

**Guidelines
for the Conduct of Test for
Distinctiveness, Uniformity and
Stability
On**

**Japanese Plum
(*Prunus salicina* L.)**



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

JAPANESE PLUM

(*Prunus salicina* L.)

I. Subject

These test guidelines shall apply to all varieties of Japanese Plum (*Prunus salicina* L.).

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&FR) 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 plum on seedling 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.

III. Conduct of tests

1. The minimum duration of the DUS tests shall normally be at least for two fruiting seasons in succeeded years.
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 for each variety. In particular, it is essential that the trees produce a satisfactory crop of fruit in each of the two growing seasons.
3. Test plot 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. The additional test protocol for special purpose may be established by PPV & FRA

- 1 Locations : Two
- 2 No. of replication : Three
- 3 Treatment unit : Two trees per replication (total 6 plants/location)
- 4 Spacing : 3 x3m

IV. Methods and observations

The characteristics described in the Table of characteristics (see section VII) shall be used for the testing varieties and hybrids for their DUS.

1. For the assessment of Distinctiveness and Stability, observations shall be made on 6 plants or 18 parts taken from 6 plants with the exception of the observation on fruit which should be made on at least 20 fruits. In the case of parts of plants, the number to be taken from each of the plant should be three.
2. For the assessment of uniformity a population standard of 5% with an acceptance probability of at least 95% should be applied. In the case of a sample size of 6 plants, no off types are allowed.
3. All observations of the tree and the branches should be made during dormancy.
4. Time of bloom should be recorded from opening of first flower to 75% bloom.
5. All observations on the leaf should be made on fully developed leaves of the middle third of current season's shoot.
6. Days to maturity should be recorded from 75% blooming to harvest.
7. Observations on the mature fruit should be recorded when fruit is ready for harvest.
8. 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 concerned authorities use the following characteristics for grouping plum varieties
 - a. Tree: Habit (characteristic no. 2)
 - b. Flower: arrangement of petals (characteristic no. 15)
 - c. Leaf blade: Incisions of margin (characteristic no. 20)
 - d. Leaf: shape of nectaries (characteristic no. 22)
 - e. Fruit: shape in lateral view (characteristic no. 26)
 - f. Stone: shape in lateral view (characteristic no. 44)
 - g. Stone: shape in ventral view (characteristic no. 45)

VI. Characteristics and symbols

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 characteristics 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 that for certain characteristics, the plant parts on which observations to be taken are given in the explanation or figure(s) for clarity and not 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 growth and development of plant. The relevant growth stages corresponding to these code numbers are described below:
 - a. Observations on tree vigour and habit should be made during dormant season
 - b. Observations on flowers should be made at the time of full bloom (75% flowering)
 - c. The observations on the leaves should be made on mature leaves from current season's shoot.
 - d. Observation on fruit should be made at mature fruit

VII. Table of characteristics:

S.No.	Characteristics	States	Notes	Example varieties	Stage of observation	Type of assessment
1	2	3	4	5	6	7
1	Tree :type of bearing	On spur only	1	Santa Rosa	a	VG
		On spur and long shoots	2	Black Beauty, Kubio		
		On long shoots only	3	--		
2 (+) (*)	Tree : habit	Upright	1	Santa Rosa, Methley	a	VG
		Semi upright	2	Krassavica, Frontier, Kubio-26		
		Spreading	3	Kubio, Queen Ann		
		Drooping	4	-		
3	One year old shoot: colour	Greyish brown	3	Santa Rosa, , Kubio-26, Tarrol,	a	VG
		Yellow brown	5	Burbank, Black Amber		
		Brown	7	Methley , Kanto-5		
		Reddish brown	9	Kubio, Red Beaut		
4	Vegetative bud: Size (mm)	small (<5)	3	Beauty, Krassavica	a	MG
		Medium (>10)	5	Kubio-26, Santa Rosa		
		Large (11-15)	7	Kanto-5, Red Plum		
5 (*) (+)	Vegetative Bud: shape of apex	Obtuse	1	Burbank, Kanto-5, Beauty, Tarrol	a	VG
		Acute	2	Red Plum		
		Round	3	Red Beauty, Mariposa, Frontier		
6 (*) (+)	One year old shoot: Position of vegetative bud in relation to shoot	Adpressed	1	Methley, Kubio, ,Beauty	a	VG
		Slightly held out	2	Queen Ann, Red Plum, Red Beaut, Black Amber		
		Markedly held out	3	AU-Cherry		
7	Flower: diameter (mm)	Small (<15)	3	Tarrol, Beauty, Krassavica, Methley	b	MG
		Medium (15-20)	5	Red Plum, Kubio		
		Large (>20)	7	Mariposa, Kanto-5, Santa Rosa		
8 (+)	Time of begining of flowering	Early	3	Mariposa		VG
		Medium	5	Burbank		
		Late	7	Kubio-26		
9 (*) (+)	Petal: Shape	Ovate	3	Santa Rosa, Tarrol	b	VG
		Elliptic	5	Burbank, Queen Ann		
		Circular	7	Red Plum, Kanto5		
		Oblate	9	-		

