

Guidelines
for the Conduct of Test for
Distinctiveness, Uniformity and Stability
On
Nutmeg
(*Myristica fragrans* Houtt.)



Protection of Plant varieties and Farmer's Rights Authority
(PPV & FRA)

Nutmeg (*Myristica fragrans* Houtt.)

I. Subject:

These test guidelines shall apply to all varieties of Nutmeg (*Myristica fragrans* Houtt.)

II. Material required:

1. The Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) shall decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered for registration under the Protection of Plant Varieties and Farmers' Rights (PPV&FRA) Act, 2001. Applicants submitting such plant material from a country other than India shall make sure that all customs and quarantine requirements stipulated under relevant national legislations and regulations are complied with. As a minimum the applicant may submit 10 grafted or budded plants of Nutmeg grafted on Nutmeg (*Myristica fragrans*) rootstock for each centre.

2. The plant material supplied should be visibly healthy, not lacking in vigour, nor affected by any important pest or disease.

3. The plant material should not have undergone any treatment, which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

4. The minimum number of planting material to be supplied by the applicant or his nominee during June-July shall be 10 numbers grafted / budded plants of the candidate variety.

III. Conduct of tests:

1. The minimum duration of the DUS tests shall normally be at least two fruiting season in different years. Tests shall be conducted at least at two places.

2. The test should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for conduct of the evaluation. Each test should include total of 6 trees. In particular, it is essential that the trees produce a satisfactory crop of fruit in each of the two growing seasons.

Test Design

The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

Test plot design

No. of rows: one

Plant to plant distance: 3 m

Additional test protocol for special purpose shall be established by the PPV & FR Authority.

On-site DUS testing:

1. The applicant or his/her nominee on his/her behalf shall submit a request to the Authority for conducting a reliable trial according to Test Guidelines and the instructions from Authority before on-site examination of the candidate variety. It will be the responsibility of the applicant to conduct the trial of the candidate variety(s) along with the suitable reference variety. This may be relaxed in case of farmers' variety, as the case may be.

2. The applicant or his/her nominee shall submit a request to the Authority for on-site examination prior to start of growing cycle as mentioned in Test Guidelines for site examination of the candidate variety.

3. On-site testing may be conducted at the places specified by the applicant. The age of the trees at on-site shall be minimum 8 years.

4. As a minimum, one (1) mother plant/tree and four (4) vegetatively propagated plants/trees should be available for inspection and examination for 'on-site DUS testing'. The vegetatively propagated plants can also be inspected if located at nearby places. The trees must be healthy and free from pest & diseases and raised under standard management practices. For farmer's variety or landraces, the authority may notify suitable guidelines on the number of plant(s) and season(s), if any.

5. On-site examination shall be arranged when the essential and distinguishing characteristics of candidate variety can most easily be seen. The characteristics of the candidate variety can be examined and compared with those of the comparative varieties as per the Test guidelines.

6. The Expert Committee constituted by the PPV & FR Authority in consultation with the DUS Centre shall be authorized to inspect on-site testing and recording of the appropriate characters.

7. Applicant shall supply the Expert Committee with summary of distinct characteristics supported by photographs. The Expert Committee shall take notes and observations on distinctness and shall confirm preliminary data and/or summary of distinctness from applicant.

8. The Expert Committee shall submit examination report to the Authority.

9. In the absence of prescribed number of plants of the candidate variety for 'on-site' testing for farmers' variety, the DUS test duration should be enhanced to include at least one more season.

10. The Authority may relax the criteria for no. of plants, spacing and other requirements maximum for a period upto 3 years from the date of publication of the general guidelines in the Plant Varieties Journal of India.

IV. Methods and observations:

1. All observations on the tree and the branches can be made throughout the year.

2. Time of bloom should be recorded when it is at its peak (March to October).

3. All observations on the leaf should be made on fully developed leaves of the middle third or fourth on mature shoot.

4. Time of maturity should be recorded from peak blooming to peak harvesting.

5. Observations on the mature fruit should be recorded when fruit is ready for harvest (splitting of fruit).

6. Observations on seed and mace should be recorded after harvesting of fruit.

7. Type of assessment of characteristics as indicated in column of Table VII of characteristics is as follows.

- a) **MG**: Measurement by a single observation of a group of plants or parts of plants
- b) **MS**: Measurement by a single observation of individual plants or parts of plant
- c) **VG**: Visual assessments by a single observation of a group of plants or part of plants
- d) **VS**: Visual assessments by observation of individual plants or parts of plant.

