Many Specialty Crop Producers said they were stressed by the pre-selling of shares and not knowing the amount or type of crops to grow. However, almost all participating in Community Supported Agriculture were satisfied with the results and plan to continue with this marketing strategy.

Specialty Crop Producers utilizing the Certified Organic and Certified Naturally Grown designations received price premiums for their products. Additionally, producers selling under these designations believe in the health benefits and the environmental safety these certifications promote. Many producers felt that the additional time required for recordkeeping and expense requirements of these programs hindered their operations.

Utilizing the results of the survey gives agricultural service providers the opportunity to directly target the problems identified by specialty crop producers. Seminars presented by the Mecklenburg County Friends of Agriculture (a cooperative effort by NCDA&CS and the NC Cooperative Extension Service and focusing on providing a forum for discussing the issues facing farmers and the county's current food system) used the survey results in developing the program's agenda. The programs presented information to Mecklenburg County farmers and individuals interested in the local food system on new alternative marketing opportunities available to local specialty crop farmers. Additionally, attendees with an interest in the local food system provided feedback on their interest in purchasing produce from local farmers and problems obtaining such produce. While programs such as the Mecklenburg County Friends of Agriculture are important in assisting specialty crop producers and those interested in the local food system, reduced operating and program budgets for government and non-government agencies makes it difficult to provide new and similar forms of assistance.

F. Contact Person:

Robert Grooms

Agribusiness Developer

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Problems & Delays:

One goal of this project was to survey Specialty Crop Producers to gather economic and non-economic information from their 2009 harvest season. Due to producer's time constraints, surveying Specialty Crop Producers face-to-face has to be completed in a very small window of opportunity: November to the first half of January. The delay in receiving the go-ahead to start surveying resulted in gathering information from their 2010 harvest and extending the project approximately one year.

NCDA&CS personnel planned to survey a large percentage of existing Specialty Crop Producers utilizing specialized marketing techniques for this project. Searches of the internet for these Specialty Crop Producers resulted in finding a number of data bases containing the names and contact information for these producers. Upon further research, many of these producer data bases contained inaccurate information concerning the producer's contact information and many of the producers listed no longer marketed their harvest through the targeted specialized marketing scenarios. Additionally, a number of producers refused our request to survey them and other producers could not be contacted for the survey. The reduced number of contacts to survey was somewhat offset by including Certified Naturally Grown Specialty Crop Producers in the survey. The Certified Naturally Grown designation is similar the Certified Organic designation.

Due to the limited number of these Specialty Crop Producers, the original allotted time for surveying was greatly reduced. However, the high quality of information collected from the respondents enabled the project to attain its' goals.

Financial Recap

Funds Expended

1. 2 Garmin 255wt GPS @ $150.84 => $301.69
2. 2 Garmin AC Adapter Cable @ $33.38 => $66.76
3. 2 RocketFish Universal GPS Power & Sync Cable @ 26.91 => $53.82
4. 2 RocketFish GPS Case @ $23.68 => $47.36
5. Stamps (Postage): $44.00
6. Robert Grooms travel: $.33 x 262 miles traveled => $86.46
7. Robert Grooms travel: $.30 x 4778 miles traveled => $1437.60
8. Debra Sloan travel: $.33 x 744 miles traveled => $245.52
9. Debra Sloan travel: $.30 x 196 miles traveled => $58.80
10. Office Supplies: Paper $29.41
11. Laser Print Cartridge: $91.00

Matching Funds Expended on Project

1. Robert Grooms: 700 hours x $29.90 => $20,937
2. Debra Sloan: 53.5 hours x $32.67 => $1,748

Additional

Survey Results:

A total of 17 Specialty Crop Producers utilizing conventional farming practices while using Community Supported Agriculture in their marketing (Conventional/CSA) and 13 Certified Organic and Certified Naturally Grown **(**Certified Organic/CNG) Specialty Crop Producers were surveyed for this project. In the results that follow, the survey questions and answers are in *italics.*

Farming Practices:

The Number of Acres Farmed in NC (Owned) and the Number of Acres Farmed in NC (Leased) were the number of acres in actual cultivation (sown in specialty crops and intended to be marketed in 2010). The Conventional Farm Practice/CSA farms averaged 9.4 acres in cultivation; Certified Organic/Certified Naturally Grown farms averaged 6 acres in cultivation. All of the survey respondents utilized conventional farming practices or were Certified Organic/Certified Naturally Grown. None of the respondents utilized a combination of both farming practices.

Farming Practices:	***Conventional /CSA***	***Certified Organic/CNG***	***Total***
Number of Acres Farmed in NC (Owned):	*96.5*	*70*	*166.5*
Number of Acres Farmed in NC (Leased):	*62.5*	*8*	*70.5*
Total Acreage Farmed:	*159.0*	*78*	*237*
Average Acreage per Farm	*9.4*	*6.0*	

Internet Access:

Twenty-eight of the survey respondents had internet access at their residence or office. Of the two Conventional Farm Practice/CSA farmers that did not have internet access, one farmer claimed he did not need internet access because he was satisfied with the number of CSA

shares sold and the other Conventional Farm Practice/CSA farmer (limited resource farmer) opted to use the internet at a local public library.

Do you have internet access at your residence/office?	***Conventional/CSA***	***Certified Organic/CNG***	***Total***
YES:	*15*	*13*	*28*
NO:	*2*	*0*	*2*

Income:

On average, 82% of a Conventional Farming Practice/CSA farmers' income comes from farming, while 37% of a Certified Organic/Certified Naturally Grown farmers' income comes from farming. Both producer groups have an average of two streams of income making up the total household income.

	Conventional/CSA	***Certified Organic/CNG***	***Total***
What percentage of your income comes from farming?	82%	37%	57%
How many streams of income make up the household income?	2.1	2.2	2.1

Sales:

Total sales for Conventional Farming Practice/CSA producers were $735,000 for 2010. Total sales for Certified Organic/Certified Naturally Grown producers were $452,000 for 2010. The total sales for these specialty crop producers were $1,187,000 for 2010. It was calculated that the average sales per acre of for Conventional Farming Practice/CSA farms were $4,623 and the average sales per acre of Certified Organic/Certified Naturally Grown farms were $5,795.

	Conventional/CSA	***Certified Organic/CNG***	***Total***
What were the Total Sales from your farm in 2010?	*$735,000*	*$452,000*	*$1,187,000*
Average sales per acre:	*$4,623*	*$5,795*	*$5,008*

Sales/Acre:

The majority of the Conventional Farming Practice/CSA producers income came from a combination of marketing directly to the public (Retail Sales) and marketing through CSA. Many of these producers sold at farmers/tailgate markets and used these places as drop off points for their CSA deliveries. Certified Organic/Certified Naturally Grown producers received most of their income selling to wholesale and retail markets at premium prices.

What percentage of your farm sales come from:	***Conventional/CSA***	***Av. Sales/Acre***	***Certified Organic/CNG***	***Av. Sales/Acre***	***Total***
Retail Sales:	*42%*	*$1,918*	*42%*	*$2,453*	*42%*
Wholesale Sales:	*21%*	*$985*	*46%*	*$2,649*	*31%*
CSA Sales:	*37%*	*$1,720*	*12%*	*$693*	*27%*
	100%	*$4,623*	*100%*	*$5,795*	*100%*

Challenges:

Eight of the surveyed producers said that the cost and availability of labor was the single largest challenge facing them in making their farm operation more competitive and profitable. A number of producers surveyed had additional land they could put into production, however the additional cost of hiring off-farm labor would not be economically feasible.

What is the largest single challenge facing you in making your farm operation more competitive and profitable?

Cost of Labor - 8 Responses

Land Prices - 3 Responses

Infrastructure Costs - 3 Responses

Time Constraints - 3 Responses

Capital Access

Customer Awareness

Receiving value for your labor.

Competing with industrial organic produce.

Distribution issues (mountain travel time).

Growing CSA fast enough to take advantage of economy of size.

New Regulations (GAP, Leafy Green Laws)

Defining what is Local, people need to purchase local first.

My own lack of organization

Picking the right vegetables to produce.

Recordkeeping/Planning

Areas of Assistance:

Both Conventional Farming Practice/CSA producers and Certified Organic/Certified Naturally Grown producers said that keeping current on government regulations was the area they needed the most assistance. Many producers said that they were in need of information on GAP (Good Agriculture Practices) and food safety laws. Advertising, marketing and pricing were additional areas where producers indicated they needed help.

In what areas do you need assistance?	***Conventional/CSA***	***Certified Organic/CNG***	***Total***
Pricing	*2*	*4*	*6*
Wholesale Marketing	*2*	*2*	*4*
Retail Marketing	*1*	*2*	*3*
Internet marketing	*6*	*1*	*7*
Contract Production	*1*	*1*	*2*

Government Rules & Regulations	*10*	*7*	*17*
Becoming a More Effective Sales Person	*1*	*0*	*1*
Advertising	*6*	*3*	*9*
Making Cold Sales Calls	*0*	*0*	*0*

More Effective Marketing:

Survey respondents stated that having access to consumer buying trend information and being able to attend local/regional food trade shows would make their marketing more effective. Utilizing information gathered from these sources would allow producers to better plan crop diversity in the coming season and better customize their marketing plans. Additionally, produces said that help with internet sales & marketing and educating the public on the benefits of purchasing local would help in their marketing.

Which of the following would make your marketing more effective?	***Conventional/CSA***	***Certified Organic/CNG***
Being able to attend local/regional food trade shows:	*6*	*4*
Having more tailgate/farmers markets in the area:	*2*	*0*
Having access to consumer buying trend information:	*8*	*9*
Internet sales & marketing assistance:	*5*	*3*

Other:

Educating the public about local produce & purchasing from farmers.

