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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
Pumpkin/Squash/Gourd (*Cucurbita pepo* L.)**

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

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

In the spaces on the left, enter the appropriate numbers that describe the characteristics of the application variety. On the right, enter the appropriate numbers that describe the characteristics of the most similar comparison variety. Right justify whole numbers by adding leading zeros if necessary. The variety that you choose for comparison should be the most similar one in terms of overall morphology, background and maturity. Please follow the guidelines on page 1 for conducting the trials. The comparison variety should be grown in field trials with the application variety for two independent growing cycles, at one or more localities, in the region and season of best adaptability. In general, measurements of quantitative traits should be taken on at least 24 randomly selected plants or plant parts to obtain averages and statistics that describe a typical field of the variety. (Form technical content last updated March 2007.)

<p>General Descriptors:</p> <p>___ 01. Fruit Shape/ Variety Group (Figure 1; also see instruction 5b above): 1 = Acorn 2 = Coozelle 3 = Crookneck 4 = Pumpkin 5 = Scallop 6 = Straightneck 7 = Vegetable marrow 8 = Zucchini 9 = None of the above, specify shape: _____ (e.g. pyriform, bottle, hourglass, fusiform, etc.) 10 = Gourd, specify shape: _____ (e.g. spherical, oblate, egg, pear, spoon, crown-of-thorns, star, winged, etc.)</p> <p>___ 02. Expected primary usage: 1 = Culinary 2 = Ornamental 3 = Both</p> <p>___ 03. What parts of the plant provide expected primary usage (above): 1 = Mature fruit 2 = Immature fruit 3 = Flowers 4 = Vegetation 5 = Seeds</p>	<p>Comparison Variety Name _____</p> <p>___ 01. Fruit Shape/ Variety Group</p> <p>___ 02. Expected primary usage</p> <p>___ 03. Part of plant for #02 above</p>
<p>04. Cotyledons measured between full expansion of first and second true leaves:</p> <p>___ . ___ ___ 04a. Length to width ratio (example: 0.00)</p> <p>___ 04b. Apex 1 = Notched 2 = Not notched</p> <p>___ 04c. Veining 1 = Obscure 2 = Obvious</p>	<p>04. Cotyledons:</p> <p>___ . ___ ___ 04a. Length to Width ratio</p> <p>___ 04b. Apex</p> <p>___ 04c. Veining</p>
Application Variety	Comparison Variety

Application Variety	Comparison Variety
<p>Main Stem:</p> <p>05. Main stem green color, when plants have 20 true leaves on the main stem:</p> <p>___ 05a. Main color: 1 = Light (Cocozelle, Black Beauty, Ma'yan, Vegetable Spaghetti) 2 = Dark near base only (Early Prolific Straightneck) 3 = Dark spots at nodes (Sihi Lavan) 4 = Dark for nearly the entire length (Fordhook Zucchini, Jack O'Lantern, Howden)</p> <p>___ 05b. White marks at nodes: 1 = Absent 2 = Present</p> <p>___ 05c. Yellow marks (associated with precocious yellow gene complex) at nodes: 1 = Absent 2 = Present</p> <p>___ 06. Growth habit when plants have 20 true leaves on the main stem:</p> <p>Bush 1 = True-bush (Fordhook Zucchini, Cocozelle, Ronde de Nice, Benning's Green Tint) 2 = Semi-bush (Taybelle, Table Ace, Jackpot)</p> <p>Vine 3 = Moderate vine (Small Sugar, Spookie, Magic Lantern, Table Queen) 4 = Rampant vine (Howden, Connecticut Field)</p> <p>___ 07. Tendrils when plants have 20 true leaves on the main stem: 1 = Absent or rudimentary 2 = Present and elongated</p> <p>08. Main stem internode dimensions when observed after the 20th internode has developed:</p> <p>___ 08a. Length 1 = Internode length constant from 5th to 15th internode 2 = Internode length increases from 5th to 15th internode</p> <p>___ 08b. Width 3 = Internode width constant from 5th to 15th internode 4 = Internode width decreases from 5th to 15th internode</p>	<p>Main Stem:</p> <p>05. Main Stem Color:</p> <p>___ 05a. Main color</p> <p>___ 05b. White marks at nodes</p> <p>___ 05c. Yellow marks at nodes</p> <p>___ 06. Growth habit</p> <p>___ 07. Tendrils</p> <p>08. Internode dimensions</p> <p>___ 08a. Length</p> <p>___ 08b. Width</p>
<p>Petioles:</p> <p>09. Petioles derived from main stem when observed after the 20th node has developed:</p> <p>___ . ___ 09a. Length to medial width ratio of 10th petiole (example: 0.00)</p> <p>___ . ___ 09b. Length to medial width ratio of 15th petiole (example: 0.00)</p> <p>___ 10. Petiole spininess (prickles) when observed after the 20th internode has developed:</p> <p>0 = Smooth (Spineless Beauty) 1 = Slightly spiny (Goldy, Fordhook Zucchini) 2 = Moderately spiny (Cocozelle) 3 = Noticeably spiny (Early Prolific Straightneck) 4 = Very spiny (Clarita) 5 = Extremely spiny</p> <p>___ 11. Petiole angle of 6th through 15th petioles on main stem (between ground and petiole) after the 20th internode has developed, measured when the main stem is at a 90-degree angle with the ground:</p> <p>1 = Horizontal (Caserta, less than 10 degrees) 2 = Nearly horizontal (Goldy, Fordhook Zucchini, 10 to 30 degrees) 3 = Intermediate (30 to 45 degrees) 4 = Vertical or nearly vertical (45 degrees or greater)</p>	<p>Petioles:</p> <p>09. Petiole measurements:</p> <p>___ . ___ 09a. L:W ratio of 10th petiole</p> <p>___ . ___ 09b. L:W ratio of 15th petiole</p> <p>___ 10. Petiole spininess</p> <p>___ 11. Petiole Angle</p>
Application Variety	Comparison Variety

