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**U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705**

EXHIBIT C

**OBJECTIVE DESCRIPTION OF VARIETY
TOMATO (*Lycopersicon esculentum*)**

NAME OF APPLICANT (S)	TEMPORARY OR EXPERIMENTAL DESIGNATION	VARIETY NAME
ADDRESS (Street and No. or RD No., City, State, Zip Code, and Country)		FOR OFFICIAL USE ONLY
		PVPO NUMBER

Choose responses for the following characters which best fit your variety. Complete this form as fully as possible for best characterization of the variety. When a single quantitative value is requested (e.g., fruit weight), your answer should be the mean of an adequate-sized, unbiased sample of plants. Use leading zeros when necessary (e.g., 0 9 or 0 8 1, etc.). The applicant variety should be compared with at least one well-known standard check variety of the same type (see list of recommended check varieties below), and grown in the same trials. The characters on this form should be described from plants grown under normal conditions of culture for the variety. Indicated by check whether trial data are from green house ___ or field ___ planting. Trials direct-seeded ___ or transplanted; staked ___ or unstaked ___. Give locations and dates of seeding and transplanting here: _____

COMPARISONS SHOULD BE MADE TO ONE OR MORE CHECK VARIETIES IN THE FOLLOWING LIST. IF AT ALL POSSIBLE, ENTER THE NUMBER OF THE CHECK IN BOXES WHERE IDENTITY OF CHECK IS REQUESTED.

- | | | | |
|------------------|-----------------------|---------------|----------------------------|
| 1 = Ace 55 VF | 7 = Homestead 24 | 13 = Red Rock | 19 = VF 134 |
| 2 = Campbell 37 | 8 = Marglobe | 14 = Roma VF | 20 = US 28 |
| 3 = Chico III | 9 = Murietta | 15 = Rutgers | 21 = VF 145 B 7879 |
| 4 = Flora Dade | 10 = New Yorker | 16 = Sunray | 22 = Other (Specify) _____ |
| 5 = Florida MH-1 | 11 = Ohio MR-13 | 17 = Tropic | 23 = Other (Specify) _____ |
| 6 = Heinz 1350 | 12 = Red Cherry Large | 18 = UC 82 | 24 = Other (specify) _____ |

1. SEEDLING

___ Anthocyanin in hypocotyl of 2 – 15 cm seedling: 1 = Absent 2 = Present ___ Habit of 3 – 4 week old seedling: 1 = Normal 2 = Compact

2. MATURE PLANT (at maximum vegetative development)

___ ___ ___ cm Height
 ___ Growth: 1 = Indeterminate 2 = Determinate
 ___ Form: 1 = Lax, open 2 = Normal 3 = Compact 4 = Dwarf 5 = Brachytic
 ___ Size of canopy (compared to others of similar type): 1 = Small 2 = Medium 3 = Large
 ___ Habit: 1 = Sprawling (decumbent) 2 = Semi-Erect 3 = Erect ('Dwarf Champion')

3. STEM

- ___ Branching: 1 = Sparse ('Brehm's Solid Red', 'Fireball') 2 = Intermediate ('Westover') 3 = Profuse ('UC 82')
- ___ Branching at cotyledonary or first leafy node: 1 = Present 2 = Absent
- ___ No. of nodes between first inflorescences: 1 = 1-4 2 = 4-7 3 = 7-10 4 = 10 or more
- ___ No. of nodes between early (1st - 2nd, 2nd - 3rd) inflorescences. _____ No. of nodes between later developing inflorescences.
- ___ Pubescence on younger stems: 1 = Smooth (no long hairs) 2 = Sparsely hairy (scattered long hairs) 3 = Moderately hairy 4 = Densely hairy or wooly

4. LEAF (mature leaf beneath the 3rd inflorescences)

- ___ Type: 1 = Tomato 2 = Potato ('Trip-L-Crop') _____ Morphology (choose illustration at the end of this form that is most similar)
- ___ Margins of major leaflets: 1 = Nearly entire 2 = Shallowly toothed or scalloped 3 = Deeply toothed or cut, sps. Toward base
- ___ Marginal rolling or wiltiness: 1 = Absent 2 = Slight 3 = Moderate 4 = Strong
- ___ Onset of leaflet rolling: 1 = Early-Season 2 = Mid-Season 3 = Late Season
- ___ Surface of major leaflets: 1 = Smooth 2 = Rugose (bumpy or veiny)
- ___ Pubescence: 1 = Smooth (no long hairs) 2 = Normal 3 = Hirsute 4 = Wooly