Educating locals on purchasing from local farmers.

Educating the local people to purchase locally.

Having a single tailgate/farmers market, not multiple ones in county.

Have one big market instead of bunches of small markets.

Have hands-on workshops.

Have marketing workshops.

Having more time to spend on marketing.

Web page development

Having demographics on Community Supported Agriculture.

Finding better location for farmers market.

Receiving Business Information:

Specialty Crop Producers did not have a single preferred method for receiving information or assistance for their operations. Seminars, one-on-one assistance and internet were acceptable methods to producers of receiving business information relative to their operations.

Preferred method of receiving specific business information:	***Conventional/CSA***	***Certified Organic/CNG***	***Total***
Seminars:	*5*	*8*	*13*
One-on-One Assistance:	*9*	*3*	*12*
Internet:	*8*	*7*	*15*

Crops Sold By Producers:

For this survey, Specialty Crop Producers were asked what crops sold the most by volume. The results are the percentage of farmers listing that crop as one of their top ten.

Top 10 Crops Sold By Producers

Conventional/CSA	***%***	***Certified Organic/CNG***	***%***	***Total***	***%***
Tomatoes	*94%*	*Tomatoes*	*69%*	*Tomatoes*	*83%*
Potatoes	*65%*	*Squash*	*62%*	*Lettuce*	*57%*
Lettuce	*53%*	*Peppers*	*46%*	*Peppers*	*50%*
Peppers	*47%*	*Lettuce*	*39%*	*Potatoes*	*47%*
Carrots	*41%*	*Greens*	*39%*	*Squash*	*43%*
Cucumbers	*35%*	*Cucumbers*	*39%*	*Cucumbers*	*37%*
Onions	*35%*	*Potatoes*	*39%*	*Greens*	*33%*
Greens	*29%*	*Vegetable Transplants*	*31%*	*Beets*	*30%*
Beets	*29%*	*Sugar Snap Peas*	*23%*	*Carrots*	*30%*
Sweet. Corn	*29%*	*Herbs*	*23%*	*Onions*	*27%*

COMMUNITY SUPPORTED AGRICULTURE

Overview:

Community Supported Agriculture has been used by farmers in the United States as a marketing tool for 25 years. The Specialty Crop Producers customize their CSA operation to fit their specialized production and marketing needs. Customization includes farmers purchasing some of their produce from other farm operations to include in their CSA boxes and charging customers on a weekly or monthly basis for their boxes.

Community Supported Agriculture:

Producers utilizing conventional farming practices and marketing through CSA offered approximately 41 CSA shares per farm. They sold an average of 37 CSA shares per farm. The conventional farming practice producers price for a full share per 25 week season averaged $510, while offering a half share for an average of $306. Certified Organic/Certified Naturally Grown producers offered an average of 116 CSA shares per 23 week season charging an average of $519 per share. Certified Organic/Certified Naturally Grown producers involved in CSA surveyed did not offer a half share CSA. Conventional farming practice producers have utilized CSA for approximately twice as long (5.4 years) as Certified Organic/Certified Naturally Grown producers (2.75 years).

	Conventional/CSA	***Certified Organic/CNG***
For the 2009/2010 growing season, how many CSA shares did you make available (av. per CSA farmer)?	*41*	*116*
How many shares did you sell (av. per CSA farmer)?	*37*	*63*
How much did you charge per share?		
Full Share:	*$510*	*$519*
Half Share:	*$306*	*$0*
# of weeks:	*25*	*23*

How long have you utilized CSA for your marketing?	*5.4 Years*	*2.75 Years*

Choosing Community Supported Agriculture Marketing:

Specialty Crop Producers were surveyed on why they chose Community Supported Agriculture in their marketing scenario. Guaranteed sales and increased financial returns were the primary reasons farmers utilized CSA in their marketing.

Why did you choose to use CSA for your marketing?

Guaranteed sales; will not lose money.

More income, more control, more predictability.

Cash flow; direct relationship with consumers.

More profitable.

Loosing money on wholesale market.

Help with cash flow; local people asked us to.

Cash-flow; customer education.

Financial security; relationship with customers.

Upfront money.

Get a fair price and able to stay small.

Seemed economically feasible; gives us the ability to plan.

Trendy; connection with clients.

Produce grown is not wasted.

Experiment with growing different crops.

Thought it would be fun.

Like model.

Could not get into a tailgate market.

Local farmers market was not big enough; make produce available locally.

Needed to reach a different type of customer.

Dedicated market.

Thought it was a good idea.

Problems Encountered:

Specialty Crop Producers were asked about the problems they encountered when they first started their CSA. Planning what crops to plant, scheduling the planting times to target specific harvesting schedules and the stress of pre selling were major problems encountered by producers when they decided to use CSA in their marketing.

What problems did you encounter when you first started marketing through CSA?

Lack of planning which crops to plant and not consistent in quality of crops.

Planning what to put in CSA boxes each week.

Schedule production to get produce throughout the season.

Growing enough produce.

Know what and how much to plant.

Stress; pre-selling.

Stressful; choosing crop diversity.

People wanted to purchase shares in April, after planting was completed.

Charging too little; too little experience.

People did not know what CSA was.

Lack of knowledge, had to educate the public.

Finding customers (one of the first CSA's in the area).

Customers wanted to pick-up boxes at their convenience.

Getting reputation.

Customers did not know how to eat seasonally.

Do not have a heart for it (complaint from shareholder).

Lack of infrastructure.

Hindsight:

Specialty Crop Producers were asked what they would have done differently when they decided to start marketing through Community Supported Agriculture.

What would you have done differently?

Execute marketing plans earlier.

Not to over promise.

One box size choice.

Charge higher price.

Invest more money in marketing.

Educate the public on Community Supported Agriculture.

Planted larger area.

Fenced area (deer problems)

Should have had one pick-up date, not three.

Use time management and labor more efficiently; would have had only one type of share.

Would have had more infrastructure in place.

Do a value bag CSA.

Nothing (9 responses).

Expectations:

Specialty Crop Farmers were asked if the result of utilizing Community Supported Agriculture in their marketing was what they expected. The overwhelming response was *Yes*.

Are the results from utilizing the CSA marketing what you expected?

Yes - 20 responses

No - 0 responses

Undecided - 1 response

Benefits from Marketing through Community Supported Agriculture:

Producers said that the primary benefit of utilizing Community Supported Agriculture in their marketing is receiving money at the beginning of the growing season. CSA payments helped these producers manage their early season cash-flow.

What are the benefits to your farming operation from your CSA?

Develop long lasting relationships with customers; customers advertise for you.

Good cash-flow; eat what I grow.

Early cash flow

Cash flow; return customers

Cash flow; connects customers to us.

Income predictability.

Money upfront; having customers more connected to farm.

Provides cash flow at the beginning of the season.

Cash up front.

Pre-selling; good connection with community.

Reduced financial risks; better cash-flow.

Income at beginning of season.

Get money upfront, but gone by July (budgeting).

Upfront money.

Money upfront.

Cash upfront; we know how much we are going to plant and sell.

Cash upfront; build lasting customer base.

Having local people purchase from us.

Cash flow; building trust with customers

Cash flow; labor from CSA people.

Changes Made to CSA:

Changes made by marketers to any marketing model are common. Several Specialty Crop Producers utilizing CSA in their marketing stated that they have increased their prices since first starting their CSA.

Others said that they have included recipe cards and newsletters in their weekly CSA boxes to increase sales.

What changes have you made to your CSA since you first started it?

Raised prices, cut number of weeks.

Price increase.

Increased prices.

More variety, drop-off points, different boxes.

Hired a person for marketing.

Better planning.

Pick-up dates.

Published CSA newsletter increased CSA numbers.

Drop to one size share; change pick-up date to one day a week.

Employ more mechanical farming methods; more efficient in marketing & production.

Publish weekly news letter, recipes ideas; farm party at end of season.

Increased size of CSA boxes; more produce variety in boxes.

Quit buying produce to put in CSA boxes from other producers; extended the CSA season to 44 wks.

Growing more and different varieties.

Trying to extend season with fall garden.

None.

One box size.

Offering a few working shares; offering different sizes of shares.

Continue Marketing through CSA:

Nineteen out of twenty respondents said they would continue marketing through Community Supported Agriculture.

Do you plan to continue marketing through your CSA in the future?

Yes – 19

No – 1

CSA Drop-Off Points:

The majority of producers utilizing CSA in their marketing also sell at local tailgate and farmers markets. These producers utilize the farmers markets and tailgate markets as a central drop-off/pick-up point for their CSA.

Would a central location for dropping off CSA boxes (ex: farmers market) be beneficial?

Yes - 18

No - 3

Put together materials on how to start and run a CSA.

Internet CSA seminars, seminars on extending growing season (hoop houses).

Keep regulations down; market the concept of CSA's.

Protection from regulations; more PR; education; marketing help.

None.

Signage and advertising.

Keeping us up to date on anything helpful.

Keeping up with regulations.

Clarifying sanitation and marketing rules; create a CSA website; have equipment sales on website

Education; marketing; help with sanitation and food safety regulations.

Have cost-share program like ASAP; make GAP (Good Agriculture Practices) certification more realistic for farmers in western North Carolina.

Awareness through schools; more organic research on plant breeding.

More cost-share; reduce price of farmer-market fees.

Provide a central market.

Have a local only area at the Charlotte State Farmers Market.

Don't Know.

