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.)

General Descriptors:	Comparison Variety Name _____
___ **01. Fruit Shape/ Variety Group (Figure 1; also see instruction 5b above):** 1 = Acorn 2 = Cocozelle 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.)	___ 01. Fruit Shape/ Variety Group
___ **02. Expected primary usage:** 1 = Culinary 2 = Ornamental 3 = Both	___ 02. Expected primary usage
___ **03. What parts of the plant provide expected primary usage (above):** 1= Mature fruit 2 = Immature fruit 3 = Flowers 4 = Vegetation 5 = Seeds	___ 03. Part of plant for #02 above
04. Cotyledons measured between full expansion of first and second true leaves:	04. Cotyledons:
__ . __ __ 04a. Length to width ratio (example: 0.00)	__ . __ __ 04a. Length to Width ratio
____ 04b. Apex 1 = Notched 2 = Not notched	___ 04b. Apex
____ 04c. Veining 1 = Obscure 2 = Obvious	____ 04c. Veining
Application Variety	Comparison Variety

Application Variety	Comparison Variety
Main Stem:	Main Stem:
05. Main stem green color, when plants have 20 true leaves on the main stem:	05. Main Stem Color:
___ 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)	___ 05a. Main color
___ 05b. White marks at nodes: 1 = Absent 2 = Present	___ 05b. White marks at nodes
___ 05c. Yellow marks (associated with precocious yellow gene complex) at nodes: 1 = Absent 2 = Present	___ 05c. Yellow marks at nodes
_____ **06. Growth habit when plants have 20 true leaves on the main stem:** Bush 1 = True-bush (Fordhook Zucchini, Cocozelle, Ronde de Nice, Benning's Green Tint) 2 = Semi-bush (Taybelle, Table Ace, Jackpot) Vine 3 = Moderate vine (Small Sugar, Spookie, Magic Lantern, Table Queen) 4 = Rampant vine (Howden, Connecticut Field)	___ 06. Growth habit
____ **07. Tendrils when plants have 20 true leaves on the main stem:** 1 = Absent or rudimentary 2 = Present and elongated	___ 07. Tendrils
08. Main stem internode dimensions when observed after the 20th internode has developed:	08. Internode dimensions
____ 08a. Length 1 = Internode length constant from 5th to 15th internode 2 = Internode length increases from 5th to 15th internode	___ 08a. Length
____ 08b. Width 3 = Internode width constant from 5th to 15th internode 4 = Internode width decreases from 5th to 15th internode	___ 08b. Width
Petioles:	Petioles:
09. Petioles derived from main stem when observed after the 20th node has developed:	09. Petiole measurements:
__ . __ __ 09a. Length to medial width ratio of 10th petiole (example: 0.00)	__ . __ __ 09a. L:W ratio of 10th petiole
__ . __ __ 09b. Length to medial width ratio of 15th petiole (example: 0.00)	__ . __ __ 09b. L:W ratio of 15th petiole
____ **10. Petiole spininess (prickles) when observed after the 20th internode has developed:** 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	___ 10. Petiole spininess
____ **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:** 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)	___ 11. Petiole Angle
Application Variety	Comparison Variety