V. Grouping of Varieties:

1. The candidate varieties for DUS testing shall be divided into groups to facilitate the assessment of Distinctiveness. Characteristics, which are known from experience not to vary, or to vary only slightly within a variety and which in their various states are fairly evenly distributed across all varieties in the collection are suitable for grouping purpose.

2. It is recommended that the competent authorities use the following characteristics for grouping varieties

- a. Tree growth habit: Crown Shape (Characteristic 4)
- b. Fruiting/ Bearing habit: Shape of Fruit (Characteristic 16)
- c. Inflorescence: Shape of Female Flower (Characteristic 13)
- d. Leaf characteristics: Leaf Blade Shape (Characteristic 8)
- e. Nut and mace: Seed Shape (Characteristic 25)

VI. Characteristics and Symbol:

1. To assess Distinctiveness, Uniformity and Stability, the characteristics and their states as given in the Table of characteristics (Section VII) shall be used.

2. Notes (1 to 9) shall be given for each state of expression for different characteristics for the purpose of electronic data processing.

3. Legend

(*) Characteristics that shall be observed during every growing season on all varieties and shall always be included in the description of the variety, except when the state of expression of any of these characters is rendered impossible by a preceding phenological characteristic or by the environmental conditions of the testing region. Under such exceptional situation, adequate explanation shall be provided.

(+) See Explanation on the Table of characteristics in Section VIII. It is to be noted for certain characteristics. The plant parts on which observations to be taken are given in the explanation or figure(s) for clarity and the colour variation.

4. A code number in the sixth column of Table of characteristics indicates the optimum stage for the observation of each characteristic during the growth and development of plant. The relevant growth stages corresponding to these code numbers are described below:
- a) Observations on tree vigour and growth habit should be made at the central shoot during flowering and fruiting season of adult trees relative to reference cultivars.
 - b) Observations on fruiting/ bearing habit should be made on the mature fruit should be recorded when fruit is ready for harvest and after harvesting of fruit (splitting of fruit).
 - c) Observations on inflorescence should be made when flowering is at its peak (March to October).
 - d) Observations on the leaf should be made on fully developed leaves on mature shoot.
 - e) Observations on nut and mace should be made after harvesting of fruits on fresh nuts and mace.

VII. Table of Characteristics:

Sr. No.	Characteristics	States	Notes	varieties characterized	Stages of observation	Type of Assessment
1	2	3	4	5	6	7
1. (*)	Tree vigour	Weak	3	DPLNG-4, DPLNG – 31	a	VS
		Intermediate	5	Konkan Swad, Konkan Sugandha		
		Strong	7	DPLNG -1, DPLNG- 46		
2. (*)	Sexual system	Dioecious Male	1	DPLNG-3, DPLNG-18	C	VG
		Dioecious Female	2	Konkan Swad, Konkan Shrimanti, Keralshree		
		Monoecious (Male + Female)	3	Konkan Sugandha, DPLNG- 11		
3.	Flowering pattern in monoecious plants	Male dominated	1	DPLNG -11, DPLNG-86	C	VS
		Female dominated	9	Konkan Sugandha, DPLNG-39		
4. (+)	Crown shape	Pyramidal	1	DPLNG- 15, DPLNG- 127	A	VS
		Conical	3	DPLNG- 4, DPLNG- 31		
		Spreading	5	Konkan Swad, DPLNG-9		
		Rounded	7	Konkan shrimanti, DPLNG- 1		
5.	Height of tree	Dwarf (<4 m.)	1	DPLNG -14, DPLNG -121	A	VS
		Medium (4-5 m.)	3	Konkan Swad, Konkan shrimanti		
		Tall (> 5m.)	5	DPLNG – 35, DPLNG-141		