5. INFLORESCENCE (make observations on 3rd inflorescence)

- ___ Type: 1 = Simple 2 = Forked (2 major axes) 3 = Compound (much branched)
- ___ Number of flowers in inflorescence. Average
- ___ Leafy or "running" inflorescences: 1 = Absent 2 = Occasional 3 = Frequent

6. FLOWER

- ___ Calyx: 1 = Normal, lobes awl-shaped 2 = Macrocalyx, lobes large, leaflike 3 = Fleshy
- ___ Calyx-lobes: 1 = Shorter than corolla 2 = Approx. equalling corolla 3 = Distinctly longer than corolla
- ___ Corolla color: 1 = Yellow 2 = Old Gold 3 = White or Tan
- ___ Style pubescence: 1 = Absent 2 = Sparse 3 = Dense
- ___ Anthers: 1 = All fused into tube 2 = Separating into 2 or more groups at anthesis
- ___ Fasciation (1st flower of 2nd or 3rd inflorescence): 1 = Absent 2 = Occasionally present 3 = Frequently present

7. FRUIT (3rd fruit of 2nd or 3rd cluster) For the first 5 characters below, match your variety with the most similar illustration on pages at the end of this form.

- ___ Typical fruit shape _____ Shape of transverse section _____ Shape of stem end
- _____ Shape of blossom end _____ Shape of pistil scar
- ___ Abscission layer: 1 = Present (pedicellate) 2 = Absent (jointless)
- ___ Point of detachment of fruit at harvest: 1 = At pedicel joint 2 = At calyx attachment
- ___ mm Length of dedicel (from joint to calyx attachment)
- ___ mm Length of mature fruit (stem axis) _____ mm Length, check var. no. _____
- ___ mm Diameter of fruit at widest point _____ mm Diameter, check var. no. _____
- ___ g Weight of mature fruit _____ g Weight, check var. no. _____
- ___ No. of locules: 1 = Two 2 = Three and four 3 = Five or more
- ___ Fruit surface: 1 = Smooth 2 = Slightly rough 3 = Moderately rough or ribbed
- ___ Fruit base color (mature-green stage):
1 = Light Green ('Lanai', 'VF 145-F5') 2 = Light Gray-Green 3 = Apple or Medium Green ('Heinz 1439 VF') 4 = Yellow Green 5 = Dark Green
- ___ Fruit Pattern (mature-green stage): 1 = Uniform Green 2 = Green-Shouldered 3 = Radial Stripes on Sides of Fruit

7. FRUIT (continued)

- ___ Shoulder color if different from base: 1 = Dark Green 2 = Grey Green 3 = Yellow Green
- ___ Fruit color, full-ripe: 1 = White 2 = Yellow 3 = Orange 4 = Pink 5 = Red 6 = Brownish 7 = Greenish 8 = Other (specify) _____
- ___ Flesh color, full-ripe: 1 = Yellow 2 = Pink 3 = Red/Crimson 4 = Orange 5 = Other (specify) _____
- ___ Flesh color: 1 = Uniform 2 = With lighter and darker areas in walls
- ___ Locular gel color of table-ripe fruit: 1 = Green 2 = Yellow 3 = Red
- ___ Ripening: 1 = Blossom-to-stem end 2 = Uniform
- ___ Ripening: 1 = Inside out 2 = Uniformly 3 = Outside in
- ___ Stem scar size: 1 = Small ('Roma') 2 = Medium ('Rutgers') 3 = Large
- ___ Core: 1 = Coreless (absent or smaller than 6x6 mm) 2 = Present
- ___ Epidermis color: 1 = Colorless 2 = Yellow
- ___ Epidermis: 1 = Normal 2 = Easy-peel
- ___ Epidermis texture: 1 = Tender 2 = Average 3 = Tough
- ___ Thickness of pericarp _____ Thickness of pericarp. Check var. no. _____
- ___ Anthocyanin in hypocotyl of 2 – 15 mc seedling: 1 = Absent 2 = Present _____ Habit of 3 – 4 week old seedling: 1 = Normal 2 = Compact