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<p>Laminae:</p> <p>___ 12. Lobing of 10th and 15th laminae on main stem (Figure 2): 0 = Not lobed 1 = Shallowly lobed 2 = Medium lobed 3 = Deeply lobed 4 = Very deeply lobed</p> <p>___ 13. Dimensions of leaf laminae after the 20th internode has developed (length measured from the point of petiole attachment to the apex of the lamina; maximal width measured at 90-degree angle to the length of the lamina):</p> <p>___ . ___ 13a. Length to maximal width ratio of 10th true leaf (example: 0.00) ___ . ___ 13b. Length to maximal width ratio of 15th true leaf (example: 0.00)</p> <p>___ 14. Silver blotching or mottling (genetic, not leaf-silvering disorder) of adaxial surface of laminae after the 20th internode has developed: 1 = Silver blotching completely absent over time (Costata Romanesca, Early Prolific Straightneck) 2 = Silver blotching present early in development, then disappearing 3 = Silver blotching over a small amount of the surface 4 = Silver blotching over a moderate amount of the surface 5 = Silver blotching over much of the surface (Caserta)</p>	<p>Laminae:</p> <p>___ 12. Lobing</p> <p>13. Leaf laminae dimensions:</p> <p>___ . ___ 13a. L:W ratio of 10th true leaf ___ . ___ 13b. L:W ratio of 15th true leaf</p> <p>___ 14. Silver blotching</p>
<p>Flowers:</p> <p>___ 15. Number of flowers per node: 1 = Averaging clearly less than one 2 = One (almost always) (Fordhook Zucchini, Cocozelle) 3 = Often more than one 4 = Consistently more than one (Yellow Summer Crookneck)</p> <p>___ 16. Staminate flower on day of anthesis on main stem between nodes 11 and 20 (Figure 3):</p> <p>___ mm 16a. Length from base of calyx to tip of corolla ___ mm 16b. Exterior width at top of calyx cup ___ mm 16c. Pedicel length ___ mm 16d. Length of anther column</p> <p>___ 17. Dominant color of corolla of staminate flower, on day of anthesis: 1 = Orange-yellow 2 = Light yellow 3 = Nearly white</p> <p>___ 18. Ring at base of interior of staminate corolla: 1 = Absent 2 = Yellow 3 = Green and yellow 4 = Light green 5 = Dark green</p> <p>___ 19. Ring at base of interior of pistillate corolla: 1 = Absent 2 = Yellow 3 = Green and yellow 4 = Light green 5 = Dark green</p> <p>___ 20. Pistillate flower on day of anthesis:</p> <p>___ mm 20a. Length from base of calyx to tip of corolla ___ mm 20b. Pedicel length</p> <p>___ 21. Ovary color on day prior to anthesis: 1 = Green (Black Beauty, Fordhook Zucchini, Cocozelle, Clarita) 2 = Green turning yellow (Yellow Summer Crookneck) 3 = Yellow (Goldy, Gold Rush, Multipik) 4 = Bicolor green and yellow (Zephyr, Flying Saucer)</p>	<p>Flowers:</p> <p>___ 15. Number of flowers per node</p> <p>16. Staminate flower measurements:</p> <p>___ mm 16a. Length of petal ___ mm 16b. Width of petal ___ mm 16c. Pedicel length ___ mm 16d. Length of anther column</p> <p>___ 17. Dominant staminate flower color</p> <p>___ 18. Ring at base of staminate corolla</p> <p>___ 19. Ring at base of pistillate corolla</p> <p>20. Pistillate flower measurements:</p> <p>___ mm 20a. Length of petal ___ mm 20b. Pedicel length</p> <p>___ 21. Ovary color</p>
Application Variety	Comparison Variety