10 (*)	Petal: length (mm)	Short < 7	3	Red Plum, Kanto-5	b	MG
		Medium 7-10	5	Santa Rosa , Black AmberBurbank		
		Large >10	7	Black Beaut, Red Beaut, Mariposa		
11	Petal: undulation of margin	Weak	3	Red beaut	b	VG
		Medium	5	Kanto-5		
		Strong	7	Santa Rosa, Mariposa		
12 (*)	Stigma: position compared to anthers	Below	3	Queen Ann, Santa Rosa	b	VG
		At the same level	5	Kubio-26, Methley, Red Beaut,		
		Above	7	Krassavica, Kubio		
13 (*) (+)	Sepal: shape	Triangular	3	Mariposa	b	VG
		Ovate	5	Tarrol, Beauty		
		Elliptic	7	Krassivica, Methley,		
14 (*)	Pedicel: Length (mm)	Short (<10)	3	Beauty, Methley	b	MS/V G
		Medium (10-20)	5	Kubio		
		Long (>20)	7	Burbank		
15 (*) (+)	Flower: arrangement of petals	Free	3	Red Plum,Santa Rosa, Kanto-5	b	VG
		Touching	5	Kubio-26, Tarrol, Black Amber Black Beaut,		
		Overlapping	7	Mariposa, Kubio, Queen Ann, Red Beaut, Burbank		
16 (*)	Leaf blade: ratio length/width (cm)	Low <2	3	Krassavica, Black Beaut, Kubio, Methley	c	MG
		Medium 2-2.5	5	Tarrol, Black Amber, Red Plum		
		High >3	7	Mariposa, Red Beaut, Beauty		
17 (+) (*)	Leaf blade: shape	Ovate	1	Methley, Mariposa, Black Beaut, Queen Ann	c	VG
		Elliptic	2	Red Beaut, Black Amber, Beauty, Krasavica, Santa Rosa		
		Obovate	3	Kubio, Red Plum ,Burbank, Tarrol		
18 (+) (*)	Leaf blade: angle of apex(excluding tip)	Acute	3	Monarch, Black Amber	c	VG
		Right angled	5	Kubio-26		
		Obtuse	7	Black Beaut, Tarrol, Burbank		
19	Leaf blade: density of pubescence on lower side	Sparse	3	Black Beaut, Mariposa, Beauty	c	VG
		medium	5	Queen Ann, Santa Ros		
		strong	7	Kanto-5		
20 (+) (*)	Leaf blade: incisions of margin	Crenate	1	Red Beaut, Black Beaut, Tarrol	c	VG
		Bi-crenate	2	-		
		Serrate	3	Santa Rosa		
		Bi-serrate	4	-		