Application Variety	Comparison Variety
Laminae:	Laminae:
____ **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	___ 12. Lobing
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):	13. Leaf laminae dimensions:
__ . __ __ 13a. Length to maximal width ratio of 10th true leaf (example: 0.00)	__ . __ __ 13a. L:W ratio of 10th true leaf
__ . __ __ 13b. Length to maximal width ratio of 15th true leaf (example: 0.00)	__ . __ __ 13b. L:W ratio of 15th true leaf
____ **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)	___ 14. Silver blotching
Flowers:	Flowers:
___ **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)	___ 15. Number of flowers per node
16. Staminate flower on day of anthesis on main stem between nodes 11 and 20 (Figure 3):	16. Staminate flower measurements:
__ __ __ mm 16a. Length from base of calyx to tip of corolla	__ __ __ mm 16a. Length of petal
__ __ __ mm 16b. Exterior width at top of calyx cup	__ __ __ mm 16b. Width of petal
__ __ __ mm 16c. Pedicel length	__ __ __ mm 16c. Pedicel length
__ __ __ mm 16d. Length of anther column	__ __ __ mm 16d. Length of anther column
___ **17. Dominant color of corolla of staminate flower, on day of anthesis:** 1 = Orange-yellow 2 = Light yellow 3 = Nearly white	___ 17. Dominant staminate flower color
___ **18. Ring at base of interior of staminate corolla:** 1 = Absent 2 = Yellow 3 = Green and yellow 4 = Light green 5 = Dark green	___ 18. Ring at base of staminate corolla
___ **19. Ring at base of interior of pistillate corolla:** 1 = Absent 2 = Yellow 3 = Green and yellow 4 = Light green 5 = Dark green	___ 19. Ring at base of pistillate corolla
20. Pistillate flower on day of anthesis:	20. Pistillate flower measurements:
__ __ __ mm 20a. Length from base of calyx to tip of corolla	__ __ __ mm 20a. Length of petal
__ __ __ mm 20b. Pedicel length	__ __ __ mm 20b. Pedicel length
___ **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)	___ 21. Ovary color
Application Variety	Comparison Variety

Application Variety	Comparison Variety
Immature Fruit:	Immature Fruit:
22. Immature fruit size (3–5 days past anthesis) (Figure 4):	22. Immature fruit size
__ . __ __ 22a. Length (through the axis) to medial width ratio (example: 0.00)	__ . __ __ 22a. L:W ratio (to medial width)
__ . __ __ 22b. Length (through the axis) to maximal width ratio (example: 0.00)	__ . __ __ 22b. L:W ratio (to maximal width)
23. Immature fruit color (3–5 days past anthesis):	23. Immature fruit color
___ 23a. Main color: 1 = Intense green (Fordhook Zucchini, Black Beauty, Jack O'Lantern, Senator, Spineless Beauty, Raven) 2 = Light green (Arlika, 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)	___ 23a. Main color
___ 23b. If striped, the darker stripes are: 1 = Broad and contiguous (Cocozelle, Costata Romanesca) 2 = Narrow and not contiguous (Caserta, Verte d'Italie)	___ 23b. Description of darker stripes
____ **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)	___ 24. Immature fruit flecks
____ **25. Immature fruit warting:** 1 = Absent (Cocozelle, Fordhook Zucchini, Ronde de Nice, Gentry) 2 = Present (Early Prolific Straightneck, Yellow Summer Crookneck, Early Summer Crookneck)	___ 25. Immature fruit warting
Mature Fruit:	Mature Fruit:
____ **26. Mature fruit surface topography (fill in the blank with the most appropriate choice) (Figure 5):** 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) 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) 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 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 Grooving (very narrow, shallow depressions along vascular tracts and midway in-between) 14 = Distinct (Howden) 15 = Not so distinct (Winter Luxury) Wrinkling (irregular surface) 16 = Distinct 17 = Indistinct 18 = Completely smooth	___ 26. Mature fruit topography
Application Variety	Comparison Variety