8. RESISTANCE TO FRUIT DISORDER (Use code: 0 = Unknown 1 = Susceptible 2 = Resistant)

- ___ Blossom end rot ___ Catface ___ Fruit pox ___ Zippering
- ___ Blotchy ripening ___ Cracking, concentric ___ Gold fleck ___ Other (specify) _____
- ___ Bursting ___ Cracking, radial ___ Graywall

9. DISEASE AND PEST REACTION (Use code: 0 = Unknown 1 = Susceptible 2 = Resistant) NOTE: If claim of novelty is based wholly or in substantial part upon disease resistance, trial data should be appended. These should specify the method of testing, the reaction of the application variety, and reaction of well-known check varieties grown in the trial (identified by name).

Viral Diseases:

- ___ Cucumber mosaic ___ Tobacco mosaic, Race 0 ___ Tobacco mosaic, Race2²
- ___ Curly top ___ Tobacco mosaic, Race 1 ___ Tomato spotted wilt
- ___ Potato-Y virus ___ Tobacco mosaic, Race 2 ___ Tomato yellows
- ___ Blotchy ripening ___ Cracking, concentric ___ Gold fleck
- ___ Other virus (specify) _____

Bacterial Diseases:

- ___ Bacterial canker (*Corynebacterium michiganense*) ___ Bacterial spot (*Xanthomonas vesicatorium*)
- ___ Bacterial soft rot (*Erwinia corotovorae*) ___ Bacterial wilt (*Pseudomonas solanacearum*)
- ___ Bacterial speck (*Pseudomonas tomato*) ___ Other bacterial disease (specify) _____

Fungal Diseases:

- ___ Anthracnose (*Colletotrichum* spp.) ___ Leaf mold, Race 1 (*Cladosporium fulvum*)
- ___ Brown root rot or corky root (*Pyrenochaeta lycopersici*) ___ Leaf mold, Race 2
- ___ Collar rot or stem canker (*Alternaria solani*) ___ Leaf mold, Race 3
- ___ Early blight defoliation (*Alternaria solani*) ___ Leaf mold, other races (specify) _____
- ___ Fusarium wilt, Race 1 (*F. oxysporum f. lycopersici*) ___ Nailhead spot (*Alternaria tomato*)
- ___ Fusarium wilt, Race 2 ___ Septoria leafspot (*S. lycopersici*)
- ___ Fusarium wilt, Race 3 ___ Target leafspot (*Corynespora casiiicola*)

9. DISEASE AND PEST REACTION (continued)

Fungal Diseases:

- Gray leaf spot (*Stemphylium* spp.)
- Late blight, Race 0 (*Phytophthora infestans*)
- Late blight, Race 1
- Verticillium wilt, Race 1 (*V. albo-atrum*)
- Verticillium wilt Race 2
- Other fungal disease (specify) _____

Insects and Pests:

- Colorado potato beetle (*Leptinotarsa decemlineata*)
- Southern root knot nematode (*Meloidogyne incognita*)
- Spider mites (*Tetranychus* spp.)
- Sugar beet army worm (*Spodoptera exigua*)
- Tobacco flea beetle (*Epitrix hirtipennis*)
- Tomato hornworm (*Manduca quinquemaculata*)
- Tomato fruitworm (*Heliothis zea*)
- Whitefly (*Trialeurodes vaporariorum*)
- Other (specify) _____

Pollutants:

- Ozone
- Sulfur dioxide
- Other (specify) _____

10. CHEMISTRY AND COMPOSITION OF FULL-RIPE FRUITS Suggested test methods may be found in "Tomato Products", 5th ed., National Canners Assn. Bull. 27-L. Please specify test methods or give a reference to methods used. Fill in table below with values for the new variety and for at least one well-known check variety of similar type grown in the same trial. Specify names or numbers of check varieties.