Need state website for Community Supported Agriculture; educate the public on buying local

Consumer education about CSA; directing consumers to CSA website.

Have NCDA&CS build marketing models; provide business analyses; cost-share, business advice

Provide consumer education; help provide covered pavilions; provide EBT at tail gate markets

Certified Organic/Certified Naturally Grown

Specialty Crops sold with the Certified Organic and Certified Naturally Grown designations are seen as value-added products. These value-added specialty crops should bring a higher selling price to the farmer than non-certified specialty crops. Given the different marketing scenarios for the groups of farmers surveyed, the total sales per acre from the Certified Organic and Certified Naturally Grown were approximately 25% greater than the total sales per acre of farmers utilizing conventional farming practice.

Length of Time Certified:

The average length of time the specialty crop producers surveyed have been Certified Organic or Certified Naturally Grown is less than 5 years.

How long has your farming operation been Certified Organic/CNG?

4.8 Years

Decision To Become Certified Organic/Certified Naturally Grown:

The reasons varied on why Specialty Crop Producers sought to be Certified Organic and Certified Naturally Grown. Some farmers saw the certification as a marketing tool to sell their

products, while others farmers believe in the farming practices their certification promotes.

What Prompted you to decide to become Certified Organic/Certified Naturally Grown?

Awareness of problems caused by pesticides.

It was a niche market 5 years ago.

Market for Certified Organic produce.

Wanted to see if I could do it.

Soil & Water grants for Certified Organic producers.

Chemical free.

For marketing; seal of approval.

Believe in the system.

Certifying to the public who we are.

Seemed like an easy way to get creditability.

Alternative to the Certified Organic policy; liked philosophy.

Needed to be Certified Organic to market under co-op.

Alternative to Certified Organic; wanted certification.

Benefits of Certified Organic and Certified Naturally Grown Operations:

The Specialty Crop Producers surveyed stated that the benefits of being Certified Organic or Certified Naturally Grown certification included receiving a premium price for their products and the certifications makes additional markets for their products accessible.

What are the benefits to your operation being Certified Organic/Certified Naturally Grown?

Good marketing tool.

Price benefits.

Premium prices for produce.

Qualify for grants and cost-share.

Being able to market locally.

Good wholesale business.

None.

Having 3rd party certification.

Price premium to offset costs.

Well received by customers.

Educating the public.

Being able to grow for High Country CSA.

Label for customers to see, backs-up what we tell them.

Downside of Being Certified Organic and Certified Naturally Grown:

Survey respondents said the time and cost requirements associated with being Certified Organic were hindrances to their operations. Certified Naturally Grown respondents said the program lacked the recognition of the Certified Organic program. Four of the twelve respondents said there was not a downside to being either Certified Organic or Certified Naturally Grown.

What is the downside to your operation being Certified Organic and Certified Naturally Grown?

Certification process (Cost & Time).

Losses from disease and insects.

Paperwork is a pain.

Premium price for organic produce does not cover cost of producing it.

Limited market.

Tremendous amount of paperwork.

None.

None.

None.

None.

Certified Naturally Grown program is smaller than I thought.

Lack of recognition for Certified Naturally Grown program.

Certified Organic and Certified Naturally Grown in the Future:

Almost all the survey respondents planned to continue with being Certified Organic or Certified Naturally Grown in the future. Some of the reasons for continuing with the programs included the availability of grants for Certified Organic producers, believing in the health benefits the program promotes and realizing a price premium for their produce.

Do you see your farming operation being Certified Organic and Certified Naturally Grown in the future?

Yes - 12 responses

No - 0 responses

Undecided - 1 response

Why?

As long as there is cost-share.

Great way to farm, we believe in it.

Markets are there.

Grants and cost share programs.

Some benefits.

Chemical free.

Always have done it, I believe in it.

Believe in the system.

Believe in it.

May switch from Certified Naturally Grown to Certified Organic because of the availability of grants.

Like the philosophy.

Marketing opportunities

Label for customers to see, backs-up what we tell them.

Changes in the Certified Organic and Certified Naturally Grown policy:

Six of the thirteen respondents said they did not think any changes need to be made in the Certified Organic or the Certified Naturally Grown policies. Other respondents wanted the Certified Organic $5,000 exemption to be eliminated and still others wanted the Certified Organic standards to be more reasonable and to require less paperwork.

What changes would you like to see in the Certified Organic and Certified Naturally Grown Policy?

Certified Organic standard should be more reasonable.

Take out the $5,000 exemption, all should be certified.

Simpler paper work.

Keep Cost Share.

Elimination of the less than $5,000 rule.

Have certifying organizations teach us how to comply.

None.

None.

None.

None.

None.

None.

Be more thorough in the inspections; better credibility.

Time Requirements for Certified Organic and Certified Naturally Grown Certification:

None of the farmers surveyed kept a written log of the number of hours they spent on recordkeeping. Their best guesses averaged to approximately 138 hours per season.

How much time do you spend recordkeeping to maintain your Certified Organic/Certified Naturally Grown status?

55 hours/year.

572 hours/year.

52 hours/year.

75 hours/year.

80 hours/year.

300 hours/year.

50 hours/year.

250 hours/year.

30 hours/year.

None

50 hours/year.

Costs of Being Certified Organic and Certified Naturally Grown:

Surveyed farmers did not keep logs of the additional costs of operating under the Certified Organic and Certified Naturally Grown designations**.** Best guesses by the producers included the actual cost of certification and what they believed to be the difference in the operating input costs of Certified Organic and Certified Naturally Grown verses conventional farming practices. The best guess average

came to $3,600 per farmer per season.

How much additional cost is added to your product cost being CO/CNG

$11,000.00

$5,000 - $6,000

$800 +

$5,000

$500

$550

None or N/A (6 responses)

Assistance from NCDA&CS:

All of the Certified Organic specialty crop producers wanted the NCDA&CS to continue the cost-share associated with the certification program. Other suggestions included educating consumers on the Certified Organic and Certified Naturally Grown programs, having seminars on Certified Organic and Certified Naturally Grown certification and having workshops on recordkeeping and grant writing.

What assistance would you like NCDA&CS to provide CO/CNG?

Continue cost-share program, more personnel to assist Certified Organic production, help in marketing.

Continue cost-share program.

Provide grant money for capital expenditures; get NCDA&CS into certifying GAP (Good Agricultural Practices) and Certified Organic.

Continue cost share, get into certification.

Keep cost-share program; help with sourcing organic materials.

Keep cost share program.

Continue cost-share program; educate consumers on the Certified Organic program.

Keep cost share program; have seminars on Certified Organic Certification; provide training for Certified Organic producers.

Have workshops on recordkeeping; have free test on manure and water; have a certification test on produce.

Provide information on Certified Naturally Grown to farmers and consumers.

Educate public on Certified Naturally Grown; support local tail gate markets.

Provide grant writing help; recognize Certified Naturally Grown, include Certified Naturally Grown in Certified Organic programs.

Project Title: Water Conservation Education and Promotion for the NC Green Industry

A. Project Summary

The drought of 2007-8 was devastating for the NC green industry as outdoor water use was discouraged by State and municipal purveyors. As a result, consumers stopped purchasing plants, landscapes and engaging in other outdoor water consuming activities. The purpose of this project was to educate the public and industry professionals about efficient use of water in the landscape. Through this education effort opportunities for green industry professionals would be increased as consumers would be educated about water wise gardening, water conserving landscape techniques and proper plant selection.

This project was not preceded by any other SCBG and therefore did not build on any outcomes from a previous SCBG project.

B. Project Approach

This project created opportunities for green industry professionals by educating consumers about the importance of efficient outdoor water use. By educating consumers about proper planting and conservation techniques, the GIC sought to encourage consumers to purchase landscape products including sod and ornamental plants. The NC Green Industry Council, produced two water education brochures; Water Wise Gardening and Water Saving Tips. The SCBG grant provided funds for the statewide distribution of these brochures. The brochures were distributed via mail, at retail centers, at trade shows and gardening shows across the state. In addition, a truck wrap was designed through NCDA's truck wrap program advertising the same message. The NC Green Industry Council applied for and received the Governor's proclamation of July as "Smart Irrigation Month." To publicize the "Smart Irrigation Month", the NC Green Industry Council launched a six-week long billboard advertising campaign across the state in six major markets. The campaign carried the message of smart outdoor water use directly to consumers. The grant provided funding for the upgrade of the existing Green Industry website which provided direct access to green industry professionals as well as funds to create a new consumer oriented website, www.savingwaternc.com. In 2010 the NC Green Industry Council participated in the NCDA "Got to be NC" booth at the NC State fair in Raleigh. All segments of the green industry were showcased at the tent. A video describing the various aspects of green industry professionals was shown

to more the 800,000 visitors. The video conveyed the message of wise outdoor water use. In 2011, the NC Green Industry Council again participated in the NC State fair in Raleigh and promoted efficient outdoor water use. At the same time, the NC Green Industry Council was asked to participate with other commodity groups in the NCDA traveling bus promotion campaign. Funding provided to the NC Green Industry through this grant made it possible for the NC green industry to educate consumers about efficient outdoor water use and to continue conveying this message for the next two years. This helped to ameliorate the crippling effects of decreased consumer spending on landscapes as a result of the statewide watering restrictions by showing consumers, industry professionals and municipal and state leaders that landscaping could be continued with the proper selection of plant material and water conserving landscape techniques.

C. Goals and Outcomes Achieved

Accomplishments of the project were numerous.

