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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* spp. ; non pepo's)**

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 species, 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. Species: _____ (Scientific name, including botanical authority, is mandatory for acceptance of the application).</p> <p>02. Expected primary usage: 1 = Culinary 2 = Ornamental 3 = Both 4 = Other (please describe) _____</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. Species: _____</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 2 = Dark near base only 3 = Dark spots at nodes 4 = Dark for nearly the entire length</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 (Gold Nugget, Redondo del Tronco) 2 = Semi-bush (Bush Pink Banana)</p> <p>Vine 3 = Moderate vine (Butternut) 4 = Rampant vine (Atlantic Giant, Long Island Cheese)</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>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>Laminae:</p> <p>___ 10. Lobing of 10th and 15th laminae on main stem (Figure 1): 0 = Not lobed 1 = Shallowly lobed 2 = Medium lobed 3 = Deeply lobed 4 = Very deeply lobed</p> <p>11. 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>___ . ___ 11a. Length to maximal width ratio of 10th true leaf (example: 0.00)</p> <p>___ . ___ 11b. Length to maximal width ratio of 15th true leaf (example: 0.00)</p> <p>___ 12. 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 (Waltham Butternut, Gold Nugget) 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</p>	<p>Laminae:</p> <p>___ 10. Lobing</p> <p>11. Leaf laminae dimensions:</p> <p>___ . ___ 11a. L:W ratio of 10th true leaf</p> <p>___ . ___ 11b. L:W ratio of 15th true leaf</p> <p>___ 12. Silver blotching</p>
Application Variety	Comparison Variety

Application Variety	Comparison Variety
<p>Flowers:</p> <p>___ 13. Number of flowers per node: 1 = Averaging clearly less than one 2 = One (almost always) 3 = Often more than one 4 = Consistently more than one</p> <p>___ 14. Staminate flower on day of anthesis on main stem between nodes 11 and 20 (Figure 2):</p> <p>___ mm 14a. Length from base of calyx to tip of corolla</p> <p>___ mm 14b. Exterior width at top of calyx cup</p> <p>___ mm 14c. Pedicel length</p> <p>___ mm 14d. Length of anther column</p> <p>___ 15. Dominant color of corolla of staminate flower, on day of anthesis: 1 = Orange-yellow 2 = Intense yellow 3 = Light yellow 4 = Nearly white 5 = Other (please describe) _____</p> <p>___ 16. Ring at base of interior of staminate corolla: 1 = Absent 2 = Yellow 3 = Green and yellow 4 = Light green 5 = Dark green</p> <p>___ 17. Ring at base of interior of pistillate corolla: 1 = Absent 2 = Yellow 3 = Green and yellow 4 = Light green 5 = Dark green</p> <p>___ 18. Pistillate flower on day of anthesis:</p> <p>___ mm 18a. Length from base of calyx to tip of corolla</p> <p>___ mm 18b. Pedicel length</p> <p>___ 19. Ovary color on day prior to anthesis: 1 = Green 2 = Green turning yellow OR Bi-color green and yellow (Gold Nugget) 3 = Yellow (PI 165558, Prizewinner)</p>	<p>Flowers:</p> <p>___ 13. Number of flowers per node</p> <p>14. Staminate flower measurements:</p> <p>___ mm 14a. Length of petal</p> <p>___ mm 14b. Width of petal</p> <p>___ mm 14c. Pedicel length</p> <p>___ mm 14d. Length of anther column</p> <p>___ 15. Dominant staminate flower color _____</p> <p>___ 16. Ring at base of staminate corolla</p> <p>___ 17. Ring at base of pistillate corolla</p> <p>18. Pistillate flower measurements:</p> <p>___ mm 18a. Length of petal</p> <p>___ mm 18b. Pedicel length</p> <p>___ 19. Ovary color</p>
<p>Immature Fruit:</p> <p>___ 20. Fruit shape: 1 = Spherical 2 = Globe OR Oblate (round, but wider than long) (Long Island Cheese, Musquee de Provence) 3 = Oval OR Oblong (round, but longer than wide) (Upper Ground Sweet Potato) 4 = Bell (Waltham Butternut) 5 = Considerably longer than wide (length to maximal width > 2.0:1) (Lunga di Napoli) 6 = Pyriform (Virginia Mammoth, Golden Cushaw) 7 = Hourglass (Hercules, Toonas Makino) 8 = Turban (Turks Turban, Bonnet Rouge) 9 = Turbinate (top-shaped) (White Rind Sugar) 10 = Fusiform (Hubbard) 11 = Drum-shaped (Buttercup) 12 = Other (please, describe) _____ _____ _____</p> <p>___ 21. Immature fruit size (3–5 days past anthesis) (Figure 3):</p> <p>___ . ___ 21a. Length (through the axis) to medial width ratio (example: 0.00)</p> <p>___ . ___ 21b. Length (through the axis) to maximal width ratio (example: 0.00)</p>	<p>Immature Fruit:</p> <p>___ 20. Fruit Shape</p> <p>21. Immature fruit size</p> <p>___ . ___ 21a. L:W ratio (to medial width)</p> <p>___ . ___ 21b. L:W ratio (to maximal width)</p>
Application Variety	Comparison Variety