Application Variety	Comparison Variety
Mature Fruit (continued):	Mature Fruit (continued):
27. Mature fruit dimensions (at least 40 days past anthesis) (Figure 4):	27. Mature fruit dimensions:
__ . __ __ 27a. Length (through the axis) to medial width ratio (Example: 0.00)	__ . __ __ 27a L:W ratio (to medial width)
__ . __ __ 27b. Length (through the axis) to maximal width ratio (Example: 0.00)	__ . __ __ 27b. L:W ratio (to maximal width)
___ **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)	___ 28. Mature fruit warting
___ **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)	___ 29. Mature fruit rind lignified
___ **30. Mature fruit stylar scar:** 1 = Protruding 2 = Flat 3 = Depressed	___ 30. Mature fruit stylar scar
___ **31. Mature fruit stylar end:** 1 = Depressed (Howden) 2 = Nearly Flat (Fordhook Zucchini, True French) 3 = Convex (Yellow Summer Crookneck)	___ 31. Mature fruit stylar end
___ **32. Mature fruit peduncle end:** 1 = Depressed 2 = Nearly flat 3 = Convex	___ 32. Mature fruit peduncle end
33. Mature fruit peduncle (Figure 6):	33. Mature fruit peduncle dimensions:
__ . __ __ 33a. Length (through the axis) to medial width ratio (Example: 0.00)	__ . __ __ 33a. L:W ratio (to medial width)
__ . __ __ 33b. Length (through the axis) to maximal width (near fruit attachment) ratio (Example: 0.00)	__ . __ __ 33b. L:W ratio (to maximal width)
___ **34. Mature fruit surface:** 1 = Netted (Winter Luxury) 2 = Cracked (Golden Zucchini) 3 = Neither	___ 34. Mature fruit surface
35. Mature fruit exterior color: ___ 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)	___ 35a Main fruit exterior color
Complex colors (give combination of choice above with color covering most of the fruit surface first)	___, ___ 35b. Striped pattern ___, ___ 35c. Bicolor pattern ___, ___, ___, ___ 35d. Quadricolor pattern
___, ___ 35b. Striped (Cocozelle 1, 8; Delicata 11, 2) ___, ___ 35c. Bicolor (Sunburst 10, 1) ___, ___, ___, ___ 35d. Quadricolor (Carnival 2, 4, 6, 11)	___ 36. Mature fruit flesh color
___ **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	___ 37. Mature fruit placenta color
___ **37. Mature fruit endocarp (placenta) color:** 1 = Orange 2 = Yellow 3 = White	
Application Variety	Comparison Variety

Application Variety	Comparison Variety
Seed:	Seed:
38. Seed cavity:	38. Seed cavity measurements:
__ . __ __ 38a. Length (through the axis) to medial width ratio (Example: 0.00)	__ . __ __ 38a. L:W ratio (to medial width)
__ . __ __ 38b. Length (through the axis) to maximal width ratio (Example: 0.00)	__ . __ __ 38b. L:W ratio (to maximal width)
___ **39. Seed hull (from mature fruit harvested on candidate variety):** 1 = Absent 2 = Present but rudimentary 3 = Present with normal appearance	___ 39. Seed hull
40. Seed dimensions (average for 12 mature seeds from open-pollinated fruit harvested on candidate variety):	40. Seed measurements
__ . __ __ 40a. Length to width ratio (Example: 0.00)	__ . __ __ 40a. L:W ratio
__ . __ __ 40b. Length to thickness ratio (Example: 0.00)	__ . __ __ 40b. L:Thickness ratio
__ . __ __ 40c. Width to thickness ratio (Example: 0.00)	__ . __ __ 40c. W:Thickness ratio
____ **41. Resistance to biotic or abiotic stresses:** 1 = None 2 = Yes, as qualified In Exhibit B or D (specify disease resistance/tolerance): _____ _____ _____ _____ _____ _____	___ 41. Resistance to biotic or abiotic stresses _____ _____ _____ _____ _____ _____
____ **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: _____ _____ _____ _____ _____ _____	___ 42. Unique features not listed elsewhere in the application _____ _____ _____ _____ _____

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:

Goldman, A. 2004. The compleat squash. Artisan, New York

Missouri Botanical Garden. 2007. Plant Science. Tropical Botanical Science Database. http://mobot.mobot.org/W3T/Search/vast.html

Paris, H.S. 1986. A proposed subspecific classification for *Cucurbita pepo*. *Phytologia* **60:** 133–138.

Paris, H.S. 1989. Historical records, origins, and development of the edible cultivar groups of *Cucurbita pepo* (Cucurbitaceae). *Econ. Bot.* **43:** 423–443.

Paris, H.S. 1996. Summer squash: history, diversity and distribution. *HortTechnology* **6:** 6–13.

Paris, H.S. 2000. History of the cultivar-groups of *Cucurbita pepo*. *Hort. Rev.* **25**(2001)**:** 71–170, 4 pl.

Paris, H.S. 2001. Characterization of the *Cucurbita pepo* collection at the Newe Ya'ar Research Center, Israel. *Plant Genet. Resources Newsl.* **126:** Cover, 41–45.

