

VIRGIN ISLANDS DEPARTMENT OF AGRICULTURE



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USDA AMS Agreement Number: 12-25-B-1490

SCBG-FB 2012

Final Report

Submitted on December 28, 2015

[Promoting Virgin Fresh Specialty Crops through Urban Agriculture, Fruit Orchard Establishments and Innovative Research](#)

Project Title

Establishment/Enhancement of Fruit Orchards

Project Summary

Tropical fruits are among the most loved food items in places where they can be easily cultivated and obtained. While there are many tropical fruits grown in the Virgin Islands, most are specimen trees in back-yard setting. There is a high demand for fresh, locally grown fruits. Establishment and maintenance of fruit orchards is essential for the growing demand for locally-produced fresh and/or processed fruits. The goal of this project is to aid in the establishment or enhancement of local fruit orchards which produce specialty crops in the U.S. Virgin Islands - St. Croix, St. Thomas and St. John by at least twenty-five percent (25%).

Project Approach

Grant project information was announced to the public via the VIDOA website and weekly radio program, daily newspapers and press releases. A power point presentation was also given to inform potential project participants about the Specialty Crop Block Grant program (SCBG) and the application process. Applicants were invited to submit proposals to meet the project requirement. Proposals were reviewed by a panel of qualified agriculture professionals. Awards were based on the applicant's ability to meet requirements such as: having access to land, farming experience and a proposal that meet the requirement of the program. Once selected, each sub-grantee was subjected to a site visit, orientation and asked to sign a cooperative agreement which spells out the requirement and rules of the program. Successful applicants were provided with partial award (50%) to initiate project. The remaining 50% was paid upon completion of the project and submission of final report and financial statement. The VIDOA monitored sub-grantee's performance monthly and provide technical assistance.

Goals and Outcomes Achieved

In 2013 and 2014, a series of tropical fruits workshops were jointly conducted by the VIDOA and the University of the Virgin Islands Cooperative Extension Service to provide basic information to farmers for sustainable, successful implementation and operation of small fruit orchards. Numerous topics were covered to include Tropical Fruit Orchard Design and Layout, Soils and Fertilizers, Pruning, Irrigation, Pests of Tropical Fruits, Marketing, Post-harvest Handling and Processing. Faculty members from the University of Florida were brought in to conduct the latter. Both classroom and hands-on activities were conducted. Over 40 farmers and interested individuals attended these workshops/trainings. Additionally, in July of 2013 and 2014 workshops on all aspects of coconut and banana production was conducted at the annual Mango Melee and Tropical Fruit Festival. Thirty three (33) farmers and gardeners were in attendance.

The implementation of the Establishment / Enhancement of Fruit Orchards projects resulted in the planting of 280+ tropical fruit trees of various types. The three (3) new tree establishment

projects increased the number of established and managed fruit orchards in the territory by one hundred percent (100%) exceeding the 25% proposed. The new fruit orchards will greatly increase the availability of tropical fruits available to residents for fresh fruit consumption and value-added products.

Two (2) farmers who have visited the orchard projects have purchased 200+ tropical fruit trees to establish new fruit orchards. It is anticipated that future field tours of the orchard projects, as the trees become established and begin to bear fruits, will entice others to also establish orchards.

This diversity of locally grown fruits at the project site, particularly the assortment of mango varieties, will continue to be an educational resource, a source of germplasm and a site for organized educational tours for students, farmers and other interested groups or individuals. Over 240 visitors have visited orchard plantings during 10 site visits including groups such as the Caribbean Food Crop Society, Friends of the Virgin Island National Park and Island Green Living Association. The orchards will provide opportunities for persons to become familiar with the numerous species and varieties of tropical fruits.

Specialty crops related activities such as the annual Agriculture and Food fair, Mango Melee, World Food Day, Mini Harvest, Value-added Vendorama and National Agriculture Week are posted on the VIDOA's website. Other posts include participation in Farmer/Chef and A Taste of St. Croix activities; farm tours; farmers' harvests; etc. These have served as a catalyst to encourage residents to follow suit by engaging in gardening/farming activities and promote and support specialty crop producers. Specialty crop producers have commented on the increase customers traffic/sales because of the postings.