6. (+)	Leaf blade: length (cm)	Short (<10 cm.)	3	DPLNG- 4, DPLNG-31	D	MG
		Medium (10-20 cm.)	5	Konkan Sugandha, Keralshree,		
		Long (>20 cm.)	7	DPLNG-8, DPLNG- 59		
7. (+)	Leaf blade: width (cm)	Narrow (< 4 cm.)	3	DPLNG- 4, DPLNG-14	D	MG
		Medium (4-8 cm.)	5	Konkan Swad, Konkan Sugandha		
		Wide (>8 cm.)	7	DPLNG- 15, DPLNG- 48		
8. (* (+)	Leaf blade: shape	Linear	1	DPLNG- 4, DPLNG- 8	D	VG
		Ovate	3	DPLNG- 58, DPLNG-73		
		Obovate	5	DPLNG -10, DPLNG- 30		
		Elliptic	7	Keralshree, DPLNG-7		
		Oblong	9	Konkan Swad, Konkan Sugandha,		
9.	Prominancy of veins	Prominent	1	Konkan Swad, Keralshree	d	VG
		Non- Prominent	9	DPLNG- 114, DPLNG- 74		
10. (+)	Leaf margin	Entire	1	Konkan Swad, Konkan Sugandha,	d	VG
		Wavy	9	DPLNG- 4, DPLNG- 8		
11. (+)	Leaf blade: shape of apex	Obtuse	1	DPLNG-79, DPLNG-103	d	VG
		Acute	3	DPLNG-4, DPLNG-123		
		Shortly Acuminate	5	Konkan Swad, Konkan Sugandha		
		Acuminate	7	Keralshree, DPLNG-1		
12. (+)	Leaf blade: shape of base	Acute	1	Keralshree, DPLNG- 1		

		Obtuse	9	Konkan Swad, Konkan Sugandha	d	VG
13 (* (+)	Flower : shape of female flower	Oblate	1	Keralshree, DPLNG-99	c	VG
		Ovate	3	Konkan Swad, DPLNG – 120,		
		Short elliptical	5	DPLNG-132, DPLNG-102		
		Long elliptical	7	DPLNG-100,		
fruiting/ bearing habit						
14. (+)	Fruit Length	Short (< 50 mm.)	3	DPLNG- 39, DPLNG-108	b	MG
		Medium (50-70 mm.)	5	Konkan Sugandha, Keralshree		
		Long (> 70 mm.)	7	DPLNG- 75, DPLNG-94		
15. (+)	Fruit Diameter	Short (< 40 mm.)	3	DPLNG- 39, DPLNG- 75	b	MG
		Medium (40-50 mm.)	5	Konkan Swad, Konkan Sugandha		
		Long (> 50 mm)	7	DPLNG- 1, DPLNG- 78		
16. (* (+)	Shape of fruit	Circular	1	Konkan shrimanti, DPLNG- 50	b	VG
		Elliptic	3	Konkan Sugandha, DPLNG- 65		
		Ovate	5	Konkan Swad, Vishwashree		
		Shortly elongated	7	Keralshree, DPLNG- 61,		
		Elongated	9	DPLNG-75, DPLNG- 94		
17. (* (+)	Presence of Neck	Present	1	Konkan Swad, Konkan Sugandha	b	VS
		Absent	9	DPLNG- 50,		
18. (* (+)	Shape at ventral shoulder	Rounded upward	1	DPLNG-77	b	VG
		Rounded downward	3	DPLNG-50, DPLNG-96		
		Sloping	5	Konkan Swad,		