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

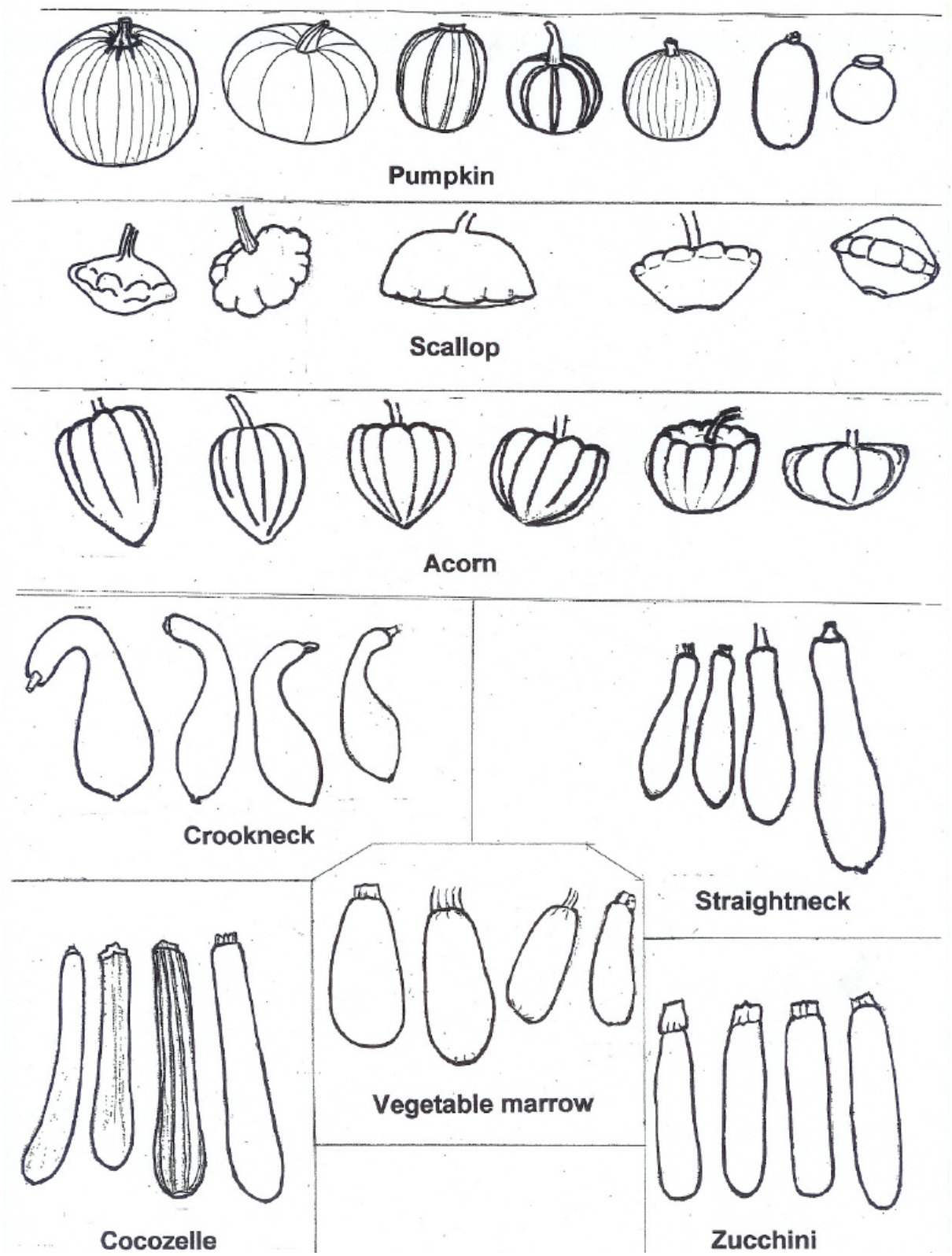