Application Variety	Comparison Variety
<p>Immature Fruit:</p> <p>22. Immature fruit size (3–5 days past anthesis) (Figure 4):</p> <p>___ . ___ 22a. Length (through the axis) to medial width ratio (example: 0.00)</p> <p>___ . ___ 22b. Length (through the axis) to maximal width ratio (example: 0.00)</p> <p>23. Immature fruit color (3–5 days past anthesis):</p> <p>___ 23a. Main color: 1 = Intense green (Fordhook Zucchini, Black Beauty, Jack O'Lantern, Senator, Spineless Beauty, Raven) 2 = Light green (Arika, Clarita, Small Sugar, Ronde de Nice) 3 = Intense yellow (Goldy, Gold Rush, Golden Rod) 4 = Light yellow (Early Prolific Straightneck, Yellow Summer Crookneck, Multipik, Dixie, Gentry) 5 = Intense bicolor (Sunburst, Nova) 6 = Light bicolor 7 = Striped green (Cocozelle, Costata Romanesca, Caserta) 8 = Striped yellow 9 = Striped bicolor, or quadricolor (Zephyr, Flying Saucer)</p> <p>___ 23b. If striped, the darker stripes are: 1 = Broad and contiguous (Cocozelle, Costata Romanesca) 2 = Narrow and not contiguous (Caserta, Verte d'Italie)</p> <p>___ 24. Immature fruit flecks: 1 = Small (Nero di Milano, Raven, Magic Lantern) 2 = Medium (Fordhook Zucchini, Nano Verde di Milano) 3 = Large (Ortolano di Faenza, Striato Pugliese, Costata Romanesca, Grey Zucchini OP, Clarita, Spineless Beauty, Howden, Ronde de Nice)</p> <p>___ 25. Immature fruit warting: 1 = Absent (Cocozelle, Fordhook Zucchini, Ronde de Nice, Gentry) 2 = Present (Early Prolific Straightneck, Yellow Summer Crookneck, Early Summer Crookneck)</p>	<p>Immature Fruit:</p> <p>22. Immature fruit size</p> <p>___ . ___ 22a. L:W ratio (to medial width)</p> <p>___ . ___ 22b. L:W ratio (to maximal width)</p> <p>23. Immature fruit color</p> <p>___ 23a. Main color</p> <p>___ 23b. Description of darker stripes</p> <p>___ 24. Immature fruit flecks</p> <p>___ 25. Immature fruit warting</p>
<p>Mature Fruit:</p> <p>___ 26. Mature fruit surface topography (fill in the blank with the most appropriate choice) (Figure 5):</p> <p>Ribbing present (swelling above vascular tracts): 1 = Prominent and along entire length (Costata Romanesca) 2 = Slight, more prominent near peduncle (Fordhook Zucchini) 3 = Slight, near peduncle (Grey Zucchini OP, Small Green Algerian)</p> <p>Furrowing (angularly depressed above vascular tracts) and/or ridging (angularly raised between vascular tracts) 4 = Prominent, along nearly entire length (Taybelle, Mammoth Table Queen) 5 = Moderate (Sweet Dumpling)</p> <p>Scalloping (roundly lobed between vascular tracts): 6 = Prominent, at equatorial region (Benning's Green Tint) 7 = Not so prominent, at equatorial region (Scallopini) 8 = Prominent, at peduncular region (Sunny Delight) 9 = Not so prominent, at peduncular region 10 = Prominent, at stylar region (Sunburst) 11 = Not so prominent, at stylar region</p> <p>Lobing (broadly and roundly protruding between the vascular tracts and shallowly depressed along the vascular tracts, along nearly the entire length of the fruit) 12 = Prominent (Jack-Be-Little) 13 = Not so prominent</p> <p>Grooving (very narrow, shallow depressions along vascular tracts and midway in-between) 14 = Distinct (Howden) 15 = Not so distinct (Winter Luxury)</p> <p>Wrinkling (irregular surface) 16 = Distinct 17 = Indistinct 18 = Completely smooth</p>	<p>Mature Fruit:</p> <p>___ 26. Mature fruit topography</p>
Application Variety	Comparison Variety

Application Variety	Comparison Variety
<p>Mature Fruit (continued):</p> <p>27. Mature fruit dimensions (at least 40 days past anthesis) (Figure 4):</p> <p>___ . ___ 27a. Length (through the axis) to medial width ratio (Example: 0.00)</p> <p>___ . ___ 27b. Length (through the axis) to maximal width ratio (Example: 0.00)</p> <p>28. Mature fruit warting: 1 = Absent (Cocozelle, Fordhook Zucchini, Ronde de Nice) 2 = Sparse, small (Gentry) 3 = Sparse, large (White Bush Scallop) 4 = Many, small 5 = Many, large (Orange Warted, Yellow Summer Crookneck)</p> <p>29. Mature fruit rind: 1 = Lignified (when cutting mature fruit, little cracks form) 2 = Not lignified (when cutting mature fruit, they slice smoothly and easily)</p> <p>30. Mature fruit stylar scar: 1 = Protruding 2 = Flat 3 = Depressed</p> <p>31. Mature fruit stylar end: 1 = Depressed (Howden) 2 = Nearly Flat (Fordhook Zucchini, True French) 3 = Convex (Yellow Summer Crookneck)</p> <p>32. Mature fruit peduncle end: 1 = Depressed 2 = Nearly flat 3 = Convex</p> <p>33. Mature fruit peduncle (Figure 6):</p> <p>___ . ___ 33a. Length (through the axis) to medial width ratio (Example: 0.00)</p> <p>___ . ___ 33b. Length (through the axis) to maximal width (near fruit attachment) ratio (Example: 0.00)</p> <p>34. Mature fruit surface: 1 = Netted (Winter Luxury) 2 = Cracked (Golden Zucchini) 3 = Neither</p> <p>35. Mature fruit exterior color:</p> <p>___ 35a. Main color: 1 = Light green 2 = Dark green (Table Queen) 3 = Black green (Fordhook Zucchini, Taybelle) 4 = Grey green 5 = Grey 6 = Light orange 7 = Pale orange 8 = Medium orange (Winter Luxury, Grey Zucchini OP) 9 = Intense orange (Jack O'Lantern, Howden) 10 = Yellow orange 11 = Light yellow orange 12 = Light yellow (Vegetable Spaghetti) 13 = Intense yellow (Early Prolific Straightneck) 14 = Nearly white (White Bush Scallop)</p> <p>Complex colors (give combination of choice above with color covering most of the fruit surface first)</p> <p>___, ___ 35b. Striped (Cocozelle 1, 8; Delicata 11, 2)</p> <p>___, ___ 35c. Bicolor (Sunburst 10, 1)</p> <p>___, ___, ___, ___ 35d. Quadricolor (Carnival 2, 4, 6, 11)</p> <p>36. Mature fruit mesocarp (flesh) color: 1 = Intense Orange (Winter Luxury) 2 = Light Orange (Connecticut Field, Fordhook Zucchini) 3 = Intense Yellow (Mongogo) 4 = Light Yellow (Early Prolific Straightneck) 5 = White (White Bush Scallop) 6 = White tinged green</p> <p>37. Mature fruit endocarp (placenta) color: 1 = Orange 2 = Yellow 3 = White</p>	<p>Mature Fruit (continued):</p> <p>27. Mature fruit dimensions:</p> <p>___ . ___ 27a. L:W ratio (to medial width)</p> <p>___ . ___ 27b. L:W ratio (to maximal width)</p> <p>___ 28. Mature fruit warting</p> <p>___ 29. Mature fruit rind lignified</p> <p>___ 30. Mature fruit stylar scar</p> <p>___ 31. Mature fruit stylar end</p> <p>___ 32. Mature fruit peduncle end</p> <p>33. Mature fruit peduncle dimensions:</p> <p>___ . ___ 33a. L:W ratio (to medial width)</p> <p>___ . ___ 33b. L:W ratio (to maximal width)</p> <p>___ 34. Mature fruit surface</p> <p>___ 35a. Main fruit exterior color</p> <p>___, ___ 35b. Striped pattern</p> <p>___, ___ 35c. Bicolor pattern</p> <p>___, ___, ___, ___ 35d. Quadricolor pattern</p> <p>___ 36. Mature fruit flesh color</p> <p>___ 37. Mature fruit placenta color</p>
Application Variety	Comparison Variety