- For the period of the grant over 250,000 Water Wise Works brochures were distributed to consumers, industry professionals, municipalities, trade organizations and water purveyors
- With the aid of NCDA the Green Industry Council participated in a truck wrap program to convey the message of efficient outdoor water use
- July was proclaimed "Smart Irrigation Month" by Governor Purdue and promoted by an extensive media campaign that included billboards in six locations across the state over a six week period.
- The Green Industry Council participated in 2010 and 2011in the NCDA "Got to be NC" tent at the NC State fair in Raleigh at which outdoor water use efficiency was promoted.
- The NC Green Industry Council participated in the NCDA traveling bus promotion tour that helped convey the water conservation message of efficient outdoor water use directly to consumers.
- The NC Green Industry website was upgraded to promote green industry products and educate green industry professionals about water wise landscape practices. Traffic to this website increased by 500 visits per month during the drought years but has decreased to 300 extra visits per month after the height of the drought. While this fell slightly short of expectations, we are pleased to be able to reach so many consumers with our water efficiency message.
- A new consumer oriented website was created to interface directly with consumers about the efficient use of water in the landscape, proper landscape techniques and wise plant selection. The launching of this website was slightly delayed following the resignation of our Executive Director, but

was successfully launched in June 2010. After initially registering under 200 visits per month, the website has registered an average of over 2,000 per month. For the period June 2010-Jan 2012, 45,881 visits have been recorded.

- One goal of the promotion campaign through the grant was to increase traffic on the Tar Heel Gardening website, www.tarheelgardening.com. This aspect of the campaign has been very successful, as visits to the site have increased to more than 8,000 by the end of 2011. Our goal was to increase traffic to over 5,000 per month. Annual traffic increased from 27,000 visits to more than 76,000 visits for 2011.

These activities have been the result of many industry organizations working together. The NC Nursery and Landscape Association, the Turf Council of NC, the NC Sod Producers, the NC Commercial Flower Growers, the NC Christmas Tree growers as well as NC State University, the JC Raulston Arboretum, the NC Botanical Garden, the NC Western Arboretum and NCDA have all played key roles in making the activities funded with these grant monies successful. As a result of these projects consumer awareness of efficient landscape practices has increased, public awareness of the importance of efficient water use has increased, industry understanding of the importance of educating the consumer has increased and the communication between water purveyors and green industry professionals has been enhanced. These statements are evidenced by the fact that website traffic on the Green Industry website has increased the traffic to the Tar Heel Gardening website has increased and traffic on the new GIC consumer website, www.savingwaternc.com, has steadily grown. Landscaping videos linked to the consumer website have been viewed over 1300 times. While the economy of the past three years has taken its toll on green industry businesses, interest in gardening and landscaping activities remains strong.

In early 2010, the Executive Director of the NC Green Industry Council resigned. As the Executive Director had been designated as the key person administering this grant, the progress of activities was delayed by several months. The education/marketing committee was tasked with coordinating grant activities and proceeded to implement the distribution of water efficiency brochures, the "Smart Irrigation Month" promotion campaign and participation in the NCDA "Got to be NC" tent and traveling promotion campaign. In the late fall of 2010 an Executive Director was hired and all planned activities resumed.

D. Beneficiaries

Assessing the success of these promotions has been complicated by the sharp downturn in the economy during late 2009 and 2010. The green industry

suffered significant losses as the housing and commercial construction declines have had a dramatic impact on landscaping activities by consumers and businesses. In addition to the success of the increased website traffic on three website, perhaps the most significant measurable success of these grant activities is the increased awareness on the part of the public about the importance of efficient outdoor water use and the enhanced communication between green industry professionals and municipal water purveyors. This has resulted in the adoption of modified municipal water use guidelines that encourage proper plant selection, water conserving irrigation and wise landscaping techniques. Whereas previously water providers simply turned the outdoor water off during times of water shortage, they now realize the connection between green industry viability, access to water for outdoor use and consumer perception of extreme public announcements of water shortage. Consumers have adopted conservation measures that have resulted in decreased outdoor water consumption thus avoiding costly watering restrictions. Thus in spite of harsh economic conditions, demand for plant products has remained strong. This enhanced communication assures that the green industry will have a voice in crafting water policy that will ensure its future viability.

Green Industry Groups that benefited from this project are as follows:

North Carolina Nursery and Landscape Association-this group is comprised of nursery growers, landscape contractors and retail garden centers

Turfgrass Council of North Carolina-this group is comprised of turfgrass growers, turf management companies and gold course superintendents

North Carolina Sod Producers Association-this group is comprised of sod growers

North Carolina Commercial Flower Growers Association-this group is comprised of greenhouse growers and retail garden centers

The expected measurable goals as defined in the project grant proposal stated that our goal was to increase traffic on the tarheelgardening.com website and to create a new website and grow traffic on that site. As stated as a potential impact of the grant proposal, it was stated that the project had the potential to impact over 2000 green industry nursery, flower and sod growers in North Carolina. As much of the project was completed after the economic downturn of 2009-10, we have seen the green industry economy in North Carolina stabilize and begin to grow again. By promoting the industry through website, brochure distribution and event appearances, the severity of the drought and economic downturn has been mitigated.

Lessons Learned

The primary lesson learned is that engagement with water purveyors, local municipal leaders and other government entities is vital to affecting change of policies that adversely affect green industry businesses. By becoming a part of the solution to water conservation awareness the green industry was able to increase public knowledge of water use efficiencies that led to increased opportunities for companies offering green industry products and services.

The work on projects for this grant has been performed by numerous people. Douglas Chapman has assumed the responsibilities for grant reporting and funding requests. The Executive Committee of the NC Green Industry Council has been instrumental in implementing the activities of this project. Dr Barbara Fair, Extension Specialist with NCSU, has served as industry consultant.

E. Contact Information

Mr. Douglas Chapman's

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Project Title: 2010 Green & Growin' Trade Show

A. Project Purpose:

A majority of nursery, landscape, and garden center professionals are small business owners with little time or staff to research new technologies and equipment, take classes to continue their professional development, or network with fellow professionals. Meanwhile, larger organizations (including municipal and collegiate-level institutions).need venues flexible enough to educate multiple employees on multiple days. The Green & Growin' Trade Show provided three days of education programs to educate attendees on current green industry issues, research and practices; information they can use in their businesses to educate employees and customers. A majority of the multi-day, multi-track education sessions will also fulfill attendee pesticide, landscape technician, irrigation contractor and arborist continuing education credits.

B. Goals and Outcomes Achieved:

The objective of the education is to inform attendees about current trends in landscaping, growing, retail and business- specifically products and services that benefit specialty crops. It was estimated that 2500 of these professionals would attend the education sessions at the Green & Growin' trade show. Through this education, professionals learned about specialty crops in various parts of the green industry business; growing, retail, landscape and business. We were able to expand on educational seminars by including topics on pest management, weed control, irrigation installation, urban forestry, sod production, and growers' seminars. We also had Charles Hall of Texas A&M University speak about the economy of the industry.

Also, to provide an Increase green industry awareness of specialty crop information by providing three days of multi-track education sessions at the Green & Growin' Trade Show. NCNLA had a target audience of 15,000 professionals who were informed of the education sessions via mail, fax and/or email, to gain a 15-30 percent participation rate. Although we did not reach 2500 in attendance we increased attendance by 20% over 2009 to 1,100.

Outcomes that were achieved was an increase of educational attendees by 20% from 2009 and an increase of education from topics such as the economic outlook for the industry to grower seminars such as a nursery

irrigation water survey involving water dispersed plant pathogen Phytophthora ramorum. The wide range of topics that we offer at the Green & Growin' Trade Show proved to be beneficial to the Nursery & Landscape Industry.

C. Beneficiaries:

The 1,100 attendees that attended the 2010 Green & Growin Trade show was an increase from 2009 of 20%. Those attendees benefited from:

- The opportunity to receive multiple continuing education credits– pesticide, landscape technician, irrigation contractor and arborist.
- Access to the latest research, technology and trends-such as a recent homeowner/builder studies, using pH/EC meters to improve plant health, and how to market your business using social networking.
- Face-to-face networking with peers and business leaders from across North Carolina, and several other states across the U.S.

D. Lessons Learned:

The economic recession prevented some industry professionals from attending due to travel costs. The educational programs were successful based on evaluations by attendees, and they indicated they would like more seminars to count towards the Continuing Education Credits.

E. Contact Person:

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Final Performance Report: Team Based Marketing and Variety Development, an Innovative Strategy to Strengthen North Carolina's Potato Industry

A. Project Summary

Potato marketing in the eastern U.S. is highly competitive and NC's potato market share has been eroding due to changing market conditions and competition. We believed that our team-based marketing and research and extension variety development strategy has been of benefit to our growers and resulted in enhanced competitiveness and increased awareness of NC potatoes.

The North Carolina Potato Association (NCPA) has a long-standing commitment to improving opportunities for NC potato growers. We have been in existence over 80 years and consist of farmers who are interested in ensuring the long-term stability of NC potato farmers. The best opportunities for maintaining and/or expanding into new markets as a potato farmer lie in the development of new, high quality potato varieties and the simultaneous establishment of good markets for these high quality varieties.