Figure 2. Leaf lobing

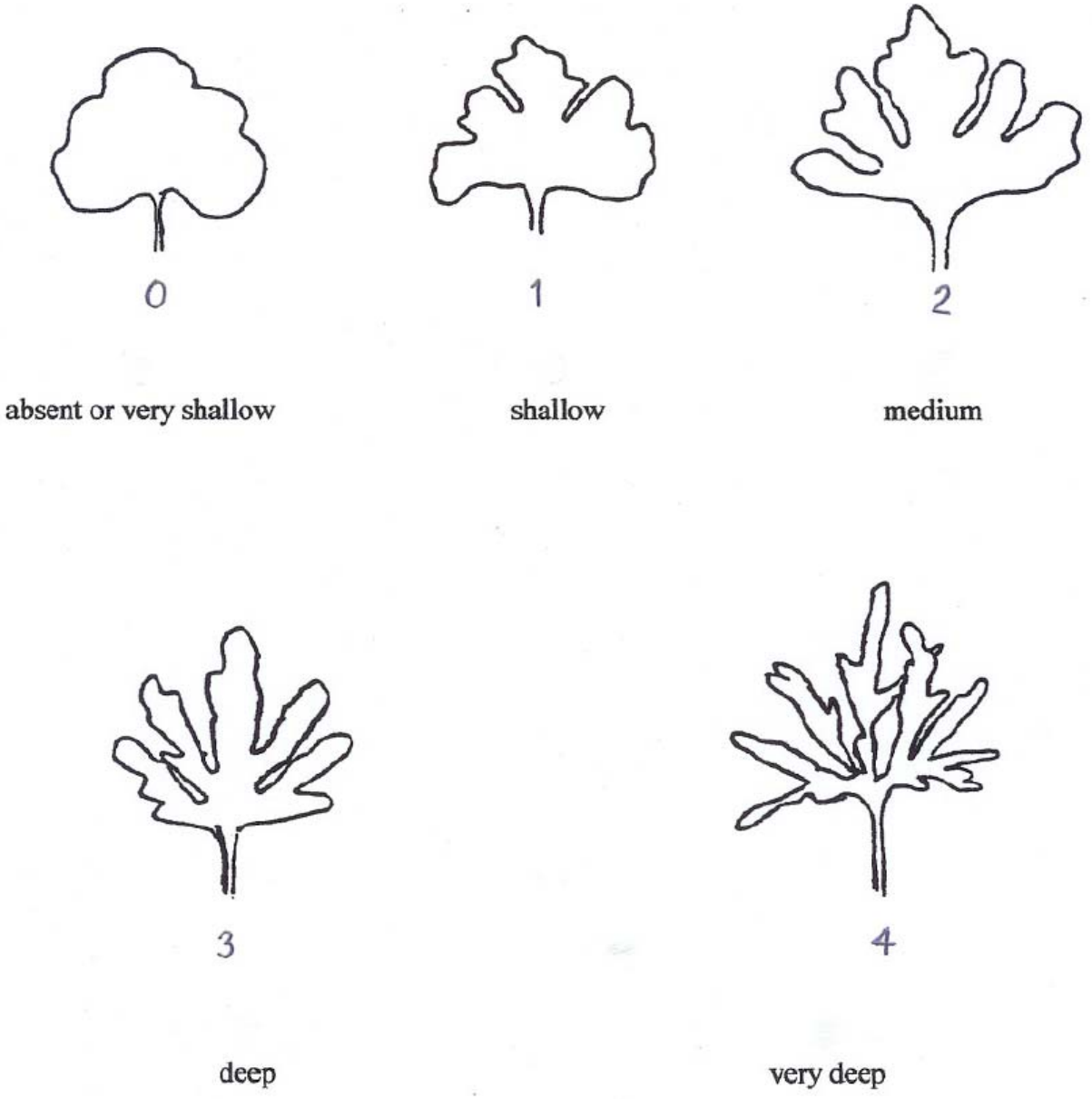


Figure 3. Flower measurements