Application Variety	Comparison Variety
<p>Immature Fruit (continued):</p> <p>22. Immature fruit color (3–5 days past anthesis):</p> <p>___ 22a. Main color: 1 = Intense green 2 = Light green (Waltham Butternut) 3 = Yellow (Prizewinner) 4 = Bicolor 5 = Striped green 6 = Other (please describe) _____</p> <p>___ 22b. If striped, the darker stripes are: 1 = Broad and contiguous (Guatemala Blue) 2 = Narrow and not contiguous</p> <p>___ 23. Immature fruit flecks: 1 = Small 2 = Medium 3 = Large (Waltham Butternut)</p> <p>___ 24. Immature fruit warting: 1 = Absent (Waltham Butternut, Redondo del Tronco) 2 = Present</p>	<p>Immature Fruit (continued):</p> <p>22. Immature fruit color</p> <p>___ 22a. Main color</p> <p>___ 22b. Description of darker stripes</p> <p>___ 23. Immature fruit flecks</p> <p>___ 24. Immature fruit warting</p>
<p>Mature Fruit:</p> <p>___ 25. Mature fruit surface topography (fill in the blank with the most appropriate choice) (Figure 4):</p> <p>Ribbing present (swelling above vascular tracts): 1 = Prominent and along entire length (<i>Luffa acutangula</i> Rocksberry) 2 = Slight, more prominent near peduncle 3 = Slight, near peduncle</p> <p>Furrowing (angularly depressed above vascular tracts) and/or ridging (angularly raised between vascular tracts) 4 = Prominent, along nearly entire length (Yokohama, White Rind Sugar, Long Island Cheese, Musquee de Provence, Rouge Vif d'Etampes, Atlantic Giant) 5 = Moderate (Upper Ground Sweet Potato, Lumina, Queensland Blue, Gold Nugget)</p> <p>Scalloping (roundly lobed between vascular tracts): 6 = Prominent, at equatorial region 7 = Not so prominent, at equatorial region 8 = Prominent, at peduncular region 9 = Not so prominent, at peduncular region 10 = Prominent, at stylar region 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 (Yokohama, White Rind Sugar, Long Island Cheese, Musquee de Provence, Rouge Vif d'Etampes, Atlantic Giant) 13 = Not so prominent (Upper Ground Sweet Potato, Lumina, Crown Prince, Gold Nugget)</p> <p>Grooving (very narrow, shallow depressions along vascular tracts and midway in-between) 14 = Distinct 15 = Not so distinct</p> <p>Wrinkling (irregular surface) 16 = Distinct 17 = Indistinct 18 = Completely smooth</p> <p>26. Mature fruit dimensions (at least 40 days past anthesis) (Figure 3):</p> <p>___ . ___ 26a. Length (through the axis) to medial width ratio (Example: 0.00)</p> <p>___ . ___ 26b. Length (through the axis) to maximal width ratio (Example: 0.00)</p>	<p>Mature Fruit:</p> <p>___ 25. Mature fruit topography</p> <p>26. Mature fruit dimensions:</p> <p>___ . ___ 26a L:W ratio (to medial width)</p> <p>___ . ___ 26b. L:W ratio (to maximal width)</p>
Application Variety	Comparison Variety