It is extremely important to keep up with market trends, buyer and consumer demands/preferences. The project has increased the NCPA's ability to support marketing of new potato varieties that are currently being developed by North Carolina State University's (NCSU) potato variety research efforts. These funds, combined with matching funds from the NCPA and allied industry members have enabled us to support an innovative approach to potato marketing and variety development to help the marketing and breeding teams to work more closely together so that as new conventional and specialty-type potato varieties are evaluated and developed, their potential can be realized and commercialized

B. Project Approach

Funds from this grant along with matching funds from NCPA and allied industry members were used to promote new potato varieties that are being developed by NCSU potato breeders. By exhibiting at major trade shows where corporate level

potato buyers attend, we were successful in increasing awareness and sales of potatoes produced by North Carolina potato farmers. The following trade shows were exhibited at:

- 2010 Produce Marketing Association(PMA) Fresh Summit, Orlando, Fl
    - Approx. 18,000 attendance at the show
    - Include corporate level buyers from retail and foodservice such as Foodlion, Harris Teeter, Supervalu, MDI, US Foodservice, Sysco, etc and produce brokers
    - NC potato grower meetings were held with buyers at the NCPA booth

- 2011 Potato Expo, Las Vega, NV
    - Approx. 1,200 attendance at show
    - Included corporate level buyers from potato chip companies such as Fritl Lay, Wise, Herrs, Utz, Lance, and retail buyers and potato brokers
    - NC potato grower meetings were held with buyers at the NCPA booth

- 2011 PMA Fresh Summit, Atlanta, GA
    - Approx. 18,000 attendance at the show
    - Include corporate level buyers from retail and foodservice such as Foodlion, Harris Teeter, Supervalu, MDI, US Foodservice, Sysco, etc and produce brokers
    - NC potato grower meetings were held with buyers at the NCPA booth

- 2012 Potato Expo, Orlando, FL
    - Approx. 1,600 attendance at show
    - Included corporate level buyers from potato chip companies such as Fritl Lay, Wise, Herrs, Utz, Lance, and retail buyers and potato brokers
    - NC potato grower meetings were held with buyers at the NCPA booth

- 2012 PMA Fresh Summit, Anaheim, CA
    - Approx 20,000 attendance at the show
    - Include corporate level buyers from retail and foodservice such as Foodlion, Harris Teeter, Supervalu, MDI, US Foodservice, Sysco, etc and produce brokers
    - Meetings were held with buyers at the NCPA booth

During the PMA Fresh Summit trade shows, Tommy Fleetwood of NCDA&CS Marketing Division was able to attend the show and was present at the NCPA booth to meet with buyers, brokers, etc. NC potato growers also attended the PMA and were able to meet one on one with both current and potential future buyers of NC potatoes. All phases of the NC potato industry were discussed during the trade

show as were current and future needs/demands of the buyers and customers of the NC industry.

During the Potato Expo events Tommy Fleetwood of NCDA&CS Marketing Division, Mark Cough and Dr. Craig Yencho of NCSU attended and were present at the NCPA booth to meet with buyers/brokers, potato researchers, and other industry reps. NC potato growers were also present at the Potato Expo trade show to meet with buyers/brokers and researchers from other areas of the US and Canada.

NC Potato Association hosts an annual meeting each year that is attended by corporate potato buyers and brokers from across the US and Eastern Canada. A bus tour of the potato farms/facilities in the major potato growing region of NC is one of the highlights of the annual meeting. NCSU potato breeders plant potato variety research plots each year on select potato farms and at NCDA research farms. The bus tour, (cost of bus lease paid for with grant) attended by approx. 45 potato buyers each year made stops at the NCSU research plots. NCSU potato breeders were able to showcase the new potato varieties to the potato buying industry.

Ads were placed in the 2010, 2011, National Potato Council yearbook that is distributed to approx. 10,000 potato growers, potato buyers, potato researchers, and other industry reps across the US and Canada giving the NC potato industry great exposure to the potato industry.

NCPA Grower Directories and brochures were distributed at all of the trade shows.

C. Goals and Outcomes Achieved

Our main goal for this project was to establish an innovative approach to potato marketing and variety development that would help the marketing and breeding teams to work more closely together so that as new conventional and specialty-type potato varieties were evaluated and developed, their potential could be realized and commercialized. Tommy Fleetwood of NCDA&CS Marketing and Mark Clough and Dr. Craig Yencho of NCSU potato breeding were successful in establishing a working relationship and collaborating on this project. The marketing and potato breeding teams worked collectively on the 2011 and 2012 Potato Expo, meeting with growers, buyers, and researchers from other areas of the US and Canada and were

successful in bringing a greater awareness of NC potatoes to the industry. During the NC Potato Association annual meetings of 2010, 2011, and 2012, new potato varieties were showcased during successful bus tours set up by NCDA&CS Marketing that included stops at the NCSU potato variety trails. Approximately 45-50 potato buyers/brokers attended these bus tours bringing a greater awareness of potato varieties available from NC growers.

A measurable goal for this project was related to acceptance of the new varieties by potato buyers which would lead to plantings of the new varieties by North Carolina potato growers. Surveys were taken with the NC growers during 2011 and 2012 to determine the new potato varieties; conventional and specialty types; and approximate acres they were planting for their buyers/customers. These surveys determined that in 2011, chip growers planted approximately 100 acres of Harley Blackwell, 80 acres of Beacon Chipper, and 25 acres Mega Chip varieties and table stock growers planted approximately 75acres of Lehigh, and 200 acres of Envol varieties. In 2012, chip growers planted 110 acres of Harley Blackwell, 175 acres of Beacon Chipper, and 40 acres of Mega Chip varieties and table stock growers planted approx. 120 acres of Lehigh and 300 acres of Envol varieties. There were also small acreages of other varieties planted in 2011 and 2012 by NC growers such as Peter Wilcox (purple skin-yellow flesh).

D. Beneficiaries

The NCPA has been in existence for over 80 years and consists of approx. 40 growers. Nearly all hobby and small to medium-sized farmers who operate roadside markets, who number in the 300's, also sell potatoes that are either produced in small plots or purchased in bulk from larger potato farmers in NC. All NC potato farmers and roadside market operators should see benefits from this project because of improved quality of NC potato varieties and increased awareness of NC potatoes. Also addition of some specialty varieties that include different colored skin and flesh varieties will be a favorable product for consumers shopping at roadside markets across the State.

It is difficult to provide solid numbers on the potential economic impact of this marketing and variety development project, but by identifying the planting of the new varieties, and acreage increases of them, we have very positive results that predict buyer awareness and acceptance of the new varieties that should lead to a positive economic impact.

E. Lessons Learned

Potato marketing in the eastern U.S. is highly competitive and NC's potato market share has been eroding due to changing market conditions and competition. NC potatoes are shipped to markets during June through mid-August and are produced under difficult circumstances due to extreme weather conditions and marketed in volatile situations. NC potatoes are produced and marketed in a very short window of opportunity during the time frame when major potato producing/storage regions of the US are finishing up shipping their storage crop and beginning their late summer and fall harvest. In order for NC potato farmers to compete with shipments of these major potato production regions, potato varieties must be of highest quality, yields must be substantial for profitability and good markets must be established. The new and improved varieties that have been commercialized through funding of this grant and matching funds from NCPA and other allied industry. Funding has also enhanced competitiveness and helped to increase and establish market share for NC potato farmers. Just as in any variety research project, there were some varieties planted on a small scale by the NC farmers that did not work in the extreme growing conditions and were eliminated from the project.

The successful establishment of the marketing/breeding team resulted in teamwork that led to very positive results in increasing awareness of NC potatoes and the varieties grown at tradeshows and buyer/grower meetings. The team was exposed to the inputs and values of each part of the team creating a greater knowledge of the NC potato industry for the individuals involved which gave the team a broader understanding of all elements involved with producing and marketing NC potatoes.

NC potato farmers are appreciative of these specialty crop grant funds and the positive outcomes that were achieved through the activities of the grant. Through commercialization of new and improved conventional and specialty type potato varieties and their promotion, buyer awareness has greatly increased resulting in enhanced competitiveness and improved profits for NC potato Farmers.

F. Project Contact Person

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G. Additional Information:

NC Potato Association Booth at PMA

NC Potato Association Booth at Potato Expo

Project Poster for Potato Expo/ Potato Varieties

Annual Meeting Tour Bus

Project Title: Developing and Implementing a Comprehensive Plan for Strawberry Marketing & Promotion

A. Project Summary

The purpose of this project was to enhance the competitiveness of North Carolina strawberries within the local market, which is dominated by strawberries from other areas even during the NC harvest season. The project worked to increase consumer awareness of North Carolina strawberries and their harvest season and increase market share and sales of N.C. strawberries by improving both statewide marketing efforts and those by individual growers. Key activities of the project included developing an improved logo and web look, creating and distributing signs to growers all across the state, developing a "social media" presence for the association, advertising on radio and public television, and surveying consumers.

B. Project Approach

The project utilized a team approach, assembling a team of experienced growers, outside expertise, and staff (both NCSA and NCDA). An initial face-to-face meeting was very productive in refining the specific directions that the project would take; for example, the wording of signs, the type of radio station to be utilized and the target audience. This team continued to advise and provide feedback on designs as they were developed. With the strawberry harvest starting less than three months after the grant was received, intense activity was needed to accomplish project goals.

C. Goals and Outcomes Achieved

The project accomplished most of the tasks it sent out to do. For example, it redesigned the NCSA logo for a fresher look, incorporating it into a larger overall marketing program. We created and printed 800 signs and distributed them to growers. It developed a presence on Twitter and Facebook, and printed and distributed 20,000 cards promoting these and its website to the public. It advertised on 5 radio stations in major NC markets (Wilmington, Charlotte, Raleigh) as well as on public television (as underwriter). It acquired a video camera and began to collect footage and still shots on strawberry farms. It conducted both grower and consumer surveys. Several highlights of media exposure included stories about the NC Strawberry Facebook page on Raleigh TV station WRAL and an op-ed piece in the Raleigh *News & Observer.*
Planned measurable outcomes (as stated in the proposal):

- *Survey growers in fall of 2009 and 2010 on their current marketing efforts, barriers to their success, and their suggestions or recommendations for marketing efforts.*

  Goal: Adoption of marketing materials and usage of strawberry branding by 30% of growers (100 growers) by the end of the project.