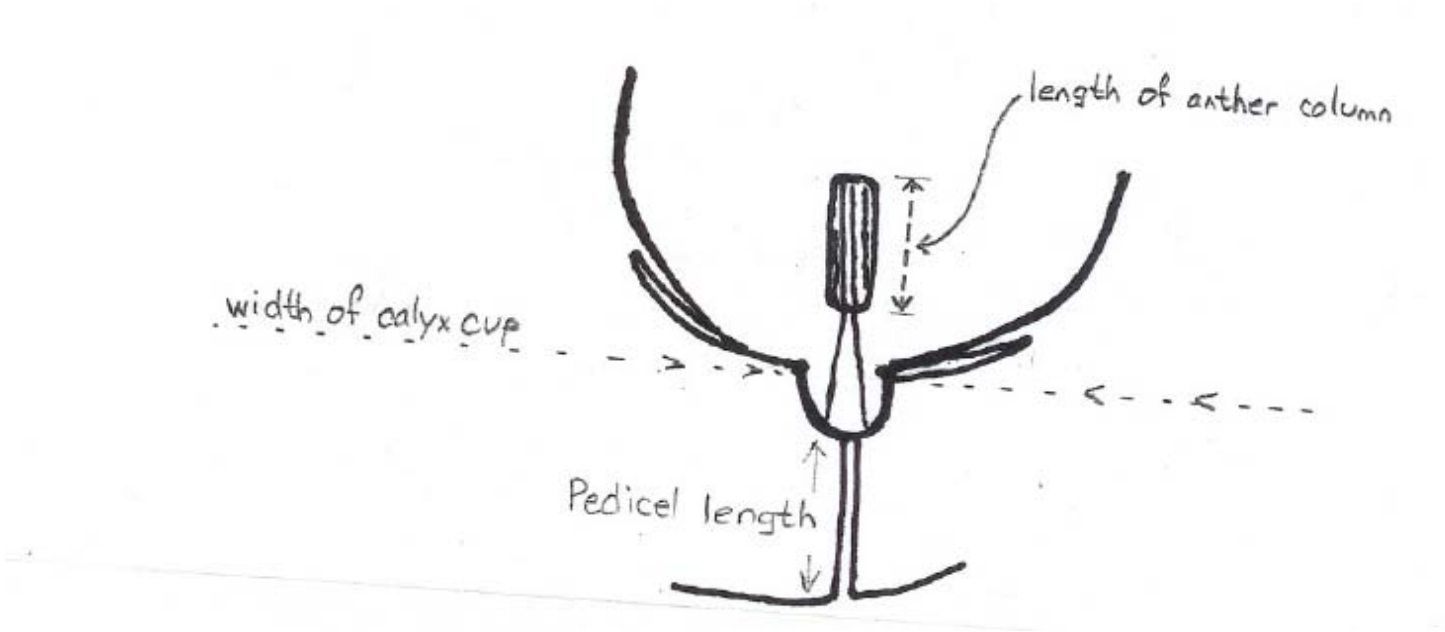


Figure 4. Fruit measurements

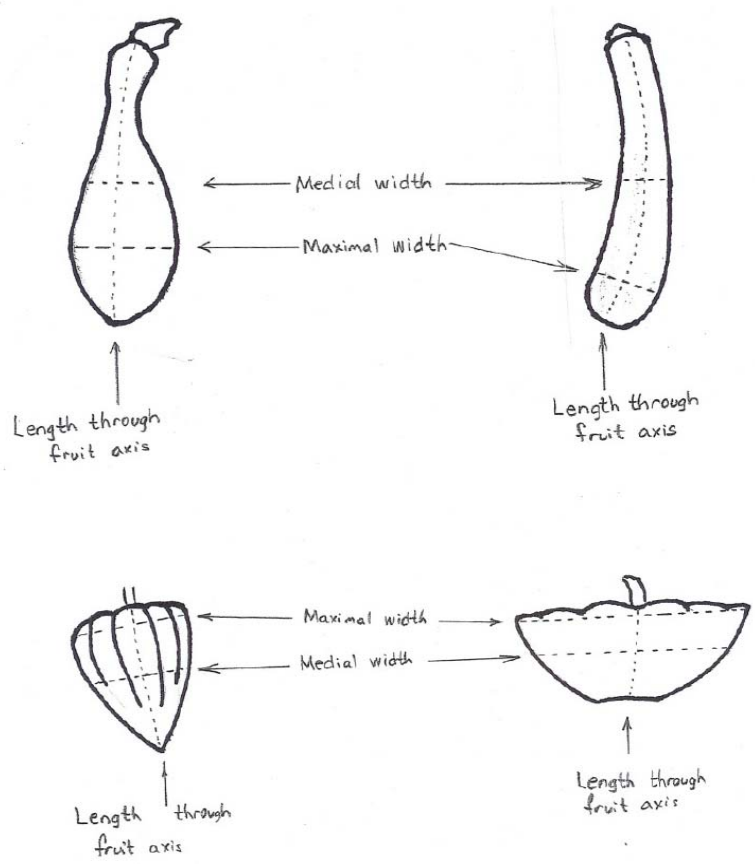