Application Variety	Comparison Variety
<p>Mature Fruit (continued):</p> <p>___ 27. Mature fruit warting: 1 = Absent (Waltham Butternut, Gold Nugget) 2 = Sparse, small (Galeux des Antilles) 3 = Sparse, large (Toonas Makino) 4 = Many, small (Essex Hybrid) 5 = Many, large (Marina di Chioggia)</p> <p>___ 28. Mature fruit rind: 1 = Lignified (when cutting mature fruit, little cracks form) (Gold Nugget) 2 = Not lignified (when cutting mature fruit, they slice smoothly and easily) (Waltham Butternut)</p> <p>___ 29. Mature fruit stylar scar: 1 = Protruding 2 = Flat 3 = Depressed</p> <p>___ 30. Mature fruit stylar end: 1 = Depressed (Prizewinner) 2 = Nearly Flat 3 = Convex (Bush Pink Banana, Gill's Blue Hubbard, Delicious)</p> <p>___ 31. Mature fruit turban: 1 = Absent (Waltham Butternut) 2 = Present 3 = Small (Buttercup) 4 = Large (Turk's Turban) Colors: _____</p> <p>___ 32. Mature fruit peduncle end: 1 = Depressed 2 = Nearly flat 3 = Convex</p> <p>___ 33. Mature fruit peduncle (Figure 5): ___ . ___ 33a. Length (through the axis) to medial width ratio (Example: 0.00) ___ . ___ 33b. Length (through the axis) to maximal width (near fruit attachment) ratio (Example: 0.00)</p> <p>___ 34. Mature fruit surface pattern (choose all that apply): 1 = Netted (Golden Cushaw) 2 = Corky (Galeuse d'Eysines) 3 = Cracked (Japanese Pie) 4 = Rough (Valencia) 5 = None of above (please describe) _____</p> <p>___ 35. Mature fruit exterior color: 35a. Main color (please describe) : _____ _____ _____ Color Chart Name _____ Color Chart Value _____</p> <p>35b. Complex colors (give combination of color, with color covering most of the fruit surface first) _____ _____ _____ Color Chart Name _____ Color Chart Value _____</p> <p>___ 36. Mature fruit mesocarp (flesh) color: 1 = Intense Orange 2 = Light Orange 3 = Intense Yellow 4 = Light Yellow 5 = Brown 6 = Green 7 = White tinged green 8 = White 9 = Other (describe) _____ _____</p> <p>___ 37. Mature fruit endocarp (placenta) color: 1 = Orange 2 = Yellow 3 = Brown 4 = Green 5 = White 6 = Other (please describe) _____ _____</p>	<p>Mature Fruit (continued):</p> <p>___ 27. Mature fruit warting</p> <p>___ 28. Mature fruit rind lignified</p> <p>___ 29. Mature fruit stylar scar</p> <p>___ 30. Mature fruit stylar end</p> <p>___ 31. Mature fruit turban</p> <p>___ 32. Mature fruit peduncle end</p> <p>33. Mature fruit peduncle dimensions: ___ . ___ 33a. L:W ratio (to medial width) ___ . ___ 33b. L:W ratio (to maximal width)</p> <p>___ 34. Mature fruit surface pattern</p> <p>Mature fruit exterior color: 35a. Main color _____ _____ _____ Color Chart Name _____ Color Chart Value _____</p> <p>35b. Complex colors: _____ _____ _____ Color Chart Name _____ Color Chart Value _____</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-coat color (from mature fruit harvested on candidate variety): Please, describe: _____ _____ _____</p> <p>41. Seed dimensions (average for 12 mature seeds from open-pollinated fruit harvested on candidate variety):</p> <p>___ . ___ 41a. Length to width ratio (Example: 0.00)</p> <p>___ . ___ 41b. Length to thickness ratio (Example: 0.00)</p> <p>___ . ___ 41c. 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 coat color: _____ _____ _____</p> <p>41. Seed measurements</p> <p>___ . ___ 41a. L:W ratio</p> <p>___ . ___ 41b. L:Thickness ratio</p> <p>___ . ___ 41c. W:Thickness ratio</p>
<p>___ 42. Resistance to biotic or abiotic stresses: 1 = None 2 = Yes, as qualified In Exhibit B or D (specify disease resistance/tolerance): _____ _____ _____ _____ _____</p>	<p>___ 42. Resistance to biotic or abiotic stresses</p> <p>_____ _____ _____ _____ _____</p>
<p>___ 43. 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>___ 43. Unique features not listed elsewhere in the application</p> <p>_____ _____ _____ _____</p>

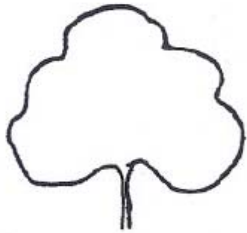
44. On additional pages, attach photographs of mature fruits of both the application variety and the comparison variety, showing external and internal coloring, with a ruler in the photograph to indicate scale.