21 (* (*)	Petiole: Length (cm)	Short <1	3	Black Amber, Burbank, Tarrol	c	MG
		Medium 1-1.5	5	Kubio, Krassavica,		
		Long >1.5	7	Beauty		
22 (+ (*)	Leaf: shape of nectaries	round	3	Kubio, Methley, Kanto-5	c	VG
		reniform	5	Red Beaut, Tarrol		
23	Leaf : Position of nectaries	Predominant on base of leaf blade	1	Methley	c	VG
		Equal on base of leaf blade and on petiole	2	Kubio-26		
		Predominant on petiole	3	Beauty, Queen Ann		
24	Fruit: length of stalk (mm)	Short <10	3	Red Plum,	d	MG
		Medium 10-18	5	Krassavica, Kanto-5		
		Long >18	7	Beauty, Red Beaut, Mariposa		
25 (* (*)	Fruit: size (weight in g)	Small (<15)	3	Kanto-5, Black Beaut, Burbank	d	MG
		Medium (15-30)	5	Krassavica, Beauty		
		Large (>30)	7	Santa Rosa, Mariposa		
26 (+ (*)	Fruit: shape in lateral view	Oblong	1	-	d	VG
		Elliptic	2	Beauty		
		Circular	3	Red Beaut ,Tarrol		
		Oblate	4	Black Amber, Krassavica, Mariposa,		
		Cordate	5	Queen Ann, Kanto-5, Kubio		
		Obovate	6	-		
		Obcordate	7	Santa Rosa		
27	Fruit: symmetry	Symmetric	1	Methley	d	VG
		Asymmetric	9	Red Beaut, Krassavica, Mariposa		
28 (+ (*)	Fruit: shape of apex	Pointed	3	Beauty , Red Plum, Santa Rosa	d	VG
		Rounded	5	Red Beaut, Methley		
		Truncated	7	Mariposa		
		Depressed	9	Black Beaut, Burbank, Red Beaut		
29 (* (*)	Fruit: shape of base	Pointed	3	-	d	VG
		Truncated	5	Methley , Krassavica		
		Depressed	7	Santa Rosa, Mariposa		
30 (+ (*)	Fruit: depth of stalk cavity (mm)	Shallow (<3)	3	Methley, Queen Ann	d	MG
		Medium (3-6)	5	Red plum, Burbank, Kanto-5		

		Deep (>6)	7	Red Beaut , Santa Rosa, Mariposa		
31 (+) (*)	Fruit: width of stalk cavity (mm)	Narrow (<5)	3	Kanto-5	d	MG
		Medium (5-10)	5	Beauty, Black Beaut, Kubio-26		
		Broad (>10)	7	Red Beaut, Santa Rosa, Mariposa		
32 (*)	Fruit: depth of suture	Shallow	3	Kanto-5, Queen Ann	d	MG
		Medium	5	Krassavica, Beauty, Black Amber,		
		Deep	7	Mariposa, Red Beaut ,Santa Rosa		
33 (*)	Fruit: bloom of skin	Weak	3	Red Beaut , Black Beaut	d	VG
		Medium	5	Mariposa, Santa Rosa Black Amber, Methley		
		Strong	7	Kanto-5, Black Beaut		
34 (*)	Fruit: relative area of over colour of skin	Small	3	Tarrol	d	VG
		Medium	5	Mariposa, Santa Rosa , Burbank		
		Large	7	CITH-P-1, CITH-P-2, Kubio-26		
35 (*)	Fruit: over colour of skin	Yellow	1	Burbank,	d	VG
		Orange yellow	2	Kanto-5,Tarrol		
		Medium Red	3	Beauty, Santa Rosa, Krassavica, Mariposa,		
		Dark red	4	Red Beaut , Red Plum, Methley, Kubio		
		Purple	5	Black Beaut		
		Dark blue	6	-		
		Black	7	-		
36 (*)	Fruit: pattern of over colour of skin	Flecks only	1	Mariposa, Beauty,	d	VG
		Mottled	3	Red Beaut, Tarrol, Kanto-5		
		Solid flush	5	Methley, Black Beaut, Red Plum		
37 (*)	Fruit: density of Lenticels	Sparse	3	Methley , Tarrol , Kanto-5	d	VG
		Medium	5	Black Beaut, Burbank, Red Beaut		
		Dense	7	Red Plum, Queen Ann		
38 (*)	Fruit: colour of flesh	Whitish	1	Red Beaut	d	VG
		Green	2	Tarrol		
		Yellowish green	3	Kubio-26, Tarrol		
		Yellow	4	Red Plum, Mariposa, Kanto-5, Krassavica		
		Orange	6	Black Amber		
		Medium red	5	Queen Ann		
		Dark red	7	Methley, Beauty, Kubio		
		Purplish	8	-		
39 (+)	Fruit: firmness of	Soft <30	3	Kanto-5, Queen Ann, Beauty	d	MG