The VIDOA has also taken to social media to promote its events, activities and pertinent information. The VIDOA's Facebook page is nearing one thousand likes and is regularly updated. The postings seek to highlight specialty crop farmers and the work they do. Our postings are often shared by community activists, senators and other farmers.

Beneficiaries

This project will benefit the territory's farmers by providing them with a guide for establishing tropical fruit orchards and a source of propagation materials; students will gain knowledge of the various tropical fruits grown in the territory, their growth habits, descriptions and uses; residents will have more fresh fruits and value-added products available for purchase; school lunch program will have an alternative to the canned, temperate fruits presently served in lunchrooms; and processors will have the raw material at a reasonable cost from which to prepare processed commodities. The Government will also benefit from increased tax revenues from businesses.

A long-time (over 25 years) vegetable crop farmer, after visiting one of the tree establishment projects, has been sold on the fruit orchard project and has since purchased more than 200 tropical fruit trees to establish a three-acre tropical fruit orchard.

The number of farmers establishing fruit orchards will have diversified market opportunities through the sale of fruits, fruit trees, farm tours, etc. We believe that the fruit orchards establishment project will have a significant positive economic impact including increased income for farm operators from sale of fruits to vendors, residents and schools; generate income from tours and; increase volume of products prepared by processors for sale to locals and visitors thereby generating increased revenue. It is anticipated that revenue and taxes generated from project related activities could range from \$.5 million - \$1 million annually.

It is anticipated that once fruit trees come into production that there is the potential to serve fresh locally-grown fruits to 1,500 students daily. Additionally, weekly sales to approximately 200-250 residents at farmers' markets and to processors are expected. Sourcing fruits locally will reduce input cost for value-added products thus increasing the net profits of small business owners.

Farmers will realize increase sales as the new trees come into production. Availability of preferred local fruits like mango, carambola, sour-sop, eggfruit and papaya would ultimately lead to increase consumption and hence improve diet and health resulting in less hospital/doctor visits.

A local daily newspaper reported on Specialty Crop Block Grant Program (Figures 1, 2, 3). The Government access television station also covered specialty crop activity and produced a 30-minute video which aired the same day and continues to be aired time to time months after the initial airing. The show, during its recurring airing, has been viewed by thousands of residents. This has provided significant positive exposure for specialty crops and an awareness of the SCBG program. These programs have generated many queries about the program.

Lesson Learned

While it appear that implementation of the project would be straight forward, it was not the case. Many adjustments had to be made as the project moved along. The Virgin Islands experienced one of the most severe droughts in 2015. This made it more challenging for digging holes to plant trees. Wild horses and deer also posed a significant challenge as both seek green plant matter to consume during the drought. The deer situation persists even after the drought and as a result each (200+) trees had to be protected with a wire cage. It is recommended that when considering a project that enough time is allowed for unanticipated occurrences. Individuals should also make every effort to secure materials early to avoid delay in project implementation.

Procurement of fruit trees from off-island source posed a challenge as no local outlet had the needed varieties or types. As a result, trees were stress during shipping and could not be planted upon arrival. Trees had to be maintained for several weeks before planting. Requesting local nurseries to stock trees may address issue.

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Additional Information



Left – Deer Protection of Mammy Apple Tree in Fruit Orchard.

Right – Fruit Orchard established by Stafford Crossman.

Ag Department works to help V.I. fruit farmers



Daily News Photo by FIONA STOKES
St. Croix farmer Aberra Bubulla, left, and Agriculture Commissioner Louis Petersen Jr. inspect the leaves of a newly planted tree in Bubulla's fruit orchard Friday. A grant program is helping farmers improve their fruit orchard yields.

Figure 1. Farmer and Commissioner observing newly planted fruit tree.

V.I. Agriculture Department offers



Daily News Photo by FIONA STOKES

St. Croix farmer Aberra Bulbulla stands near his newly imported plants Friday as he shows how his new pop-up water irrigation system works.

Figure 2. Farmer explaining new pop-up irrigation system.

Saturday, December 13, 2014

grants to fruit farmers

By FIONA STOKES
Daily News Staff

ST. CROIX — When Aberra Bulbulla walks around his 4-acre fruit orchard in Estate Waldberggaard, he says he feels a sense of pride that he has been able to grow an orchard that is worthy of acknowledgment.