Application Variety	Comparison Variety
<p>Seed:</p> <p>38. Seed cavity:</p> <p>___ . ___ ___ 38a. Length (through the axis) to medial width ratio (Example: 0.00)</p> <p>___ . ___ ___ 38b. Length (through the axis) to maximal width ratio (Example: 0.00)</p> <p>___ 39. Seed hull (from mature fruit harvested on candidate variety): 1 = Absent 2 = Present but rudimentary 3 = Present with normal appearance</p> <p>40. Seed dimensions (average for 12 mature seeds from open-pollinated fruit harvested on candidate variety):</p> <p>___ . ___ ___ 40a. Length to width ratio (Example: 0.00)</p> <p>___ . ___ ___ 40b. Length to thickness ratio (Example: 0.00)</p> <p>___ . ___ ___ 40c. Width to thickness ratio (Example: 0.00)</p>	<p>Seed:</p> <p>38. Seed cavity measurements:</p> <p>___ . ___ ___ 38a. L:W ratio (to medial width)</p> <p>___ . ___ ___ 38b. L:W ratio (to maximal width)</p> <p>___ 39. Seed hull</p> <p>40. Seed measurements</p> <p>___ . ___ ___ 40a. L:W ratio</p> <p>___ . ___ ___ 40b. L:Thickness ratio</p> <p>___ . ___ ___ 40c. W:Thickness ratio</p>
<p>___ 41. Resistance to biotic or abiotic stresses: 1 = None 2 = Yes, as qualified In Exhibit B or D (specify disease resistance/tolerance):</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>___ 41. Resistance to biotic or abiotic stresses</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>___ 42. Unique features that are not listed in the current 'Exhibit C' and/or are strongly environmentally dependent or occur sporadically (i.e.: peduncle characteristics, immature or mature fruit length or contents, width, or weight, stylar scar size, pollen color, seed-coat characteristics, branching, etc.): 1 = None 2 = Yes, as described herein: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>___ 42. Unique features not listed elsewhere in the application</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>

43. On additional pages, attach photographs of mature fruits of both the application variety and the comparison variety, showing external and internal coloring, with a ruler in the photograph to indicate scale.

Additional photographs of the plant, flowers, immature fruits, or other plant parts could also be helpful in providing a full description of the variety to readers. Please provide such photographs if you believe they would be helpful.

References:

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- Missouri Botanical Garden. 2007. Plant Science. Tropical Botanical Science Database. <http://mobot.mobot.org/W3T/Search/vast.html>
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- Paris, H.S. and R.N. Brown. 2005. The genes of pumpkin and squash. *HortScience* **40**: 1620–1630.
- Paris, H.S. and H. Nerson. 2003. Seed dimensions in the subspecies and cultivar-groups of *Cucurbita pepo*. *Genet. Resources Crop Evol.* **50**: 615–625.
- U.S.D.A. 1969. Growing pumpkins and squashes. *Farmers' Bull. No. 2086*, Agricultural Research Service, Washington, DC.