  A survey was distributed at the 2009 Southeast Strawberry Expo, via email, and via membership renewals. Approximately 85 growers responded (not all NC). Results were used to inform project planning. A follow-up survey distributed at the 2010 was returned by only a handful of growers. We surmise they are "surveyed out". A better measure is that signs and promotional cards were sent to 147 farms across the state. Of these, 20 were non-members of the association, several of whom subsequently joined. These materials presumably were used by all response was enthusiastic, and 15 farms requested additional signs.

- *Survey consumers at public locations and via the web in winter/spring 2010. Survey consumers during the harvest season at farms and farmers markets.*

  Goal: Survey at least 300 consumers off-farm and 300 on-farm.

  Because of a short harvest season and the press of other project activities on project staff, the season was almost finished before the survey could be distributed to farms. Limited manpower also made it difficult to conduct face-to-face surveys at other venues (it turned out that our student intern was busy with school during key time periods). However, an on-line survey was very successful, receiving almost 800 responses before it was closed. An analysis of responses was shared with members in the August 2010 newsletter (attached)

- *Use the existing NCSA and NCOA websites, and new accounts on Facebook, Twitter, and YouTube to reach consumers. For the month of May (strawberry peak month), baseline levels from 2009 are 12,495 visits at www.ncstrawberry.com and 22,000 visits at www.ncfarmfresh.com.*

  Goal: Increase website visits at these sites by 30% during the strawberry season.

  Visits to www.ncstrawberry.com increased by 49% in April and 22% in May. This is consistent with strong late April PR by the project and with the early, short harvest season. Fans at the NC Strawberry Facebook page increased

from 0 at its inception in mid-April to more than 1200 fans, with a peak of 1247 active users on May 11. An analysis of NCSA website use was shared with members in the September 2010 newsletter.

D. Beneficiaries

The direct beneficiaries of the project are North Carolina's strawberry growers. Approximately 50% of North Carolina's estimated 250-300 strawberry producers received direct assistance in the form of signs and other materials. Statewide direct promotions and increased media coverage benefited all growers. Indirect beneficiaries include North Carolina consumers, who were encouraged towards a fresher choice in strawberries, towards a nutritious food choice, and through visits to farms, towards a greater understanding of agriculture and low cost, healthful family outings.

E. Lessons Learned

A positive lesson, not newly learned but certainly reinforced, was that strawberries are a great crop to promote which receives an almost universally enthusiastic response from media and consumers. Other lessons:

- The consumer who does not already visit farms and buy direct from farmers is the audience we most need to reach and the most difficult.
- It is hard to plan for April and May with a grant that comes in late January.
- Surveys are difficult to design so that they give useful information, and face-to-face surveys require more labor than we anticipated.
- Variable weather and patterns of crop ripening make marketing strawberries difficult. In 2010, an early, heavy crop caught everyone by surprise. This year, also, the season ended quickly, leaving many people disappointed after a big build up; in other years, the need for mid- and late season PR is greater. We learned that building a "fan" base through Facebook will be an excellent tool to get consumers to respond to an early market or a glut.
- Long-term planning and more groundwork before the harvest season are needed. To fully reach our goals we need additional staff and outside expertise for future promotional efforts.

F. Contact Person

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G. Additional Information

New Promo Materials (images of materials created by the project)
Grower survey form (Nov. 2009)
Summary of responses to first grower survey
Grower survey 2 (Nov. 2010)
Consumer survey (paper version of on-line survey) Consumer Survey report
Website Use report

Links:
(excellent early season article)
http://www.wral.com/news/local/video/7406216/

(Raleigh News & Observer op-ed article)
http://www.newsobserver.com/2010/04/17/440711/a-ripe-tar-heel-opportunity.html

http://www.facebook.com/NCStrawberry

Double-sided corrugated plastic 18 x 24 sign, will come with wire stands

new sticker

Just Kipe for MJu

Our redesigned logo

The final design for our

Just K.ipe for l1Ju

FRESH LOCAL NOW!

Single-sided corrugated plastic sign, 18 x 12..

Just Kipe for WJu

Find us!

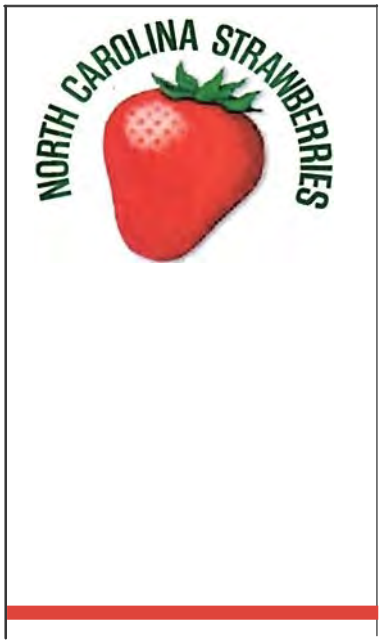
Web www.ncstrawberry.com

Facebook www.facebook.com/NCStrawberry

Twitter www.twitter.com/NC_Strawberry

YouTube www.youtube.com/user/NCStrawberry

"Business cards" promoting our new social media sites.



Our Website at Work

By Debby Wechs!el; NCSA Executive Secreta/)

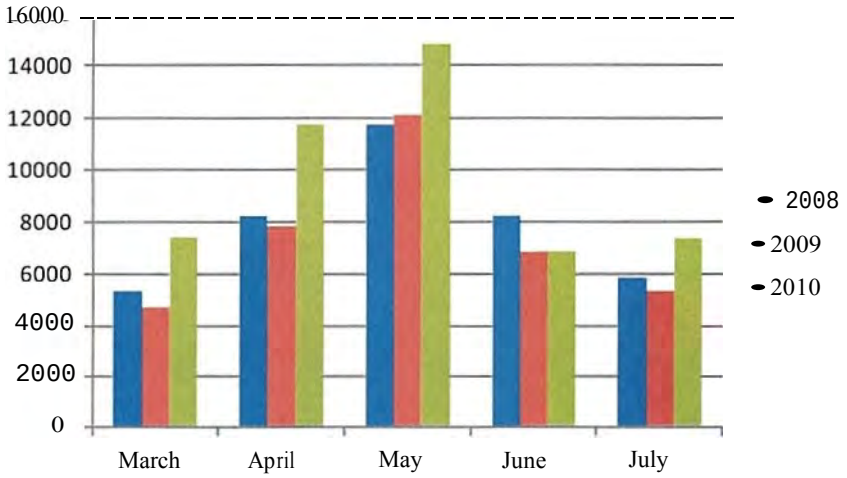
The NC Strawberry Association web si te, \V\Vw.ncstrawberry.com, is designed to serve many audiences, as indicated in the menu of choices down the left side of the screen: Consumers, Media, Educators, Kids, Growers. Since a main purpose is to reach out to the public (which includes all of those except the growers), this year we redesigned the home page to make it look inviting and delicious to these folks, espe cially during the harvest season. We figure that growers will find their way to what they need. In the summer and fall, when harvest is over, grower-related topics such as our Plant Supplier List and the Straw berry Expo are more prominently featured.

The top chart at right shows the num ber of visits to the website during the key spring months. I added July, because I was intrigued by the jump in July visitors this year. I can't explain it but guess that it may be related to the consumer poll via Sur veyMonkey that many members sent out that month. The second chart shows totals for each year of the months March-July. During the rest of the year, visits tend to hover somewhere near March levels.

Website visits show a substantial growth in 2010 during the key spring months, especially April. This may partly be because we distributed thousands of business cards promoting our website, Fa cebook, and Twitter add resses. It may also be because of the large and almost explo si vely early harvest in April this year and the excellent media coverage strawberries received in April.

Our goal has been to increase web site visits by 30% during the key spring months. We more than met that goal in April this year (49% increase) and came pretty close in May (22% increase). We will continue to work on increasing visits to our website in 20 I I.

Website visits by month, March-July, 2008-20 I 0

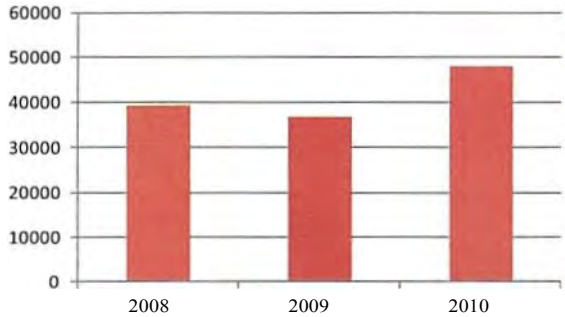


A look at the pages that people are downloading (these arc pdf files) shows that here the website is especially serving two groups: growers (incl uding extension) and kids (incl uding parents and teachers). The graph of the most downloaded files shows that grower resource lists and the Expo registration forms rank high, as do the *Strawberry Time* booklet and individual kid related activity pages (maze, word search, etc.).