That acknowledgment has come in the form of Bulbulla being named the Crop Farmer of the Year three times.

Part of the money to sustain Bulbulla's prize-winning plantings comes from federal grant money distributed through the V.I. Agriculture Department's Fruit Orchard and Plot Establishment Project.

That project was developed with the goal of increasing the number of fruit orchards and plots on each of the islands.

Standing in the shade of one of Bulbulla's avocado trees, Agriculture Commissioner Louis Petersen Jr. said farmers across the territory have recently benefited from the Fruit Orchard and Plot Establishment Project.

"What we focused on doing with this initiative was to increase production through more plants and not just trying to increase the fresh fruits for consumption but for sale to those who have been increasingly developing value added products from the fresh fruits," he said. "The farmer get sales from people who make jams, chutney, juices and smoothies and those types of products, so the more fruits they can produce the less the value added retailer has to purchase imported fruits."

Bulbulla's orchard is an example of how the federal money has helped the local farmers.

He grows more than 40 different types of fruit on his orchard, including 35 mango trees — which include seven varieties of mangoes — and 99 coconut trees, including three different varieties. He also has avocados, limes, pomegranate, star apple, ice cream beans, Java plums, chocolate fruit, sapodilla and almonds.

Bulbulla said he moved to St. Croix 20 years ago from his native Ethiopia by way of Fresno, Calif., and has been farming since then.

Most of the work he has done and improvements he has made would not have been possible without the support of farming initiatives through the Agriculture Department, Bulbulla said.

Petersen said the Agriculture Department has been receiving Specialty Crop Block Grant funding for a number of initiatives over the years and recently awarded 10 farmers across the territory with subgrants up to \$5,000 each to increase or expand the yield of their fruit orchards.

The territory has a number of mixed orchards, and the farmers who have benefited from the recent initiative — two on St. John and four each on St. Croix and St. Thomas — have been able to use their money in varying ways, according to Petersen.

Bulbulla said he used his grant money to upgrade his aging irrigation system and to import about 40 new types of plants that he plans to add to his lush orchard.

Other farmers could have used the money for any purpose, including improving their fence lines, improving water storage areas; transplanting trees; or getting equipment that would help them produce more.

Bulbulla said the plants he purchased are grafted and will begin producing fruit in about two or three years. Having the wide variety of fruits allows for better sales to his customers, because he never has too much of any one fruit, which helps keep the fruit from rotting because of under-utilization.

"If I only had avocado or only had soursop, then people would buy as much as they need, and then I would reach a cap and can't sell any more," he said. "This way, I can just keep selling different fruits and keep the process moving."

Petersen said he is proud of the initiatives and how they have been assisting the farmers to do more. Any local farmer can apply as long as they have a sound farm business plan, copies of their records and are licensed, he said.

— Contact reporter Fiona Stokes at 714-9149 or email fstokes@dailynews.vi.

Figure 3. Newspaper article on Specialty Crop Block Grant Program.

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SCBG-FB 2012

Final Report

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Project Title

Urban Agriculture Project and Community Gardens

Project Summary

Persons in low-income housing communities in the territory do not have the financial resources to regularly purchase fresh fruit and vegetables and as a result rely on what they could afford – cheap, nutrition-lacking, highly sugared drinks, fast foods, processed and canned products to meet their nutritional needs. Similarly, many of these individuals who reside in low-income communities do not have the land on which to plant and grow gardens. The purpose of this

project is to increase food (specialty crops) production in residential areas through cooperative efforts, thereby increasing healthy eating, reducing household expenses and realizing economic savings. The primary goal of the project is to establish community gardens and encourage residents to get involved in gardening to produce fresh vegetables for their use.

Project Approach

Grant project information was announced to the public via the VIDOA website and weekly radio program, daily newspapers and press releases. A power point presentation was also given to inform potential project participants about the application process. Applicants were invited to submit proposals to meet the project requirement. Proposals were reviewed by a panel. Awards were based on the applicant's ability meet requirements such as: having access to land, farming experience and a proposal that meet the requirement of the program. Once selected, each sub-grantee was subjected to a site visit, orientation and a sign a cooperative agreement which spells out the requirement and rules of the program. Successful applicants were provided with partial award (50%) to initiate project. The remaining 50% was paid upon completion of the project and submission of final report and financial statement. The VIDOA monitored sub-grantee's performance monthly and provide technical assistance.