	Flesh	Medium 30-35	5	Red Plum, Monarch , Red Beaut		
		Firm >35	7	Santa Rosa, Mariposa		
40	Fruit: juiciness	Low	1	Mariposa, Beauty , Black Beaut	d	MG
		Medium	2	Queen Ann, Santa Rosa,		
		High	3	Kanto-5, Black Amber		
41 (+)	Fruit: sweetness (°Brix)	Low <15	3	Red Beaut	d	MG
		Medium 15-17	5	Mariposa, Santa Rosa, Red Plum, Beauty, Burbank, Methley		
		High >17	7	Queen Ann, Krassavica		
42 (*)	Fruit: adherence of stone to flesh	Non-Adherent	1	-	d	VG
		Semi-adherent	2	Queen Ann, Mariposa		
		Adherent	3	Tarrol, Black Beaut, Kubio-26		
43 (*)	Stone: size (g)	Small (<1.5)	3	Krassavica, Red plum	d	MG
		Medium (1.5- 2.5)	5	Queen Ann, Beauty, Black Amber, Kanto-5		
		Large (>2.5)	7	Santa Rosa, Red Beaut , Mariposa		
44 (+) (*)	Stone: shape in lateral view	Narrow elliptic	1	Queen Ann, Black Amber	d	VG
		Medium elliptic	2	Beauty, Santa Rosa, Krassavica		
		Circular	3	-		
		Broad ovate	4	Red Plum, Burbank,		
45 (+) (*)	Stone: shape in ventral view	Narrow elliptic	1	Frontier, Krassavica, Kanto-5	d	VG
		Medium elliptic	2	Mariposa , Santa Rosa, Queen Ann		
		Broad elliptic	3	Red plum, Burbank		
46 (*)	Stone: texture of lateral surface	Fine grained	1	Krassavica, Burbank, Red Beaut, Methley, Queen Ann	d	VG
		Granular	3	Kubio, Black Amber		
		Rough	5	Beauty , Kanto-5, Red Plum, Mariposa		
		Hammered	7	Santa Rosa		
47 (+) (*)	Stone: width of stalk-end (mm)	Narrow (<4)	1	Kanto-5, Red Beaut, Black Amber, Queen Ann	d	MG
		Medium (4-8)	2	Black Beaut, Kubio-26		
		Broad (>8)	3	Red Plum, Mariposa, Beauty, Santa Rosa		