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:

Andres, T.C. 2007. The cucurbit network. www.cucurbit.org.
 Goldman, A. 2004. The compleat squash. Artisan, New York
 Jeffrey, C. 2001. Cucurbitaceae. In: Hanelt, P. et al. Mansfeld's Encyclopedia of agricultural and horticultural crops. Berlin: Springer, 1510-1557.
 Missouri Botanical Garden. 2007. Plant Science. Tropical Botanical Science Database. [Http://mobot.mobot.org/W3T/Search/vast.html](http://mobot.mobot.org/W3T/Search/vast.html)
 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.
 Robinson, R.W. and D.S. Decker-Walters. 1997. Cucurbits. CAB International, Wallingford, Oxon, UK.

Figure 1. Leaf lobing



0

absent or very shallow



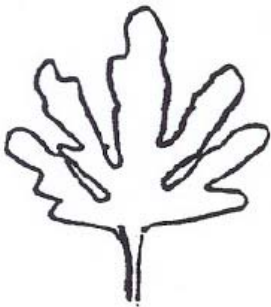
1

shallow



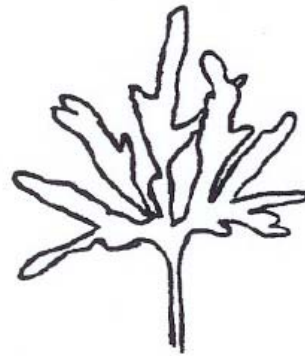
2

medium



3

deep



4

very deep

Figure 2. Flower measurements

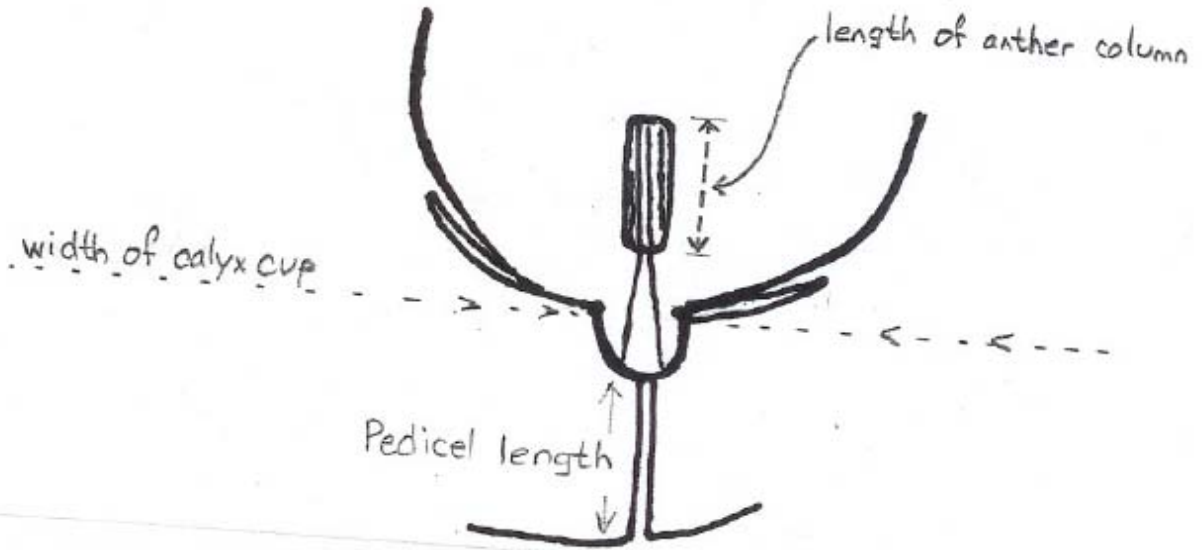


Figure 3. Fruit measurements

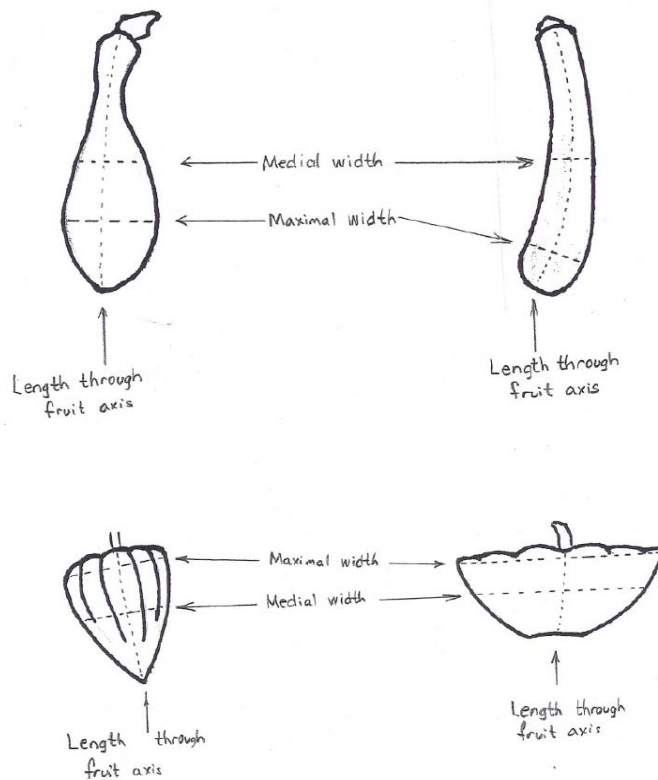


Figure 4. Fruit cross-sections