Informal face-to-face and phone conversations along with submitted proposals were used to gauge participants' knowledge of specialty crops. Because of the small community setting, the VIDOA were aware of participant's knowledge through their participation in workshops, trainings, farmers' meetings and personal knowledge.

Grant availability was announced on the Department's weekly radio program "Fresh From the Farm", press releases and through conversations with individuals. The project coordinator conducted workshops to explain the program's purpose and expectation to interested parties on all three islands. The Commissioner of Agriculture met with various groups to discuss the program and encouraged their participation.

Department staff regularly visited garden sites along with Cooperative Extension staff to provided technical support on various concerns to include drip irrigation, plant nutrition and pest control.

The progress of the projects were regularly evaluated and surveyed, visually, and suggestions were made mainly on crop protection.

Data collection on the type and quantity of crops harvested was not available due to an oversight by the project managers. Though no Harvest Report was provided to the Department, a significant amount of crop production were witnessed by VIDOA staff.

Visual post-survey of the projects were conducted by Department staff along with University of the Virgin Islands Cooperative Extension staff.

The gardens were open to all for tours but no planned tours were executed. However, one of the gardens is in a highly travelled area and participants received numerous inquiries about project activities.

Goals and Outcomes Achieved

The produce harvested was divided equally among the project participants. They in turned shared with other family members and neighbors. Over 50 participants, family and friends benefited from the harvested produce. The Virgin Islands Department of Agriculture provided technical assistance, donated vegetable seeds, seedlings and irrigation supplies, crop protective materials and installation of the two 1,000-gal water containers used to supply irrigation water.

VIDOA staff has utilized its weekly radio show “Fresh From the Farm” to promote the SCBG program, encourage residents to start gardening and participate in community garden projects. The co-hosts (VIDOA and UVI/CES staff) of the radio program also frequently discuss the many benefits of growing your own vegetable garden to include the freshness of produce, reduce pesticide risks, savings, improved health, exercise and social interaction. During the past two years, the Department, in conjunction with the University of the Virgin Islands Cooperative Extension Service, has conducted over ten (10) gardening/farming workshops and seminars with a focus on increasing local food production and consumption. Over 100 farmers and gardeners attended these workshops. Each workshop had a practical component. Topics for the workshops include vegetable seedling production, land preparation, field scouting and monitoring (IPM), irrigation and processing.

Fifteen (15) first-time gardeners were engaged in the projects. These individuals were guided by five (5) experienced gardeners and a master gardener who has several years of gardening on St. Croix, Virgin Islands.

While the goal of the program was to increase the number of community gardens by three (3), we were only able to increase the number by two (2). During the grant extension period, applications were submitted and evaluated but it was determined that there was not enough time to complete projects before the deadline.

Through its FaceBook page (<https://www.facebook.com/Frederiksted-Community-Garden-162371593822936/?ref=hl>) , one of the participants shared information to its members and the community on the consumption of fresh, locally grown produce. The members were encouraged to utilize the produce and were given recipies and suggested uses for the various harvested items. Additionally, the group is coordinating with the University of the Virgin Islands

Extension Service for various demonstration projects to be held at the garden for the membership and general community.

Each vegetable seed and/or seedling placed in the ground increases the availability of fresh locally-grown produce in the territory. The community garden programs increased the amount of specialty crop produced in the territory. Passionfruit, collards, kale, chives, okra, pak choi, mustard green, arugula and lettuce were some of the crops that were grown, harvested, distributed and consumed by participants.

While we are not certain of the exact amount of household savings, we are aware that families in the program spending were reduced because they did not have to purchase a number of food items, which they would normally have to, for meal preparation.

Beneficiaries

Low income families and friends who participated in the program and was the recipient of harvested produce benefited from the program. Project participant's goal is to produce enough fresh food to donate to charitable organizations such as the soup kitchens.