VIII. Explanation for the Table of characteristics

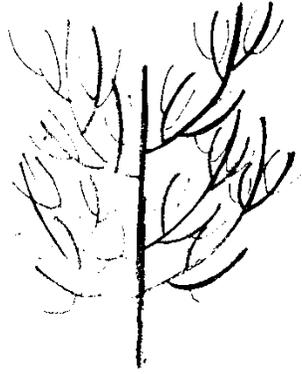
Character 2: Tree habit



1
Upright



2
Semi upright

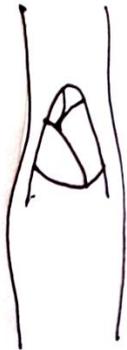


3
Spreading

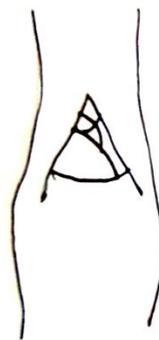


4
Drooping

Character 5: Vegetative bud: shape of apex



1
Obtuse

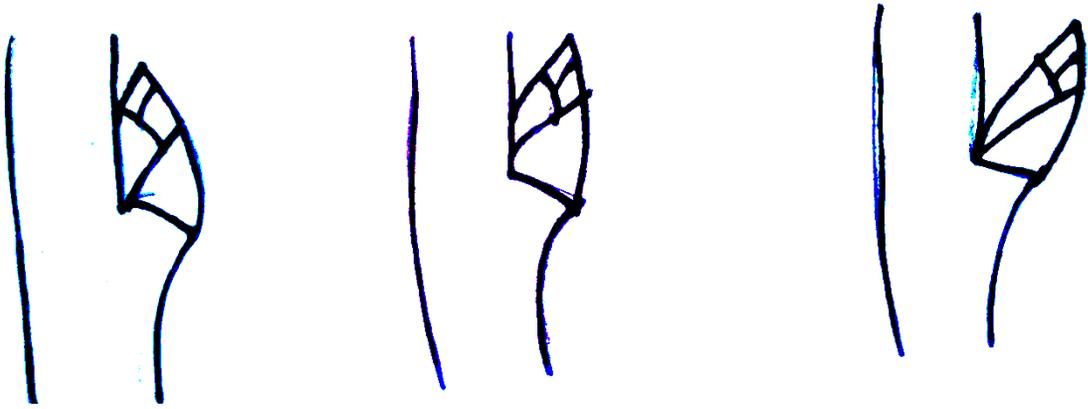


2
Acute



3
Round

Character 6: One-year-old shoot: position of vegetative bud in relation to shoot



1
Adpressed

2
Slightly held out

3
Markedly held out

Character 8: Time of beginning of flowering

The time of beginning of flowering is when all trees have 10% open flowers.

Character 9: Petal: Shape



3
Ovate



5
Elliptic



7
Circular



9
Oblate

Character 13: **Sepal: Shape**



3
Triangular

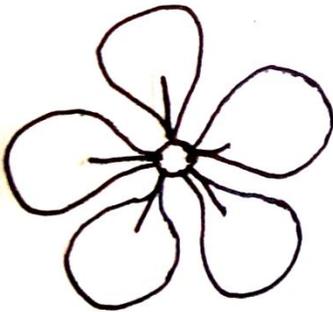


5
Ovate

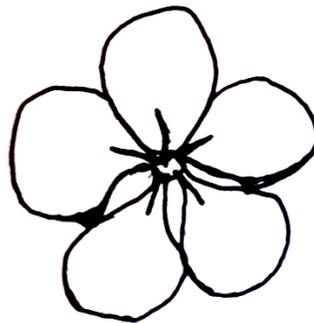


7
Elliptic

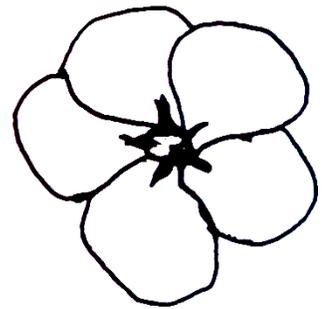
Character 15: **Flower: arrangement of petals**