		downward		Keralshree		
		Falling abruptly	7	DPLNG-75, DPLNG- 94		
19. (* (+)	Shape at dorsal shoulder	Rounded upward	1	DPLNG-50, DPLNG-81	b	VG
		Rounded outward	3	Konkan Sugandha, DPLNG-21		
		Rounded downward	5	Keralshree, DPLNG-47		
		Slopping downward	7	Konkan Swad, Konkan shrimanti		
		Falling abruptly	9	DPLNG-75, DPLNG- 94		
20. (* (+)	Presence of Stylar scar	Present	1	Keralshree, Konkan Swad	b	VS
		Absent	9	Konkan shrimanti, Konkan Sugandha		
21. (+)	Shape of Stylar scar	Pointed	1	Keralshree, DPLNG-10	b	VS
		Rounded	3	DPLNG- 50, DPLNG-59		
		Blunt	5	Konkan Swad, DPLNG- 39		
		Beak	7	DPLNG-75, DPLNG- 94		
seed and mace						
22. (* (+)	Presence of Caruncle	Present	1	DPLNG-98	e	VS
		Absent	9	Konkan Swad, Konkan Sugandha		
23. (* (+)	Mace covering pattern	Partial reticulate	1	DPLNG-39, Konkan Swad	e	VG
		Entire reticulate	3	Keralshree, Konkan Sugandha		
		Compact	5	DPLNG- 92, DPLNG-97		
24. (* (+)	Type of mace probe	Beak	1	DPLNG-58, DPLNG-59	e	VG
		Blunt	9	Konkan Swad, Konkan Sugandha		
25. (* (+)	Seed shape	Round	1	Konkan Sugandha, DPLNG-41		

		Ovate	3	DPLNG-31, DPLNG-90	e	VG
		Obovate	5	Keralshree, DPLNG-43		
		Elliptic	7	Konkan Shrimanti, DPLNG-75		
		Trapezoid	9	Konkan Swad, DPLNG-58		
26.	Seed colour	Brownish black	1	Keralshree, DPLNG-31	e	VG
		Black	9	Vishwashree, Konkan Swad		
27.	Presence twin seed pattern	Absent	1	Keralshree, Konkan Swad	e	VG
		Present	9	DPLNG - 44, DPLNG - 72		