The project was undertaken at a time when there is an increased demand for fresh, local fruits, vegetables and herbs. Many in the territory are concerned with pesticide residue on produce and the inferior quality of produce available for purchase. Healthy eating and the consumption of more fruits and vegetables have been on the rise. Additionally, there has been an increase in the use of local produce to manufacture value-added items including jams, jellies, chutneys, hot sauces, pickles, juices, frozen drinks, etc. More importantly, both the Executive and Legislative branches of government have expressed a desire to increase production of locally-grown produce and incorporate these products in the school lunch program.

The primary beneficiaries of the project are the participants of the project and their friend and families. However, consumption of healthy foods increases the potential for good health and as a result may reduce the strain on the heavily-burdened government health and social services.

More than ninety six percent (96%) of the fruits and vegetables consumed in the territory is imported and are expensive and, many times, are of poor quality because of shipping duration

. The potential economic impact that the project will have in the long term include household saving of approximately \$50-\$100 bi-weekly.

Lesson Learned

Even though water was available, the severe drought and excessive heat posed a challenge and limited yield. Additionally as the rain came, it brought a new challenge (caterpillars) that

required much attention by the novice gardeners. Frequent and thorough monitoring of crops and quick action to address concerns are recommended. Delay in implementing the project could have been avoided by securing permission to use the property in advance.

Additional Information



Figure 1. Collage of gardening activities

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Final Report

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Institutional Sub-Grantee

Project Title

Ginger Production and Market Potential in the V.I.

Project Summary

Ginger *Zingiber officinale* is a popular culinary and medicinal plant used in the Virgin Islands. Ginger grows below ground from an aromatic tuber-like rhizome which is often branched. Most gingers in cultivation are sterile cultivars grown for the edible rhizome and the flower is rarely seen so limited or no seeds are produced. Ginger is commonly used in the Virgin Islands in drinks, ginger beer and sorrel, as a seasoning in cooking and desserts and for multiple medical infirmities such as nausea, joint pain and inflammation. Though ginger is commonly

used in the Virgin Islands, it is seldom grown here, however it is abundantly grown in other Caribbean islands. The purpose of this research is to work with farmers on St Croix in different locations to evaluate the potential for ginger production and quality in our soils. Ginger is widely utilized in the Virgin Islands but seldom grown. The objective was to determine the production potential, in-row plant spacing, length of postharvest storage and develop value added product of these spicy rhizomes.

Project Approach

Ginger is propagated by portions of rhizomes known as seed rhizomes. Carefully preserved seed rhizomes were cut into small pieces of 1-2 inch lengths with one or two good buds. These seed pieces were 50-100g each to provide a uniform yield. Only one variety was used due to availability. The seed pieces were set at 8 or 12 inch spacing on banks. Rows spacing were at 5 ft. to allow for mechanical harvest. Four locations with local farmers were set up that vary in soil, elevation and cultural practices. Drip irrigation was installed and watered as needed. Fertilizer 12-12-12 was applied at planting and supplemental iron fertilizer FeEDDHA needed in high pH soils. Ginger was monitored for data monthly for growth, disease, insect and overall development. Harvest began in mid-December and continued to February at the university plot. Harvested ginger was cleaned, washed and graded for marketability. Total weight and marketable weights recorded.

A postharvest aspect was added to study postharvest storage. Ginger was stored at three temperatures: 40°F, 60°F and 80°F. Data was recorded weekly on weight and marketability of the stored ginger. Ginger from storage was planted out to determine the viability following storage. The sizes used were the same as previous years planting but only at one foot spacing. The 60°F resulted in good stand establishment after both 4 and 8 weeks of storage but greatly declined by the 12th week due to desiccation.

We also evaluated processing ginger to make either a dried powder or candied. In both cases the ginger was peeled and sliced in a food processor at 2 or 4 mm. One half of the sliced ginger was placed in a food drier and the rest candied. The dried ginger was ground to powder. Ginger was distributed to sixteen (16) farmers on St Croix and five (5) farmers on St Thomas during February and March, 2014. Farmers and backyard gardeners on both St Croix and St Thomas were given instructions on spacing and fertilizer requirements.