3
Free

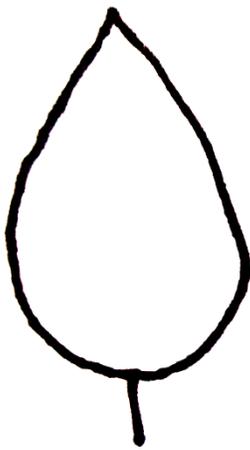


5
Touching

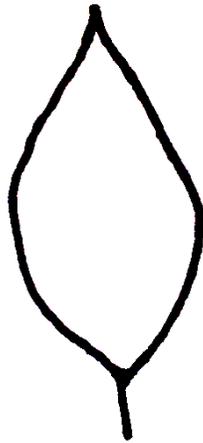


7
Overlapping

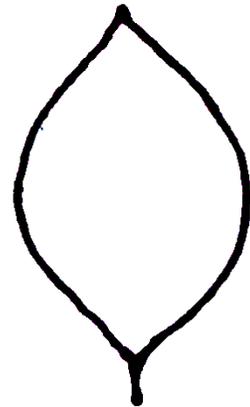
Character 17: Leaf blade: shape



1
Ovate

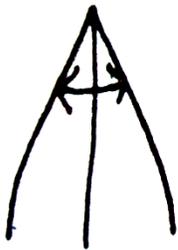


2
Elliptic

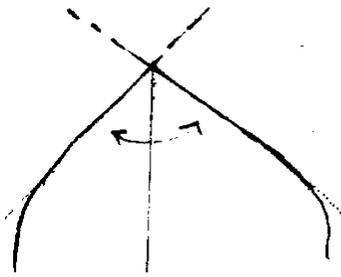


3
Obovate

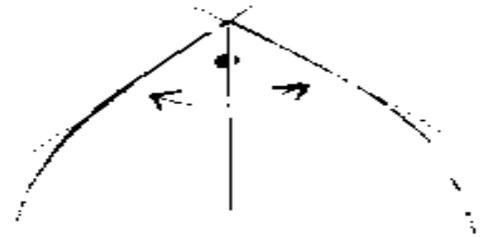
Character 18: Leaf blade: angle of apex (excluding tip)



3
Acute



5
Right angles



7
Obtuse

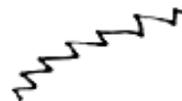
Character 20: Leaf blade: incisions of margin



1
Crenate



2
Bi-crenate

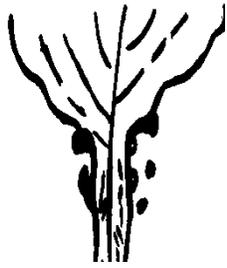


3
Serrate

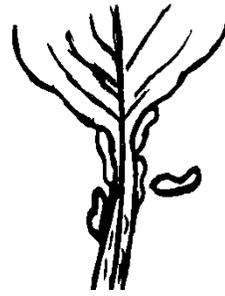


4
Bi-serrate

Character 22: Leaf: shape of nectaries



1
Round



9
Reniform

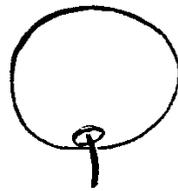
Character 26: Fruit: shape in lateral view