VIII. Explanations on table of characteristics

Characteristic 4: Crown shape



1

Pyramidal



3

Conical



5

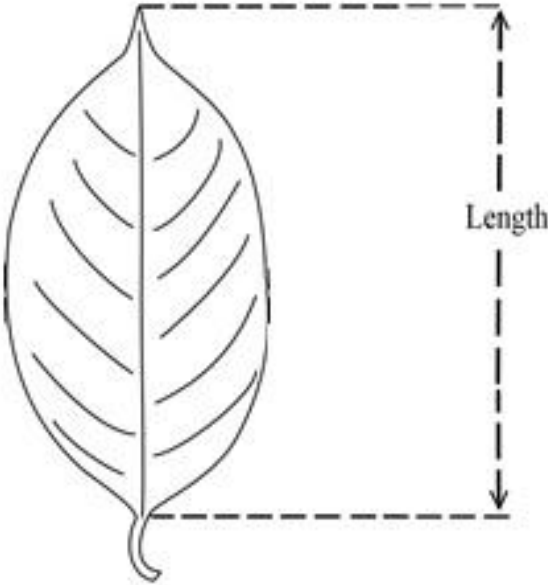
Spreading



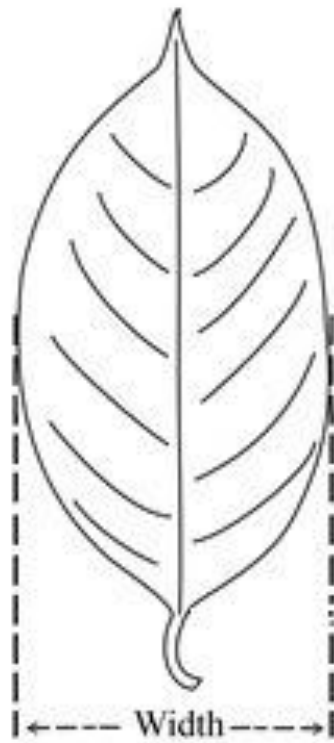
7

Rounded

Characteristic 6: Leaf blade length



Characteristic 7: Leaf blade Width

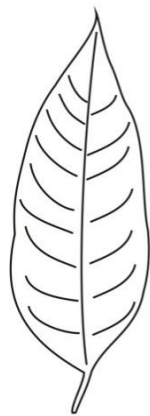


Characteristic 8: Leaf Blade: Shape of Leaf



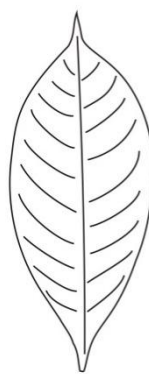
1

Linear



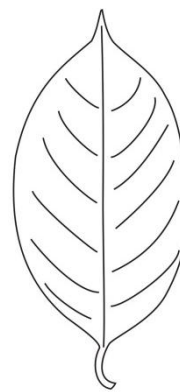
3

Ovate



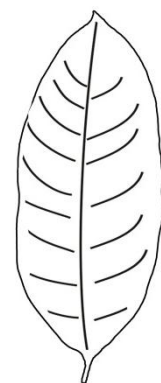
5

Obovate



7

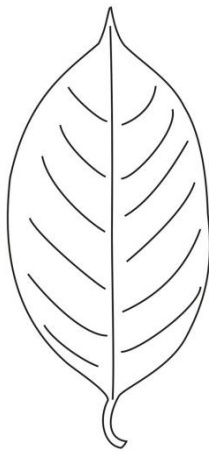
Elliptic



9

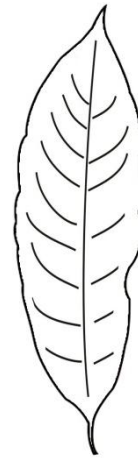
Oblong

Characteristic 10: Leaf margin



1

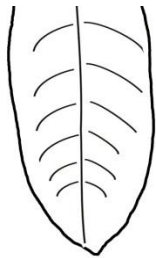
Entire



9

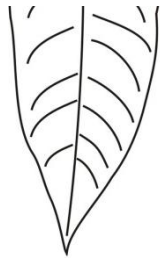
Wavy

Characteristic 11: Shape of leaf apex



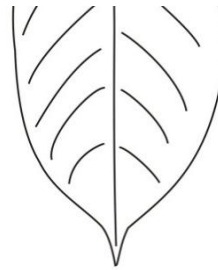
1

Obtuse



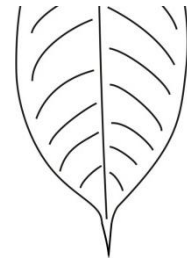
3

Acute



5

Shortly Acuminate



7

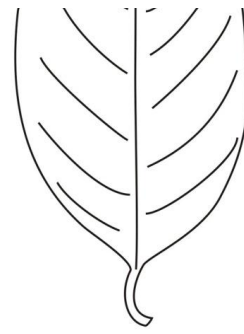
Acuminate

Characteristic 12: Leaf blade : Shape of base



1

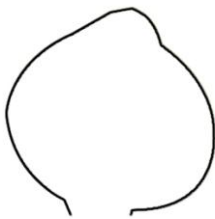
Acute



9

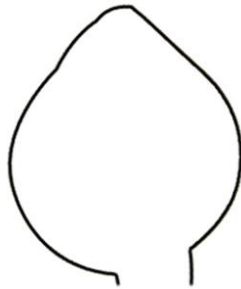
Obtuse

Characteristic 13 : Shape of female flower



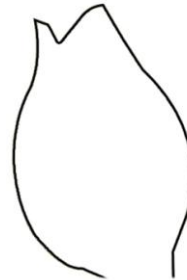
1

Oblate



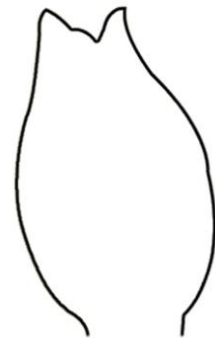
3

Ovate