Presentations were made on ginger results by UVI students funded through this grant. At the 50th Annual Caribbean Food Crops Society meeting held during July, 2014 on St Thomas an oral presentation was made and a manuscript was prepared to be published in the proceedings. This oral presentation included a short video of the mechanical ginger harvest which greatly impressed the audience. At the Caribbean Food Crops Society there was an audience of 350 Caribbean and stateside farmers, researchers and administrators involved in tropical agriculture. Also a university student presented the ginger results at the Southern Regional American Society for Horticultural Science conference in Atlanta February, 2015. The Southern

Regional ASHS had an audience of 200. Harvested ginger clusters were displayed at the annual Agriculture Fair in 2014 and 2015. The annual Agriculture Fair had a local audience approximately 33,000 with over 2,000 visited the display. During the 2014 harvest, the local government TV channel did a 35 minute documentary on the ginger production. The documentary ran throughout the year and generated interest in local ginger production. Ginger was distributed to farmers on both St Croix and St Thomas that requested seed planting material. A follow up later in the year indicated that most farmers didn't maintain their ginger area and it became lost in weeds. However, one farmer cared of the ginger posting the harvest on Facebook and selling it at the annual Agriculture Fair. The farmer requested and was given 20 lbs of seed material to plant this year.

A colorful handout was developed as an internal fact sheet that was in-house produced and distributed to farmers on both St Croix and St Thomas during workshops on Tropical Root Crop production.



Figure 1. Ginger in mid-December after 305 days of growth and stems beginning to senesce.



Figure 2. Foliage has senesced by 90% after 345 days in mid-January.



Figure 3. Washing and grading harvested ginger for marketability.

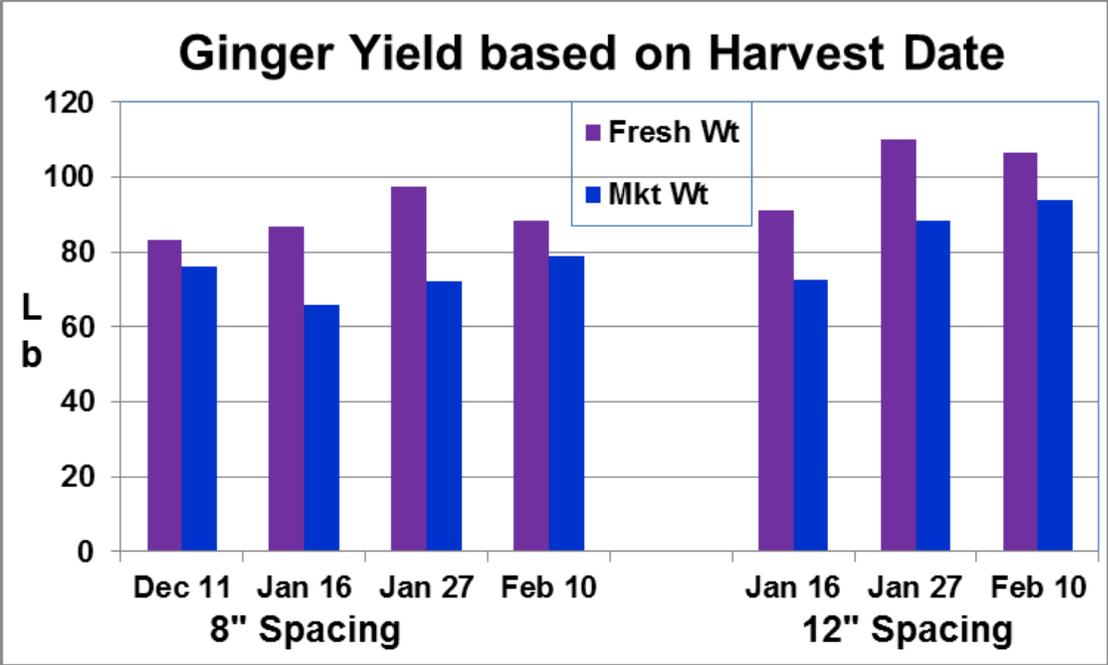


Figure 4. Ginger production from a 75 ft. row at two in-row spacing and different harvest dates.



Figure 5. Post-harvest temperature storage study indicating ginger drying up and sprouting after 4 weeks under ambient conditions but fresh and plump at 60°F.