Figure 1. Fruit shapes

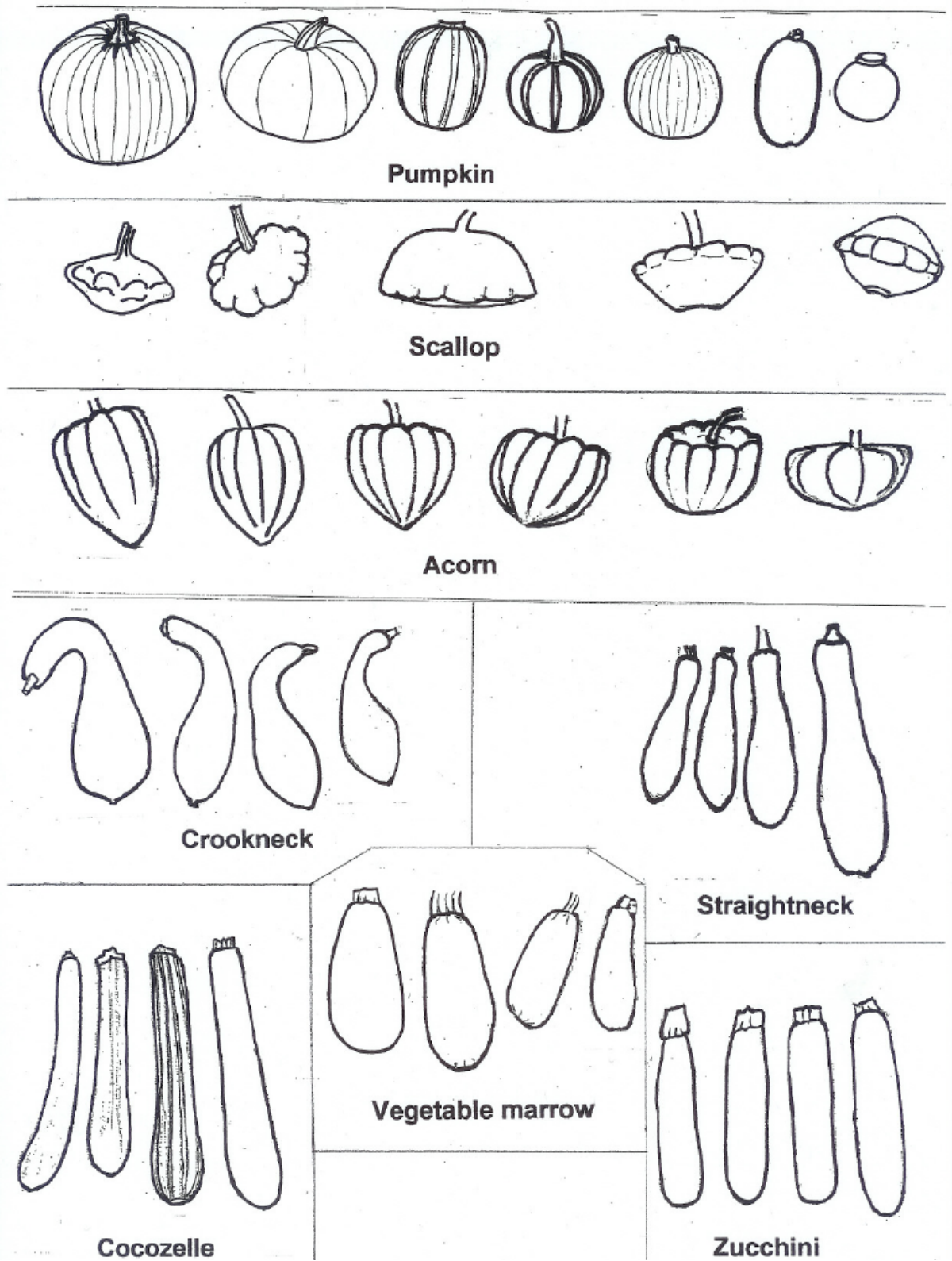


Figure 2. Leaf lobing

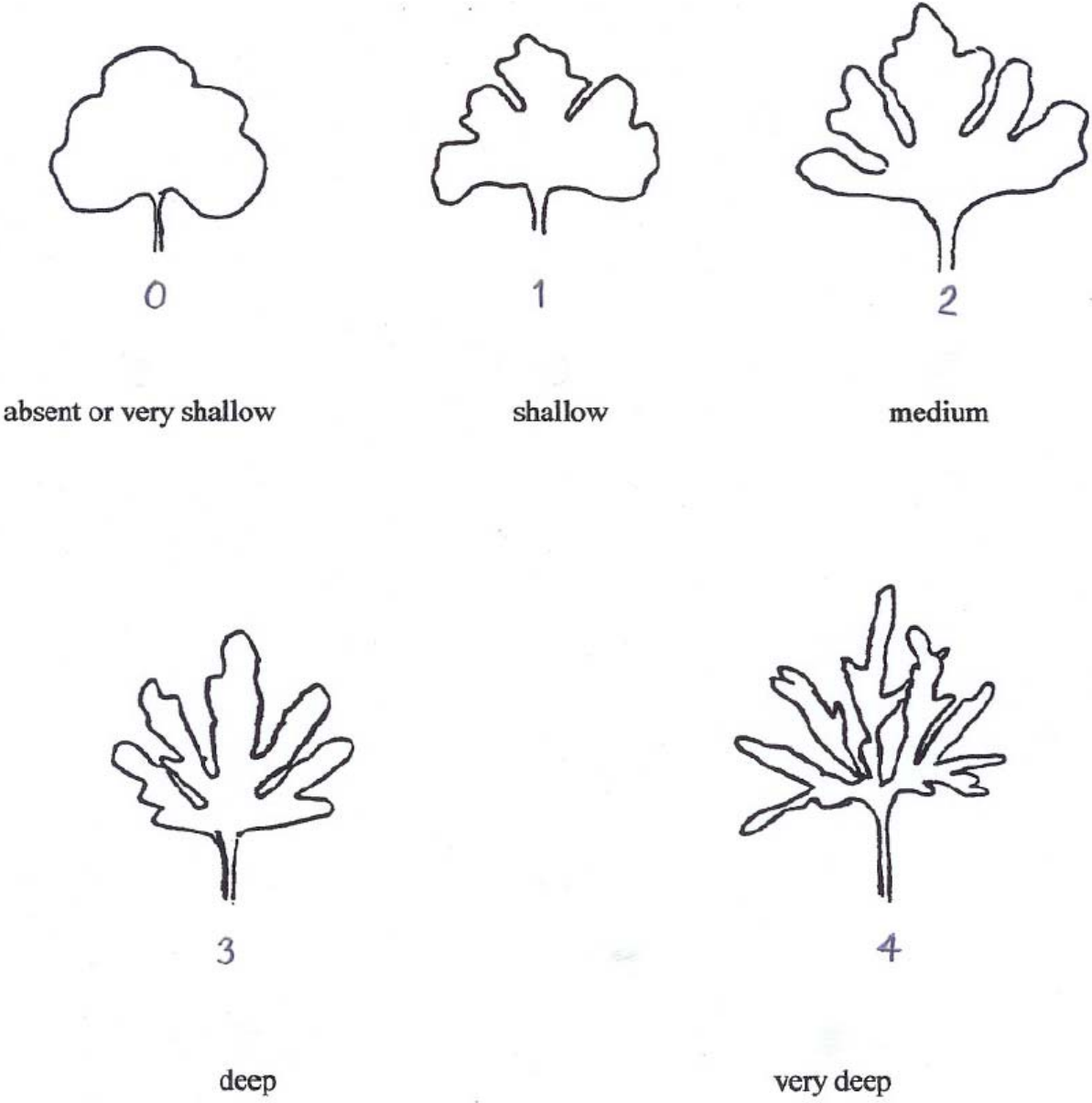