5

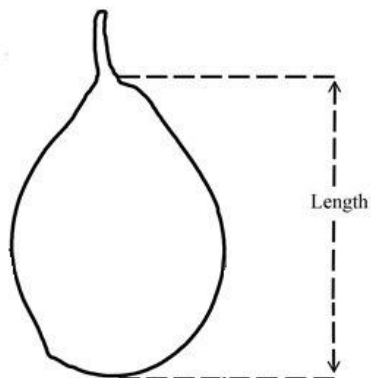
Short elliptical



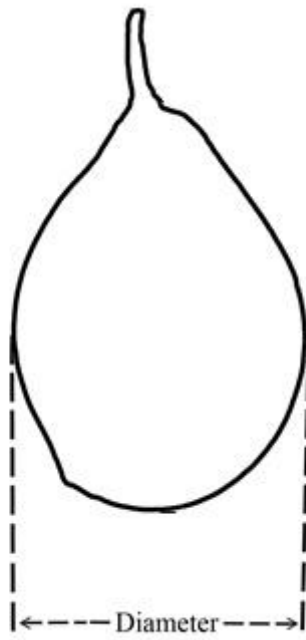
7

Long elliptical

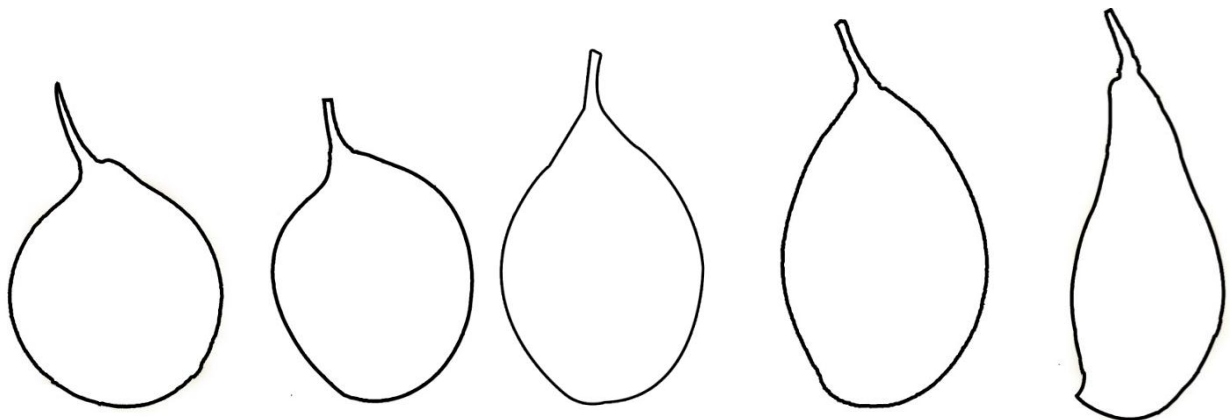
Characteristic 14 : Fruit length



Characteristic 15: Fruit diameter



Characteristic 16: Shape of fruit



1

Circular

3

Elliptic

5

Ovate

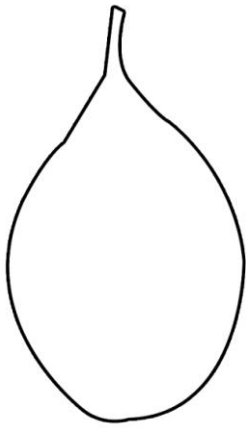
7

Shortly elongated

9

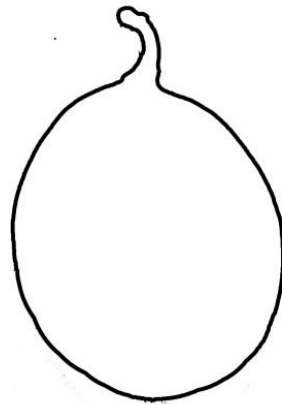
Elongated

Characteristic 17: Presence of neck



1

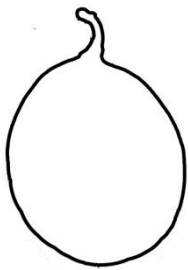
Present



9

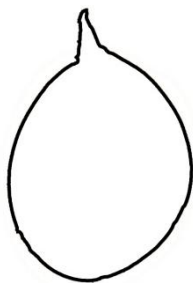
Absent

Characteristic 18: Shape at ventral shoulder



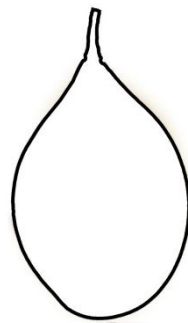
1

Rounded upward



3

Rounded downward



5

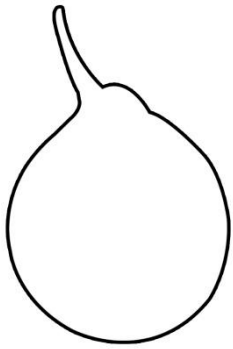
Sloping downward



7

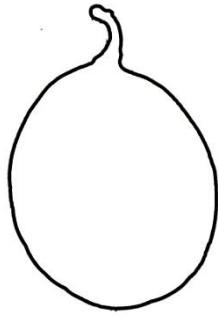
Falling abruptly

Characteristic 19: Shape at dorsal shoulder



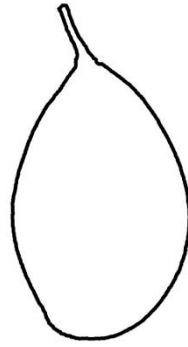
1

Rounded upward



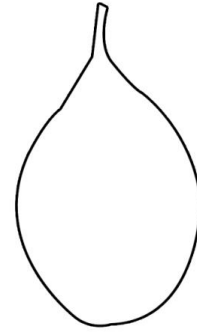
3

Rounded outward



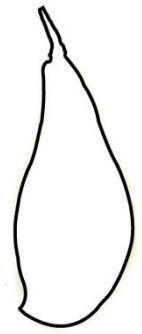
5

Rounded downward



7

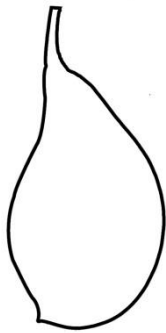
Sloping downward



9

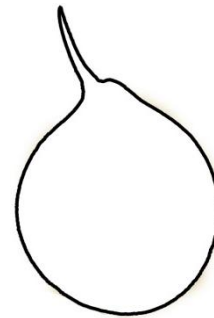
Falling abruptly

Characteristic 20: Presence of Styler scar



1

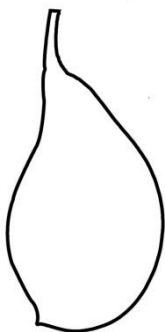
Present



9

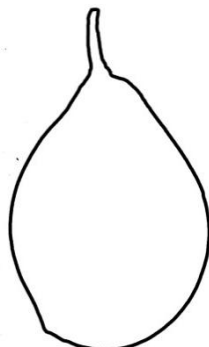