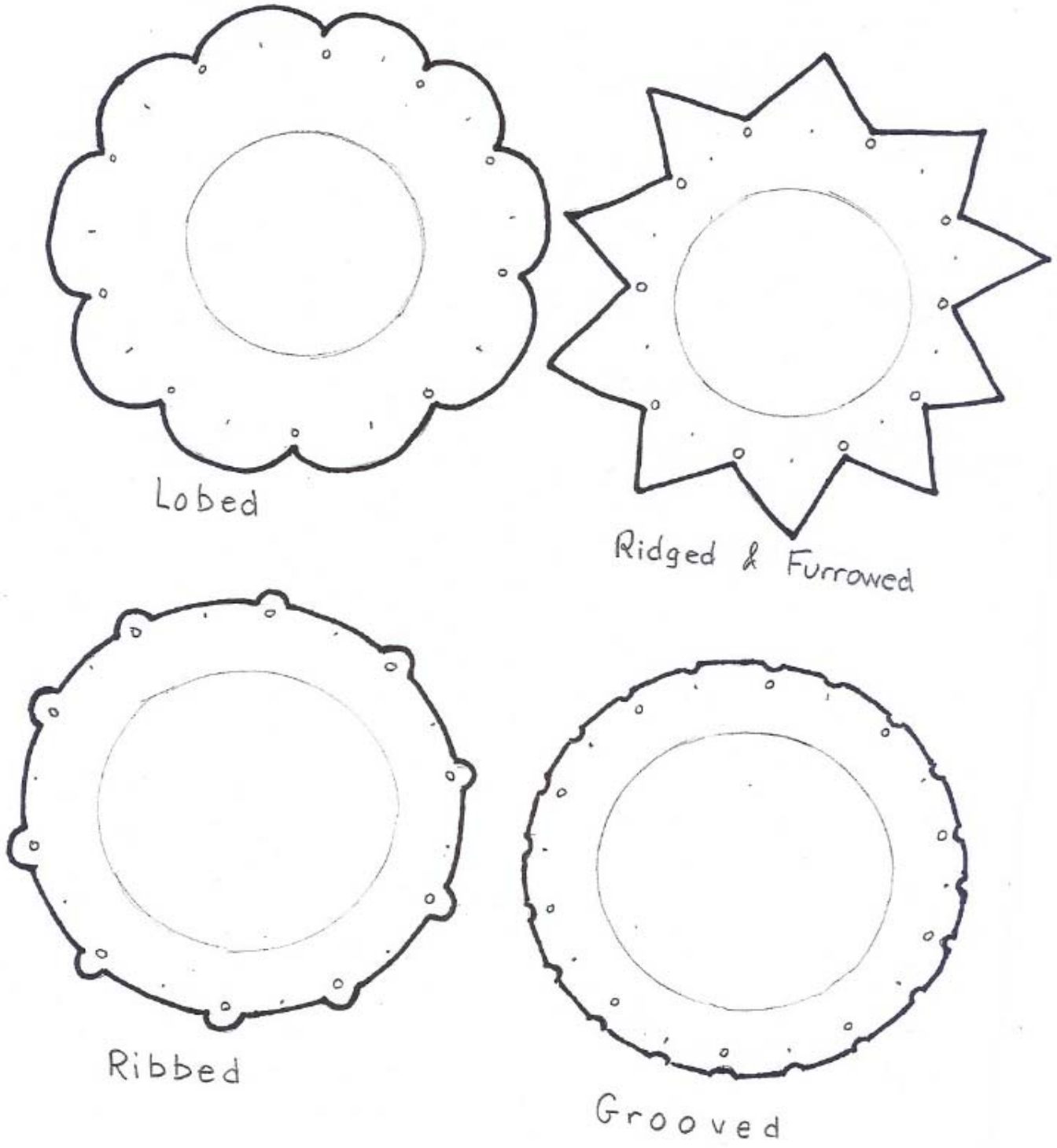
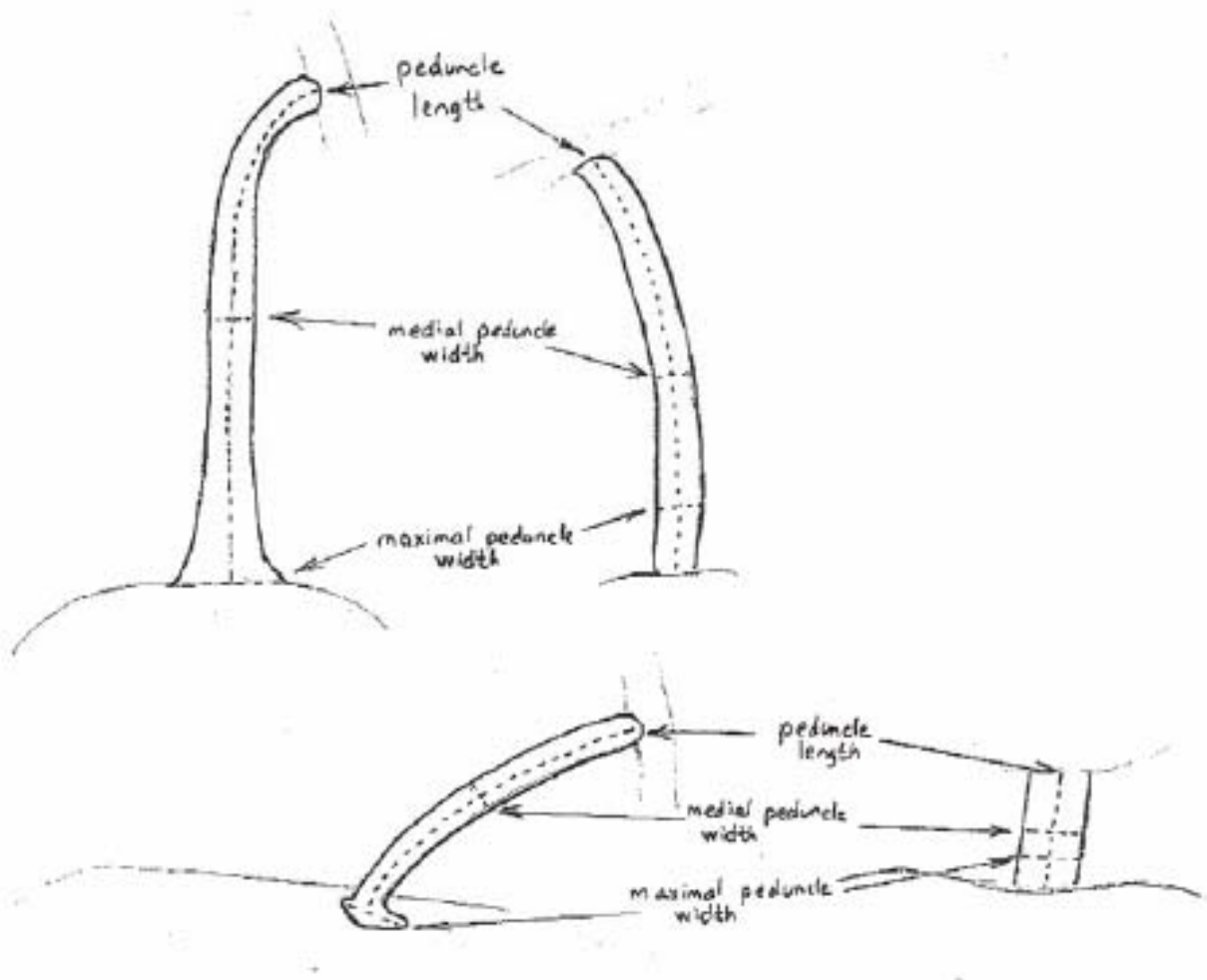


Figure 5. Peduncle measurements



INSTRUCTIONS FOR OBJECTIVE DESCRIPTION OF VARIETY Pumpkin, Squash, Gourd of all species EXCEPT *Cucurbita pepo* L.

1. Subject & Purpose of these Guidelines

These Guidelines for testing apply to all varieties of pumpkins, squash, and gourds except 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 moschata* Duchesne). 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.