Figure 3. Flower measurements

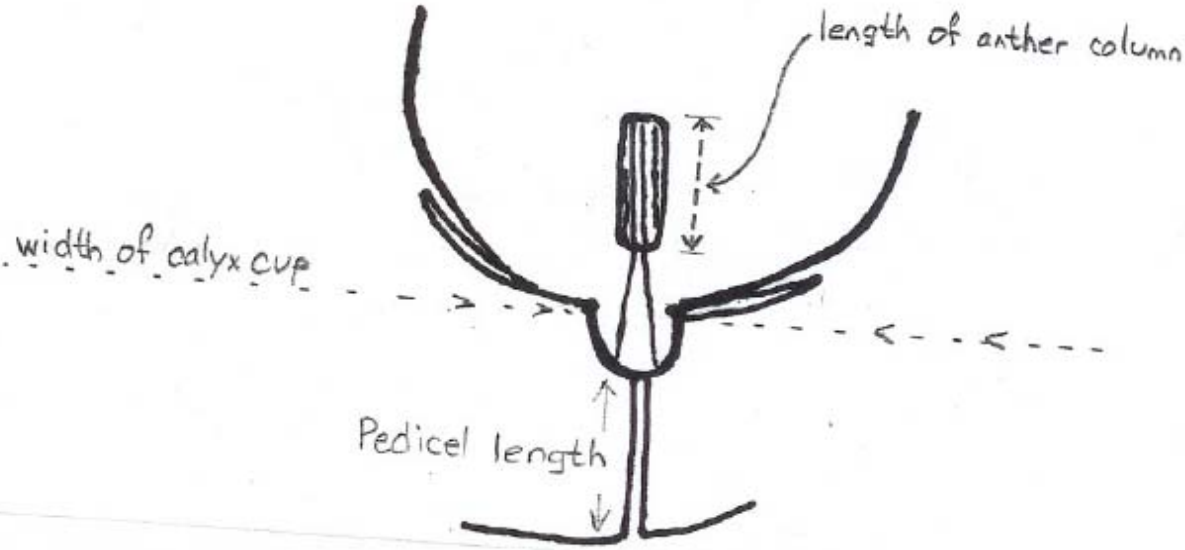


Figure 4. Fruit measurements