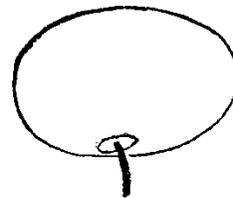
1
Oblong



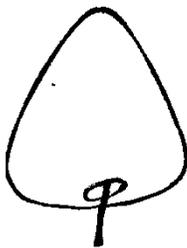
2
Elliptic



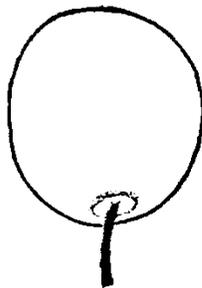
3
Circular



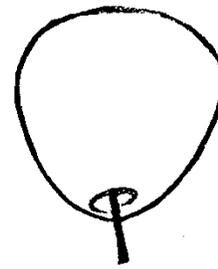
4
Oblate



5
Cordate

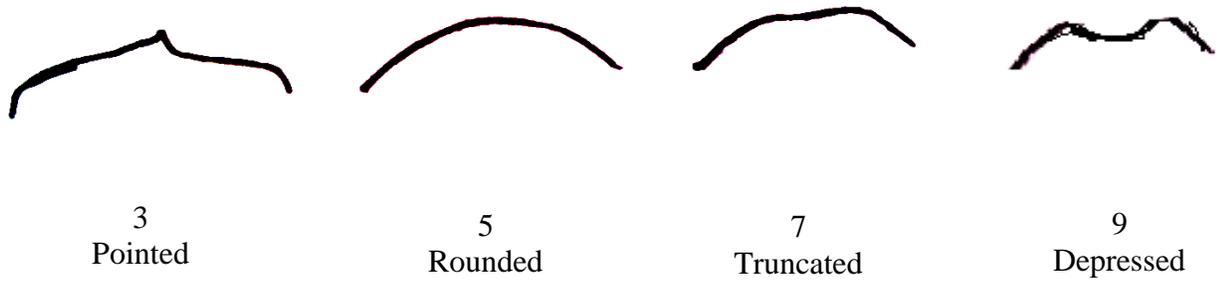


6
Obovate

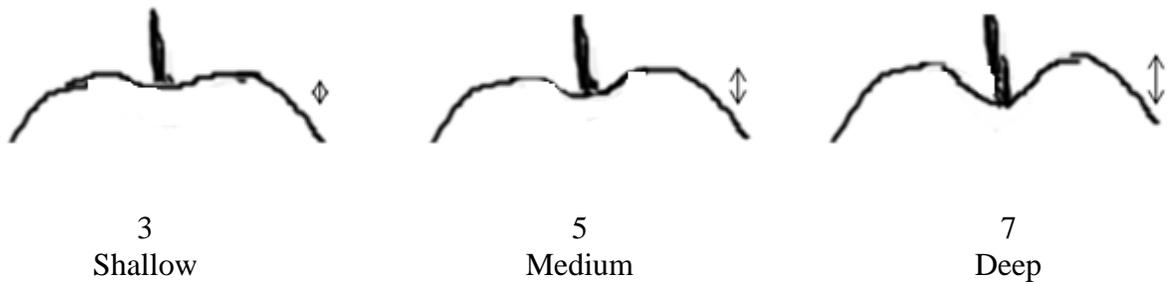


7
Obcordate

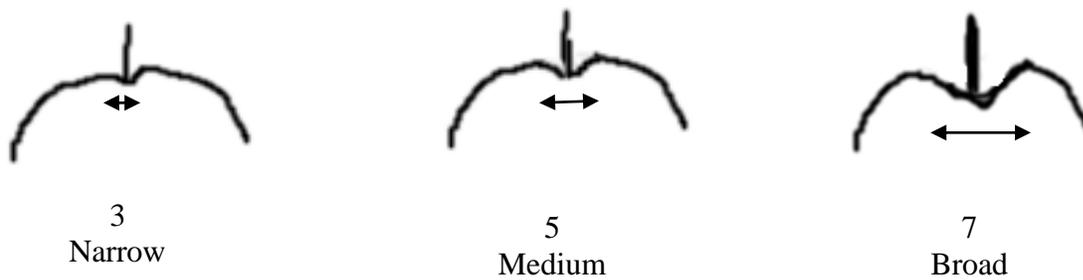
Character 28: **Fruit: shape of apex**



Character 30: **Fruit: depth of stalk cavity**



Character 31: **Fruit: width of stalk cavity**



Character 39: **Fruit: Firmness of flesh**

To be observed at eating ripeness with firmness tester expressed in RI (relative Index).

Character 41: **Fruit: Sweetness**

Calculation of total soluble solids measured using a refractometer. The measured unit is the degree Brix ($^{\circ}$ Brix). One degree Brix corresponds to 1 gram of sucrose in 100 grams of solution.

Character 44: Stone: shape in lateral view



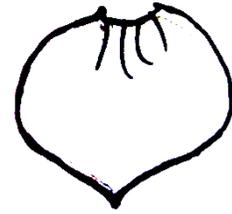
1
Narrow Elliptic



2
Medium Elliptic



3
Circular

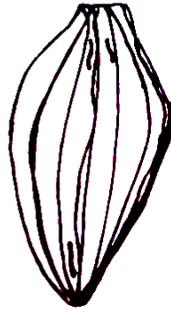


4
Broad Ovate

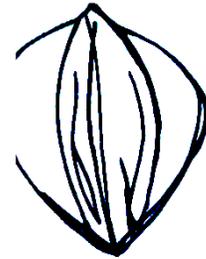
Character 45: Stone: shape in ventral view



1
Narrow Elliptic



2
Medium Elliptic



3
Broad Ovate

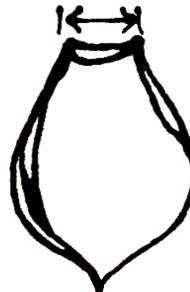
Character 47: Stone: width of stalk-end



1
Narrow



2
Medium



3
Broad

Working Group details:

The task force has finalized the DUS test guidelines for **Plum** with support of Dr. Javid Iqbal Mir, Nodal Officer & Shi Lal, Co-Nodal Officer, Dr. Ramesh Kumar and SRF Asma Hamid of CITH, Srinagar. The officials of the PPV&FR Authority including Dr. Tejbir Singh, Registrar-II (Hort.) and Sh. Dipal Roy Choudhury, Joint Registrar also provided technical input.

The Members of the Task Force (21/11/2014)

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Nodal DUS Test Centre	Other DUS Test Centre
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