Absent

Characteristic 21: Shape of Styler scar



1

Pointed



3

Rounded



5

Blunt



7

Beak

Characteristic 23: Mace covering pattern



1
Partial reticulate

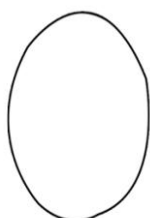


3
Entire reticulate



5
Compact

Characteristic 25: Seed shape



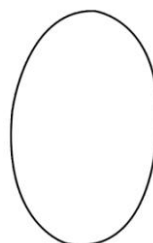
1
Round



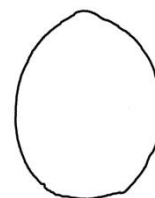
3
Ovate



5
Obovate



7
Elliptic



9
trapezoid

IX) Working group details:

The test guidelines developed by Department of Horticulture, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli and Task Force (08/2015) constituted by the PPV & FR Authority, New Delhi.

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Dr. J. Rema

Dr. Madhukar Bachulkar

Dr. Ravi Prakash (Member Secretary)

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2. Shri. N.K. Mhatre, Junior Research Fellow, PPV & FRA Project on Nutmeg, Deptt. Of Horticulture, College of Agriculture, Dapoli, Dr. B.S.K.K.V., Dapoli, Ratnagiri- 415 712 (M.S.)

X. DUS Testing Centres

Nodal Centre	Other Centre
Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli. Dist- Ratnagiri- 415 712 (M.S.).	<ol style="list-style-type: none">1. Indian Institute of Spices Research, Marikunnu, P.O. Calicut- 673012, Kerala2. Central Coastal Agricultural Research Institute, Goa.