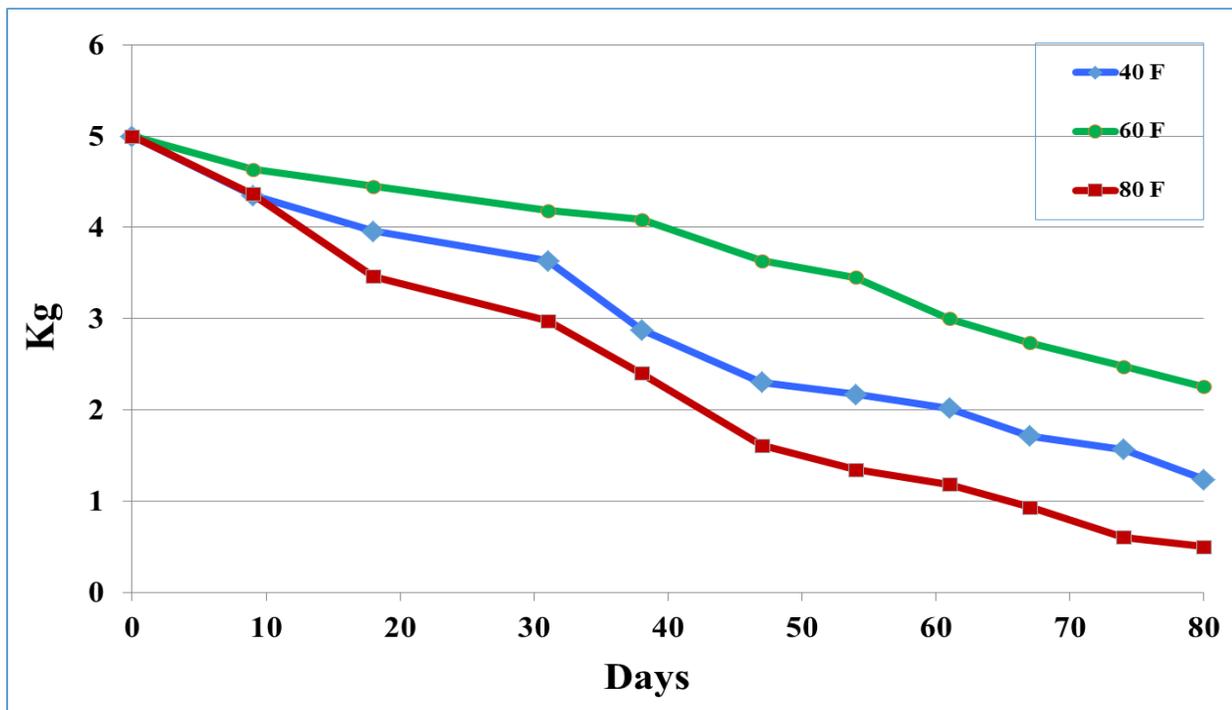


Figure 6. Marketable weight of ginger over time at three different storage temperatures.

Table 1. Germination of ginger seed pieces following postharvest storage at 40° F, 60° F or 80° F and planted after 4, 8 or 12 weeks.

Temperature	4 Weeks	8 Weeks	12 Weeks
40° F	10%	0%	0%
60° F	95%	80%	35%
80° F	80%	0%	0%

Goals and Outcomes Achieved

No significant difference was obtained in the production between in-row spacing for either total yield or marketable yield. Harvested ginger was stored at 40, 60 or 80°F over 75 days. Ginger at 40 °F exhibited chilling injury after two weeks of storage. The ambient temperature, 80 °F, resulted in desiccation and sprouting of the ginger within 40 days. Refrigeration at 60 °F provided the best storage for ginger after 75 days. Ginger was also processed by slicing at 2 or 4 mm, dried and ground into powder. The 2 mm dried ginger resulted in a finer powder. Ginger was found to successfully grow in the Virgin Islands at 8” or 1’ in-row spacing and best stored postharvest at 60 °F.

Beneficiaries

Both farmers and consumers throughout the Virgin Islands learned of the growing and production of ginger through the 35 minute ginger documentary aired on the government channel, Agriculture Fair and conferences where the results were presented. Farmers and backyard gardeners on both islands were given ginger to grow in the production area with instructions. University undergraduate students were exposed to ginger production and analysis of data for presentation and local, national and international conferences.