Figure 5. Fruit cross-sections

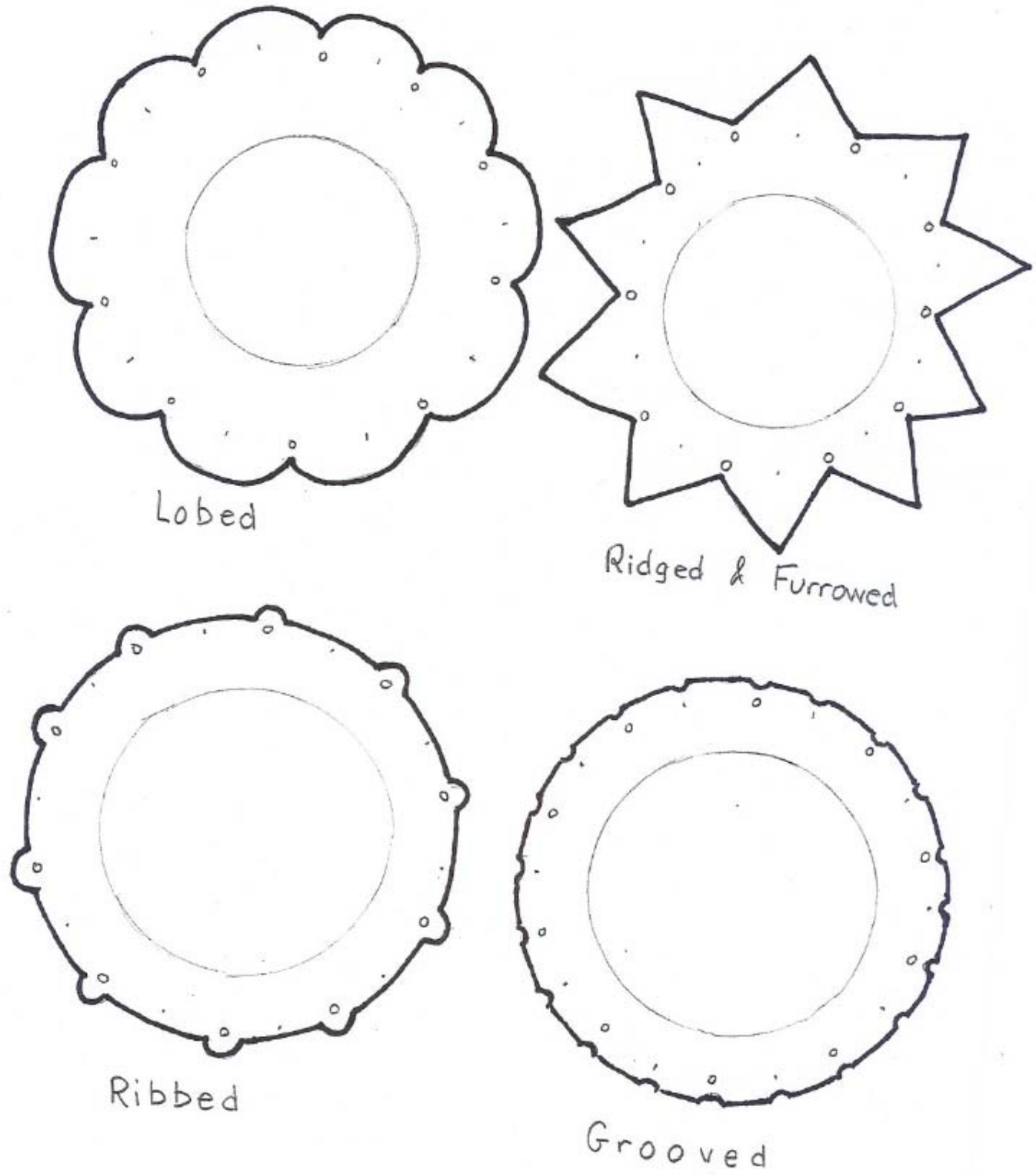
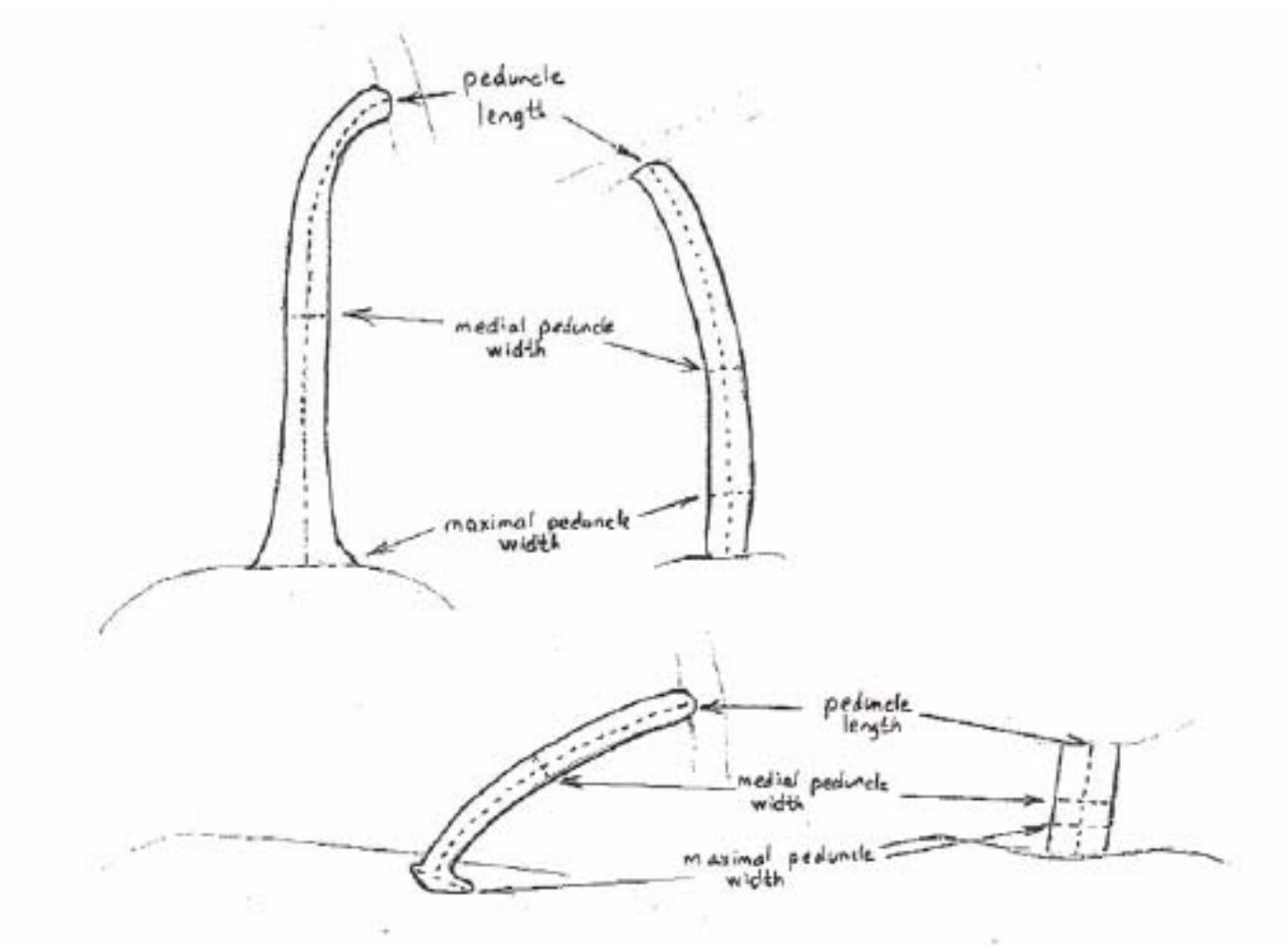


Figure 6. Peduncle measurements



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.