	Submitted Variety	Check Variety _____	Check Variety _____	Check Variety _____
pH				
Titrateable acidity, as % citric				
Total solids (dry matter, seeds and skin removed)				
Soluble solids as °Brix				

11. PHENOLOGY Express length of developmental stages either as calendar days or as heat units (growing degree days), in degrees Celsius. If heat units are used, indicate the base temperature used in their calculation in _____°C. See paper by Warnock under "References" for method. Give comparative data for at least one check variety; identify checks by name or by number from table on page 1.

	Application Variety	Check Variety _____	Check Variety _____	Check Variety _____
Seeding to 50% flow (1 open on 50% of plants)				
Seed to once over harvest (if applicable)				

- Fruiting season: 1 = Long ('Marglobe) 2 = Medium ('Westover') 3 = Short, concentrated ('VF 145') 4 = Very concentrated ('UC 82')
- Relative maturity in areas tested: 1 = Early 2 = Medium early 3 = Medium 4 = Medium late 5 = Late 6 = Variable
(If relative maturity is known to differ by location or environment, please explain on separate sheet)

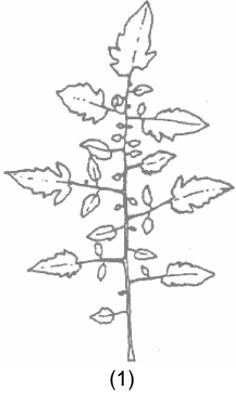
12. ADAPTATION If more than one category applies, list all in rank order.

- Culture: 1 = Field 2 = Greenhouse
- Principle use(s): 1 = Home garden 2 = Fresh market 3 = Whole-pack canning 4 = Concentrated products
5 = Other (specify) _____
- Machine harvest: 1 = Not adapted 2 = Adapted
- Regions to which adaptation has been demonstrated:
 1 = Northeast 2 = Mid Atlantic 3 = Southeast 4 = Florida 5 = Great Plains
 6 = South-central 7 = Intermountain West 8 = Northwest 9 = California: Sacramento and Upper San Joaquin Valley
 10 = California: Coastal Areas 11 = California: Southern San Joaquin Valley & Deserts

ILLUSTRATIONS OF TOMATO LEAF AND FRUIT CHARACTERISTICS

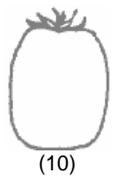
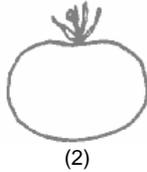
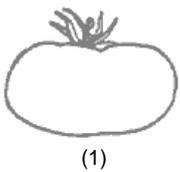
4. LEAF

Morphology:



7. FRUIT

Typical fruit shape:



Shape of transverse section:



1 = Round



2 = Flattened



3 = Angular



4 = Irregular

Shape of stem end:



1 = Flat



2 = Indented

Shape of blossom end:



1 = Indented



2 = Flat

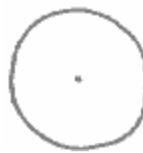


3 = Nippled

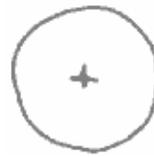


4 = Tapered

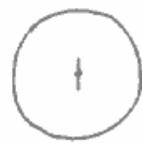
Shape of pistil scar:



1 = Dot



2 = Stellate



3 = Linear



4 = Irregular

REFERENCES

- Anonymous, 1976. All About Tomatoes. Ortho Books, Chevron Chemical Co., San Francisco. In three volumes: Midwest/Northeast Edition, West Edition, and South Edition.
- Ware, G.W. & J.P. McCollum, 1968. Producing Vegetable Crops. The Interstate Printer & Publishers, Inc., Danville, Illinois. Chapter 30, pp. 451-473, "Tomatoes".
- Warnock, S.J. 1978. Using Tomato Heat Units. Leaflet No. 6, Campbell Institute for Agricultural Research, Camden, NJ. 10 p.
- Webb, R.E., T.H. Barksdale, & A.K. Stoner, 1973. "Tomatoes", pp. 344-361, in: Nelson, R.R. (Ed.), Breeding Plants for Disease Resistance. Pennsylvania State University Press, University Park.
- Young, P.A. & J.W. MacArthur, 1947. Horticultural characters of tomatoes. Bull. Texas Agric. Exper. Station No. 698.