Local residents of the Virgin Islands learned of the potential for ginger production in the islands and were able to buy locally-grown ginger. The video on ginger that was recorded and run on the local government access channel reached thousands of local viewers. Resident farmers posted pictures of their ginger harvest on their Facebook pages which had wide distribution. Though difficult to set a true number of beneficiaries, from the conferences and exposure at the annual Virgin Islands Agriculture and Food Fair, the number is over 2,000 that were directly impacted. Farmers that had grown the ginger from the material distributed to them from the project were able to sell all of their production locally at the Saturday farmers market and at individual roadside stands.

Lessons Learned

Ginger has a long cropping season that lasts for a year. Many farmers were not used to maintaining a crop for that long period of time before harvest. Pre-emergent herbicides can be used to control weed at planting but the effects run out after two months. Ginger requires supplemental iron in the form of Fe-EDDHA for it to grow on calcareous soils.

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Project Title

Evaluation of Cucumber Varieties for Downy Mildew Resistance/Tolerance in the Virgin Islands

Project Summary

Cucumber, *Cucumis sativus*, is the most important vegetable crop grown in the Virgin Islands. According to the latest census of agriculture (USDA NASS 2009), cucumber was ranked number one in acres planted and pound harvested. There is also a very large demand for cucumber in

the Virgin Island and the volume of production of this crops significant higher than any other vegetable crop.

There are a number of pests that affect cucumber production in the Virgin Islands. These pests include melon worms, leaf miner and a variety of fungal diseases but none have been as devastating as downy mildew. This disease has decimated cucumber production causing catastrophic losses in a brief period of time. It has certainly taken a very severe economic toll on the ability of farmers to successfully produce a crop.

Cucumber production in the Virgin Islands had been on a dramatic increase during the years prior to the occurrence of downy mildew. It has been observed that the disease was more prevalent during the rainy season. Therefore it was only possible to successfully grow cucumber during the dry season but not during the rainy season. Unfortunately, in recent years the rainy has extended into the customarily dry summer months, and the normal dry season is almost non-existent. This extended rainy season, which is the ideal condition for downy mildew, has resulted in many incidences of total cucumber crop failure. Growers still continue to consistently plant cucumber hoping that they will occasionally be able to escape the disease and generate some much needed income.

Downy mildew, caused by the pathogen *Pseudoperonospora cubensis*, is a devastating disease that can begin to develop at any time during the crop development. The main strategy employed for the control of downy mildew is the use of fungicides. This has not been very effective in the Virgin Islands for a number of reasons. The use of fungicides for downy mildew control is relatively complex and requires a high level of management. Fungicides must be used in specific rotations taking into consideration its group code number which is based upon the mode of action and resistance risk of the products. The fungicides are usually required to be applied at frequent intervals and used singly or in various combinations. This approach has not been successful in the Virgin Islands of its complexity and the very limited availability of some of the more desirable fungicides. Additionally, there are quite a number of farmers who are interested in organic production and are therefore not interested in using the fungicides which are recommended for conventional production.

The use of crop varieties that are resistant or tolerant to insect pests and diseases is one of the most effective strategies of an integrated pest management (IPM) system. Pest-resistant varieties are less susceptible than other varieties to certain insect and diseases. AA resistant variety may be less preferred by the pest, adversely affect the pest's normal development and survival, or the plant may tolerate the damage without economic loss in yield or quality. Using resistant varieties often means that growers do not need to apply as many pesticides as with susceptible varieties. Disease resistant/tolerant vegetables are commonly available and widely used. This strategy is a very good fit for the Virgin Islands because it is effective; relatively low-cost; easy to fit into an IPM program; compatible with other routine cultural practices; and is environmentally friendly.

Some local growers have been attempting to find and use resistant varieties but the information available in the seed catalogs and from the seed company representatives have been contradictory and confusing. Some companies list certain varieties as downy mildew resistant while the same varieties are not listed as such by other companies.

The objective of this project is to assist growers in the Virgin Islands in reducing their economic losses from downy mildew through the use of varieties that have been demonstrated to be downy mildew resistant under our local conditions.

Project Approach

No money was awarded or disbursed to this project and no activity was conducted due to time constraints and administrative oversight.

Goals and Outcomes Achieved

NA

Beneficiaries

NA

Lessons Learned

NA

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