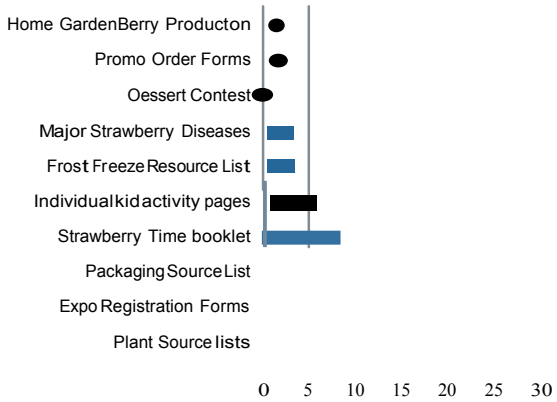
This chart is for 2009, as 2010 figures arc not available. It shows percentage of total down loads, as the number of total downloads per file in the stats isn't very informative. Ap parently the files may be broken into chunks in the download there is no way we had over a thousand requests for the Expo exhibitor form! In previous years, when we had more active child-related promotions (art contests and when we intro-duced the new Spanish-lan guage *Temporada defresas),* those downloads reached impressive heights. We expect that to happen again in 2011, when we will definitely do a kids art contest.

If you have sug gestions of items to add to the website, either to help you or your customers visiting the website, please let me know. We've already got some good ideas, the problem has been finding time to make them happen. But each year, we try to make the website a little better! We also still have severa l thousand promo cards listing our website, Facebook, and Twitter add resses; please contact the CSA office if you want some to give out. •:•

Total website visits March-July, 2008-20 I 0



Most downloaded pages, 2009 (% of total)



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Strawberry Marketing & Promotion

This survey is a follow-up for last year's Specialty Crop Marketing Grant and a planning tool for how we can best use 2011 grant funds to help farmers promote their strawberries.

State my farm is in Strawberry acreage· D under 2 D 2-5 D 6-10 D over 10

Which of these activities does your farm do? Check the appropriate box.	Have done for several years	Just started in 2010	Plan to start in 2011	Maybe sometime	Not a tool I am interested in
Farm Website					
Farm Facebook Page					
Twitter Messaging					
Post Video on YouTube					
Send E-mails to customers					
Use Strawberry Time booklets					
Use NCSA's stickers					
Give out recipe brochures/cards					
Put up roadside signs					
Buy newspaper ads					
Buy radio ads					
Buy TV ads					
Work to get free news coverage					
Post flyers					
Send out newsletler/postcards					
Sell to restaurants					
Organize sales to groups (offices, etc)					

NC Growers: In 2010, we sent out free signs and cards to farms. Did you use them?

Arrow signs O yes O no

Fresh/local/now signs O yes O no

Small cards O yes O no

Comments on them?

For ALL growers: Would you be interested in buying signs (or more signs) for your farm? (While NCSA may again send out some free signs to NC growers, bulk printing can offer substantial savings)

O yes O no

What would you like the signs to say or look like?

Would you be interested in the following

____ Signs I could take to stores/restaurants I sell to

____ Brochures, fliers, handouts on

O health benefits

O recipes

O how to care for strawberries

O other?-----

— More kinds of stickers. Your ideas?

____No tools for my farm. Devote funds to ads and statewide promotions.

OTHER IDEAS or NEEDS:

Strawberry Marketing & Promotion

The NC Strawberry Association is interested in finding out what its members are doing to market and promote their strawberries and seeks your ideas and suggestions for its marketing campaign- and how NCSA can best help you.

State my farm is in _____ Strawberry acreage: ☐ under 2 ☐ 2-5 ☐ 5-10 ☐ over 10

We do the following on our farm (check all that apply):

- ☐ Roadside signage
- ☐ Newspaper ads
- ☐ Radio ads
- ☐ TV ads
- ☐ Work to get free news coverage
- ☐ Post flyers
- ☐ Print newsletter
- ☐ Postcards
- ☐ Billboards
- ☐ Website
- ☐ Email notices
- Email newsletter
- ☐ Blog
- ☐ Facebook
- ☐ Twitter
- ☐ Visits to schools
- ☐ Public speaking
- ☐ Other PR/media:

Our sales and activiteis:

- ☐ Host school tours
- ☐ Have agritainment activities
- ☐ Hold special events/festivals
- ☐ Use Strawberry Time booklets
- ☐ Use NCSA stickers
- ☐ Use other stickers/booklets
- Use NCSA recipe brochures
- ☐ Do Pick-Your-Own
- ☐ Do pre-pick sales at the farm
- ☐ Have a farm market (many items)
- ☐ Operate satellite stands
- ☐ Sell to restaurants
- ☐ Sell to local stores/stands
- ☐ Have a CSA
- ☐ wholesale to supermarkets, etc.
- ☐ Process some of our fruit
- ☐ other sales/activites:

The NC Strawberry Association could help me by (Choose those that would help you, and NUMBER, with most important as #1):

____Signage for my farm

More kinds of stickers

Brochures, handouts on:

____Hats, T-shirts, aprons

____Templates for fliers, cards, newsletters, print ads

____Doing statewide radio/TV ads

____Doing print ads

____Getting strawberries into the news (print/TV)

____ Getting more feature stories (print/TV)

____Encouraging purchase of local strawberries

____Getting more people onto our farms

More work with children. schools

____ Opening up more wholesale opportunities

____Getting wholesale buyers to buy local berries

____Developing processing markets

____Increasing awareness of off-season fruit

OTHER IDEAS:

____Teaching consumers when strawberries are in season

Strawberries and YOU

Please help the North Carolina Strawberry Association and your local strawberry grower by filling out and turning in this survey before you leave. Thank you!

Which of the following best describes you?

- O I like strawberries a lot, and buy them all year long.
- O I buy strawberries a few times throughout the year.
- O I make sure to buy strawberries during the local harvest, but occasionally throughout the year.
- O I only buy strawberries when they are ripe locally.

How do you find out when local strawberries are ready for harvest in your area? (check all that apply)

- O See it in the newspaper
- O Hear about it on radio/TV
- O Email/postcard/newsletter from a farm
- O See farmers' signs along the road
- O Website, Facebook, or Twitter from NCSA or a farm
- O Word of mouth
- O I contact my local farm
- O I know I can always get local strawberries in May

Other: _____

If you buy strawberries in the store, do you read the signs or labels to see where they are grown?

O Yes O No O Sometimes

When you buy locally grown strawberries, where do you get them? (check all that apply)

- O Pick your own
- O Prepicked at the farm
- O Roadside stand
- O Grocery store
- O Farmers market
- O CSA
- O Other _____

When you buy strawberries at a local farm (pick-your-own or ready-picked berries), how often do you visit the farm during the season?

O This is my first visit O Usually once O 2-3 times O 4 or more times

Why do you choose buy locally grown berries? (check all that apply)

- O Better flavor
- O Better freshness & nutritional quality
- O I like to pick my own berries
- O It is fun to visit the farm
- O Helps local farms and economy

What keeps you from buying local strawberries more frequently?

- O It is inconvenient/out of my way to visit a farm or farm stand
- O Prices are too high
- O I don't think it makes any difference if fruit is local or not
- O I don't know when the local crop is ready
- O The season goes by so fast that I miss it
- O I would like to find organic berries, but I can't
- O Nothing, I already get all I want, no problems!

Other _____

What can we do to improve your strawberry experience?

On-line Consumer Survey Results

By Debby Wechslet; NCSA Exec. Secretmy

In mid- May, as part of our marketing grant project, I developed a short on-line consumer survey to learn something about the strawberry-buying public. I created both a web version on SurveyMonkey.com and one that I sent to NC member fanns as a pdf file could be printed out on paper. It was distributed at least one member farm – if you handed out and collected surveys, please send them to me!

I initially publicized the web survey through our Facebook page and put a link on our website's home page. We received a few dozen responses. Then, in mid-July, I sent out a plea to members to send out the link to their own email lists – whether farm, friends, or other contexts (for exam ple, I sent it out to folks on my neighbor hood email list, and asked them to send it out further). Many of you must have done this, as the number of responses skyrock eted to more than 750!

We can't tell where consumers are from or how they heard of the survey (those were not questions asked). However, in general, because most respondents heard about the survey via a grower, we can as sume that most respondents have at least a passing acquaintance with locally grown strawberries.

Below are the questions and results of the web survey, with a few comments.

Which of the following best describes you?

Respondents could choose only one answer. 56% said they make sure to buy strawberries during the local harvests, but occasionally throughout the year. About 23% said they only buy strawberries oc casionally throughout the year and 6% said they like strawberries a lot and buy them all year long. 15% said they only buy when local berries are ripe. These answers are perhaps not terribly revealing and the question could have been worded better, but note that about 70 % show some com mitment to buying local berries.

How do you find out when local strawberries are ready for harvest in your area?

See graph below. Respondents could choose several answers. These answers bear out other studies that have shown that signs are the most important way consum ers hear about local strawberries, followed by word of mouth. Also note the impor tance of newspapers – I am guessing that this is mostly feature articles at the start of the season (often listing local farms) rather than growers' ads. Many consumers prob ably clip that article and magnet it to their refrigerator! This tells me that the Associa tion (and individual growers) shou ld make an even greater effort to encourage that kind of article – which is free publicity in more papers.

If you buy strawberries in the store, do you read the signs or labels to see where they are grown?

75% said yes, 19% said sometimes, and 6% said no. Here, I think that some re spondents may have been trying to tell us what they thought we wanted to hear, and what we don't !mow from the responses is if, when they see California berries during the NC strawberry season at their local supern1arket, they still buy them or refuse to buy them (and ideally, complain to the produce clerks!) See the article on page 1 to see how Louisiana is aggressively try ing to make labeling work for the state's growers.

If you do buy locally grown strawber ries, where do you get them?

See chart below. Respondents could check all that apply. These responses show a pretty even distribution of outlets. Bear ing in mind that most respondents were on an email list of one of our members, responses imply that visiting a farm to buy or pick is only one of the strategies that these customers usc to find berries.