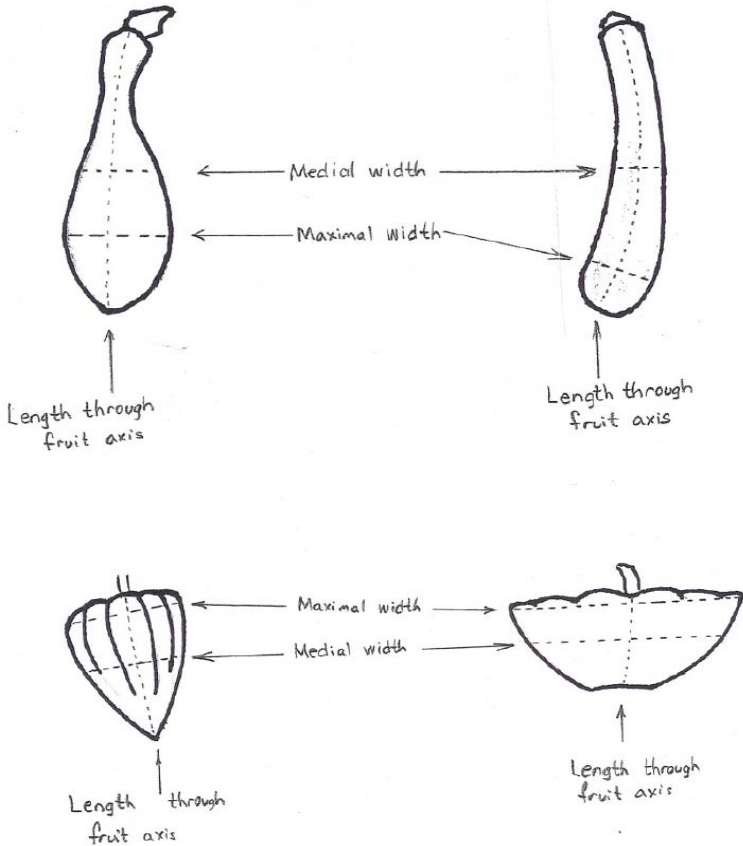
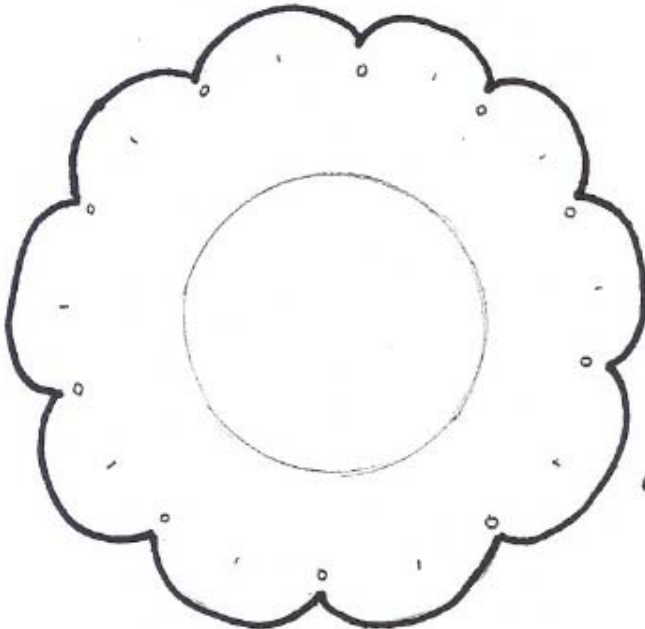
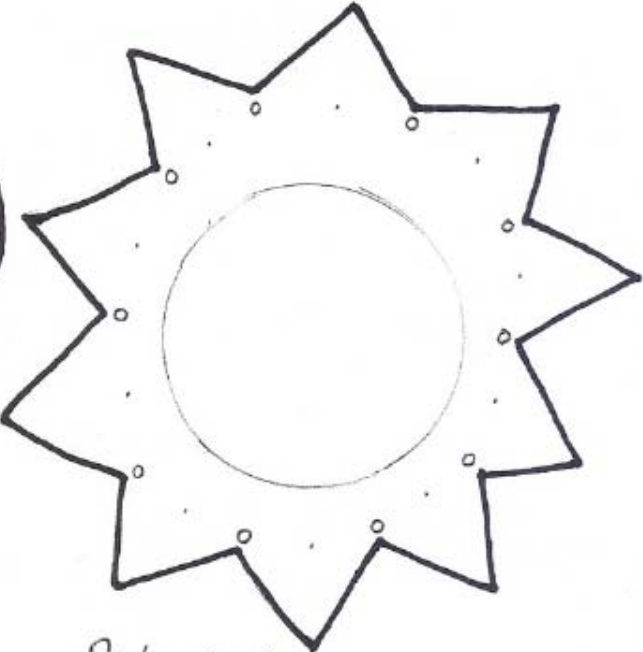


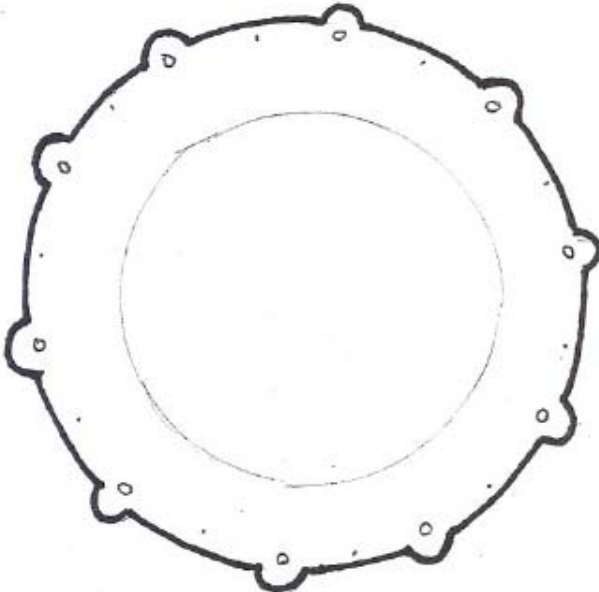
Figure 5. Fruit cross-sections



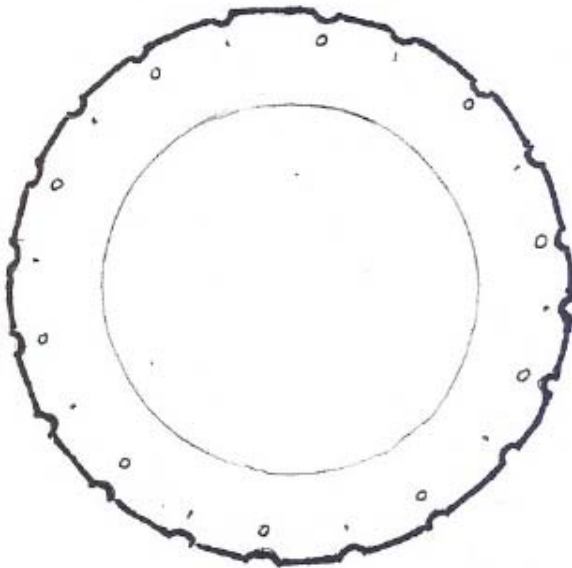
Lobed



Ridged & Furrowed

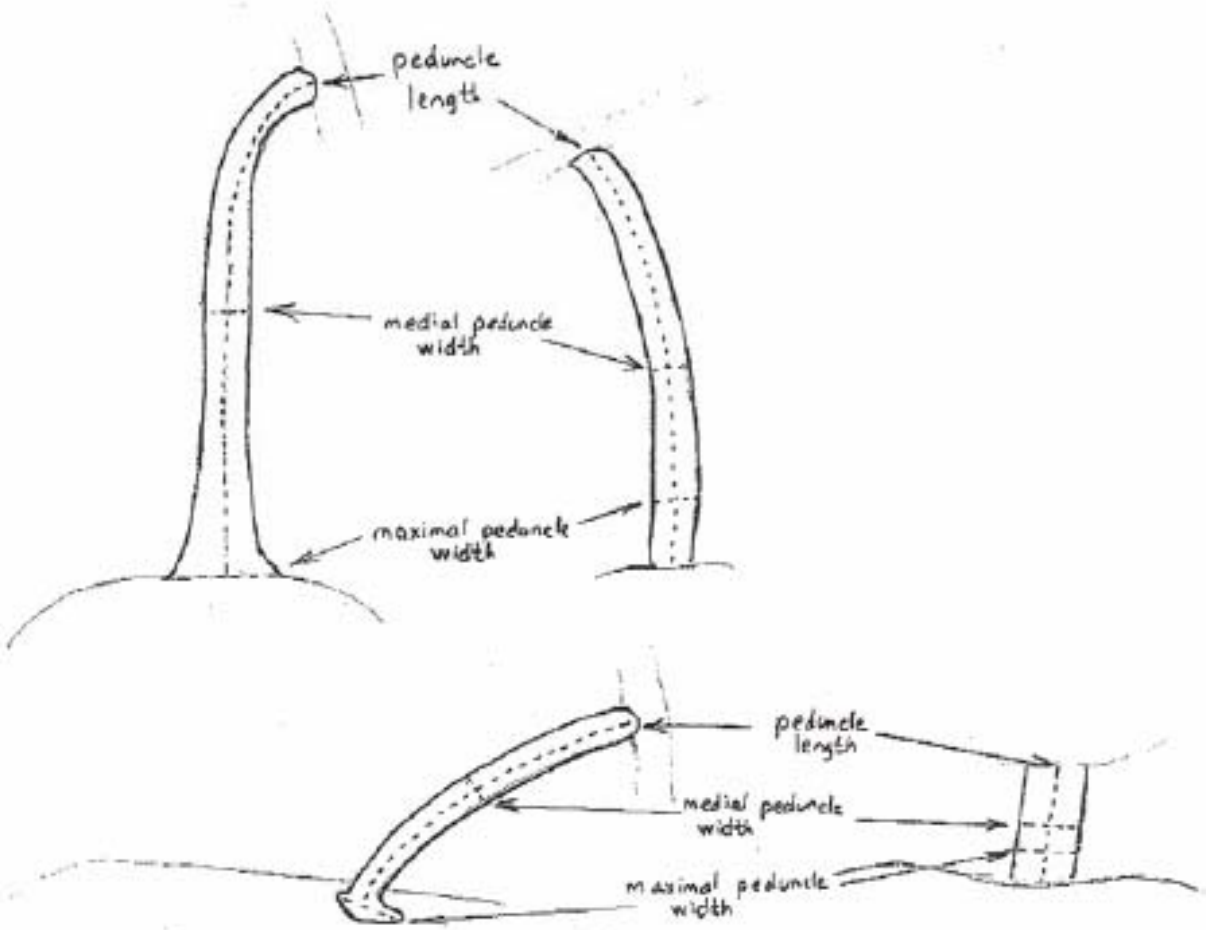


Ribbed



Grooved

Figure 6. Peduncle measurements



INSTRUCTIONS FOR OBJECTIVE DESCRIPTION OF VARIETY Pumpkin, Squash, Gourd (*Cucurbita pepo* L.)

1. Subject & Purpose of these Guidelines

These Guidelines for testing apply to all varieties of pumpkins, squash, and gourds for those belonging to the species *Cucurbita pepo* L. Their purpose is to tabulate many characteristics in order to establish the distinguishing phenotypic features of various cultivars of this species.

2. Material Required

- a. The applicant, upon receiving a PVP application number and seed-depository letter from the PVP Examiner, will deposit 3000 (three thousand) seeds at the institution indicated on the depository form.
- b. The seed sample should meet normal commercial requirements for germination, which should be stated by the applicant.
- c. The sample must not have undergone any treatment unless the competent authorities allow or request such treatment. If the seed sample has been treated, full details of the treatment must be given.

3. Conduct of Testing

- a. The minimum duration of the test of the variety shall be two independent growing cycles and the test may be done at one or more localities.
- b. The test should be conducted under conditions ensuring satisfactory growth of the plants and normal expression of the characteristics of the variety under examination.
- c. The size of the plots must be large enough to allow the plants to realize their potential. The plots also must be large enough to allow removal of plants or parts of plants for measurement or counting, if necessary, without jeopardizing later observations, such as those to be made at the end of the growing cycle. Each characteristic for testing should be based on **a total of at least 24 plants (12 per growing cycle)**. Separate plots for observations and for measurements can be used but only if they have been subjected to similar growing and environmental conditions.
- d. Testing for special purposes (disease resistance, vitamin content, etc.) may be established.

4. Methods and Observations

- a. All observations determined by measurement or counting should be made on at least 12 plants or parts taken from each of 12 plants.
- b. For the assessment of uniformity, a population standard of 3% should be applied. Where the test is conducted on 24 plants, the maximum number of off-types allowed would be 2.

5. Grouping of Varieties

The applicant should correctly classify the variety to species together with citation of the botanical authority (for example: *Cucurbita pepo* L.). The applicant should suggest, upon submitting the variety for testing, the market type to which the variety belongs and suggest control varieties of the same species and type.