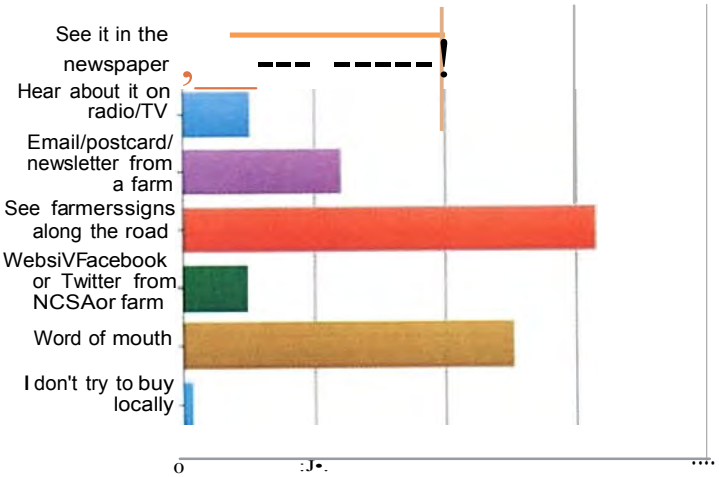
If you buy strawberries at a local farm (pick your own or ready-picked berries), how often do you visit the farm during the season?

45.5 %said they visited the farm 2-3 times during season. 26.5% said they vis ited 4 or more times, and 24.5% said they usually visited once. 3.6 % indicated that they visited a farm for the first time this year. While for most questions (except the open-ended one at the end) only 1-2% of respondents skipped the question, 16% of respondents skipped this, which we can assume is the percentage of respondents who never get berries at the farm. So, the challenge is to move the rarely or never visitors into the frequent-buyer groups!

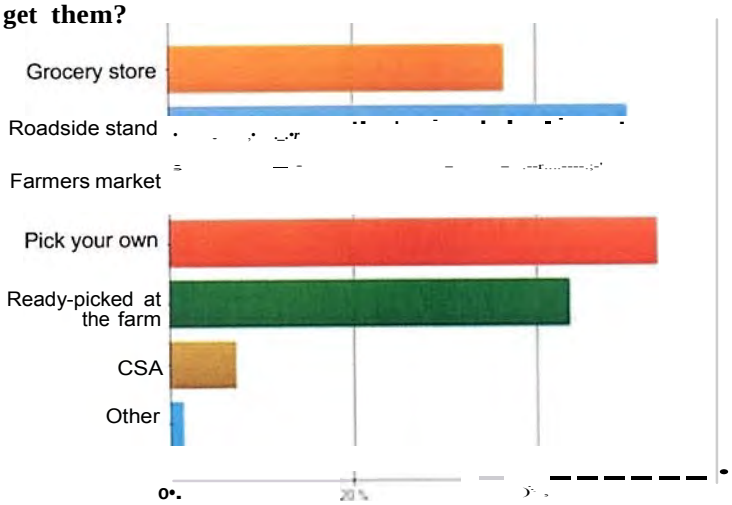
If you buy locally grown strawberries, why do you choose to do this?

See graph on facing page. Respondents could choose more than one answer. It is great that so many respondents identify freshness, flavor, and nutritional quality with local berries! It was interesting how many people responded "helping farm ers and the local economy," and how few responded that it is fun to visit the farm,

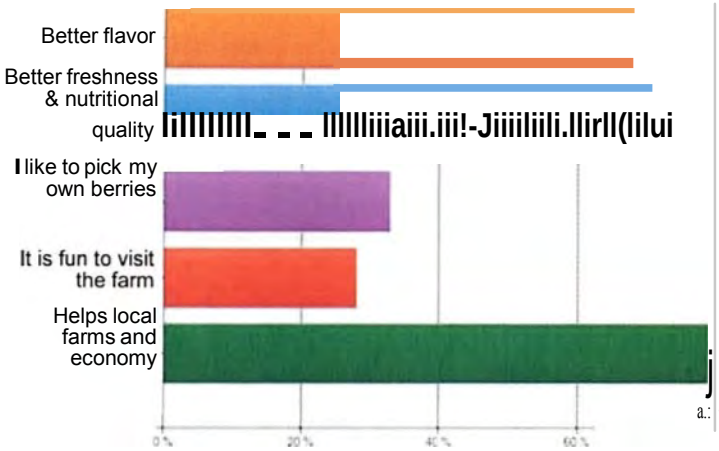
How do you find out when local strawberries are ready for harvest in your area?



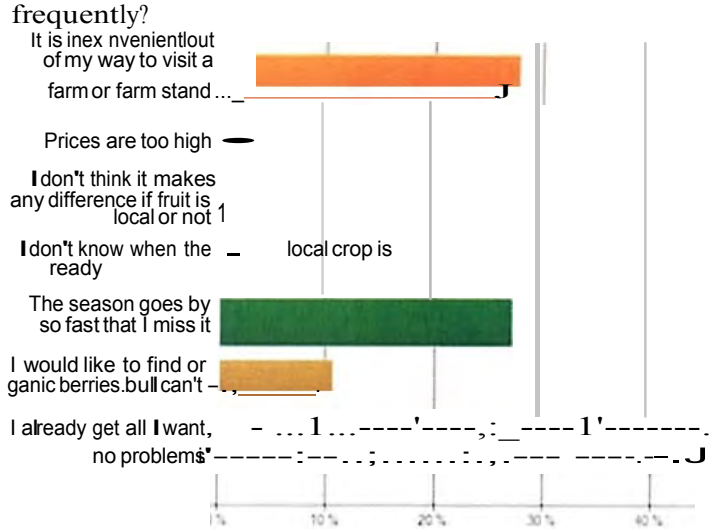
If you do buy locally grown strawberries, where do you get them?



If you buy locally grown strawberries, why do you choose to do this?



What keeps you from buying local strawberries more frequently?



despite the recreational nature of a farm visit for many people. The "I like to pick my own" choice could probably have been worded better – or left out. Perhaps we should have offered an open-ended option as well to discover other reasons.

What keeps you from buying local strawberries more frequently?

See graph above. Respondents could choose more than one answer. I think this is one of the more useful questions. Top response "inconvenient" can be addressed by gening more berries into stores, by the use of satellite stands, or by making the desire to visit a farm more compelling.

"The season goes by too fast" and "I don't know when local berries are ready" are issues we can work on through providing more and better information. Interest in or ganic berries is always pretty high and hard to satisfy. Note that PRICE is definitely NOT an objection of these respondents.

What can we do to improve your strawberry experience?

The answers to this open-ended ques tion were the most interesting of all. About 43% of respondents answered. Some complimented specific farms. Variations on "A longer harvest season" and "Of fer organic berries" were very common responses. Here are some that I liked:

• Shame the local Kroger stores in Cary, C, and other chain stores for im porting strawberries from Watsonville, CA, this spring instead of sourcing local grown strawberries that are field-ripened and have so much more flavor. I purchased a 6-quarr flat at the Raleigh Farmers Market for $18 and shared with neighbors who expressed this "vas their first experi ence of the flavor of a strawberry that was ripened in the field. They loved these local berries and now expect me and you to alert them when the local strawberries are ripe. Also, the restaurants and taverns should be alerted to feature strawberry pies, sundaes, plus strawberry daiquiris, and strawberry margaritas on Cinco de Mayo and the rest of May.

• A longer growing season would be wonderful but please, please don't mess with strawberries the way apples and tomatoes, etc. have been. They don't have any taste or flavor anymore.

• We always have a great time strawber ry picking. 1 would buy other vegetables available at the farm when I go out to pick.

- Try to get more local crops in the gro cery store. Have a roadside stand conve nient on the way home from work where it would be safe to pull off the road to buy.

• Bener advertising that the local har vest is ready.

• Make them sweeter. Sometimes even local strawberries are a disappointment. Probably has to do with the weather.

• Deliver them to my house.

• More pesticide-free strawberries!! Idon't need the organic label, but I need to know they're pesticide-free before I'll stop to buy.

• Keep smiling, keep the place clean, and keep the prices reasonable while still being profitable. I'll come back every year to the farmers who do this! We have sev eral great patches around. All have great fruit, but two act really snotty. They got my money once, but never again!

• I would definitely buy more locally grown strawberries if they were made available at the grocery store.

• I purchased locally grown strawber ries quite often when 1 first moved to NC. However, 1 was very disappointed in the flavor this year. The strawberries from Costco were much tastier and prettier to look at.

• Strawberries I'm finding at pick your own farms don't have the great 'straw berry' flavor they used to. Some owners have told me that they are using commer cial varieties because they'll last longer. Isuppose it's a cost issue. I hope to begin growing my own strawberries for our fam ily, but have heard it may even be difficult to find the older varieties that are flavorful!

• Parking is sometimes inconvenient at the U-pick farms I frequent; not paved and ruts in the road make it difficult for me to walk around.

• Short of delivering them right to my workplace (smile), I have no complaints whatsoever. I'm just busy and sometimes don't take the time to get out there and buy them. Thank you.

• I would love to sec more obvious sig nage in stores that do sell local strawber ries, so that other people can learn more.

• Sell strawberry plants in the spring so we can grow some, too!

• Get the word out that they are coming SOON even before the fruit is ready, then follow up when they are ready for picking/ purchasing! Love them!

• Have more local farmers stands for all produce, including strawberries, blueber ries, etc...

• Find a way to grow them on trees. I am getting too old to stand on my head to pick!

• Like to see locally grown in restaurants.

• Mine is perfect- have been visiting the same farm for years – the berries are great, the people are friendly, and it always makes me feel good to go there!!•!•

See ALL responses in the "Members Only" section ofwww.ncsrrawbeny.com.