

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

**PEACH
(*Prunus persica* L.) Batsch.**



Protection of Plant varieties and Farmer's Rights Authority

**(PPV & FRA)
Government of India**

Peach (*Prunus persica* L.) Batsch.

I. Subject

These test guidelines shall apply to all varieties of peach (including nectarine) of the species (*Prunus persica* L.) Batsch.

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 peach 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
- 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 peach varieties

- a. Tree growth habit (Characteristic No. 3)
- b. Flower type (Characteristic No. 11)
- c. Leaf blade margin shape (Characteristic No. 20)
- d. Petiole: shape of nectaries (Characteristic No. 24)
- e. Fruit shape (Characteristic No. 26)
- f. Stone shape (Characteristic No. 48)

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
 - e. Observation on stone should be made after harvest of fruit

VII. Table of characteristics

S.No.	Characteristics	States	Notes	Example variety	Stage of observation	Type of assessment
1	2	3	4	5	6	7
1 (* (*)	Tree: size	Very small	1	Kanto-5, Snowcrest,	a	VG
		Small	3	Quetta , Peshawari		
		Medium	5	Red Globe, Glohaven		
		Large	7	Fantasia, Elberta		
		Very large	9	Nimla, CITH-P-1		
2	Tree: vigour	Weak	3	Kanto-5, Summer Glo	a	VG
		Medium	5	Fantasia, Snow Queen		
		Strong	7	Red Globe, Cresthaven		
3 (* (+)	Tree: habit	Upright	1	Red Globe, Cresthaven	a	VG
		Semi spreading	2	-		
		Spreading	3	Nimla, Early Red June		
		Drooping	4	Kanto-5		
		Weeping	5	Elberta		
4	Flowering shoot: thickness (mm)	Thin (<3.0)	3	Fertilia, Nimla	a	MG
		Medium (3.0-4.0)	5	Cresthaven, Snowcrest		
		Thick (>4.0)	7	Red Globe		
5	Flowering shoot: length of internodes (mm)	Very short <16	1	Shan-i-Pinjab, Baby Gold	a	MG
		Short 16-18	3	Glo-Haven, Snow Queen		
		Medium 18.1-20	5	Paradelux, Nimla, Vance Marble, Quetta		
		Long 20.1-22	7	Peshawari		
		Very long >22	9	Fertilia, Crest-Haven		
6	Flowering shoot: anthocyanin coloration	absent	1	-	a	VG
		present	9	Nimla , CITH-P-1		
7	Flowering shoot: intensity of anthocyanin coloration	Weak	3	Shan-e -Punjab, Nimla , CITH-P-1	a	VG
		Medium	5	Paradelux, Snowcrest		
		Strong	7	Summer Glo Fantasia		
8	Flowering shoot: density of flower buds (number on 15 cm length shoot)	Very sparse <5	1	CITH-P-3, CITH-P-2	a	MG
		Sparse 5-10	3	Stark Early White Giant		
		Medium 10.1-15	5	Snow Queen, Vance Marble		

		Dense 15.1-20	7	Elberta, Fantasia, Kanto-5		
		Very dense >20	9	Red Globe, Glo-Haven		
9 (* (+)	General distribution of flower buds	Isolated	3	Fantasia	a	VG
		In groups of two or more	7	CITH-P-1, CITH-P-2, CITH-P-3		
10 (+)	Time of beginning of flowering	Very early	1	Early Red June	b	MG
		Early	3	Early Glo		
		Medium	5	Fertilia		
		Late	7	Snow Queen		
		Very late	9	Snowcrest		
11 (* (+)	Flower: type	Campanulate	3	July Elberta, Red Globe, Snow Queen	b	VG
		Rosette	5	Vance Marble, Quetta, Kanto-5		
12 (* (+)	Corolla: main color (inner side)	White	1	-	b	VG
		Ver light pink	2	-		
		Light pink	3	Quetta, Snow Queen		
		Medium pink	4	Shan-i-Pinjab, Snowcrest, Stark Early White Giant		
		Dark pink	5	-		
		Violet pink	6	Fertilia, CITH-P-1		
		Red	9	Elberta		
13 (* (+)	Petal: shape	Narrow ovate	1	-	b	VG
		Medium ovate	3	Kanto-5, July Elberta		
		Narrow elliptic	5	Earligrande, Silver King, Snowcrest		
		Medium elliptic	7	Early Red June, Elberta		
		Circular	9	Shan-i-Pinjab, Fertalia, Red Globe		
14. (* (+)	Flower: number of Petals	Five	3	Glohaven, Quetta	b	MG
		More than five	7	Vance Marble, Fertalia		
15 (* (+)	Stigma: position compared to anthers	Below	1	Elberta, K-209014, Quetta,	b	VG
		At same level	2	Shan-e- Punjab, Fertalia, Andross		
		Above	3	CITH-P-1, CITH-P-2, CITH-P-3		
16 (* (+)	Ovary: pubescence	Absent	1	Fantasia, Snow Queen	b	VG
		Present	9	Cresthaven, Red Globe		
17	Stipule: length (cm)	Short (1-2)	3	Vance Marble, Southland-2	b	MG
		Medium (2-3)	5	Early Red June, CITH-P-1		
		Long (3-4)	7	Fantasia, Elberta		
18	Leaf blade:	Low <3.2	3	Vance Marble, Red Globe	c	MG

(*)	ratio length/width	Medium 3.2-4	5	Cresthaven, Glohaven		
		High >4	7	Peshawari, Summer Glo		
19 (+)	Leaf blade: shape in cross section	Concave	1	Cresthaven, July Elberta	c	VG
		Flat	2	Glohaven, Peshawari		
20 (*) (+)	Leaf blade: margin	Crenate	1	Peshawari, Early Red June	c	VG
		Shallow serrate	2	Glohaven, Red Globe		
		Deep serrate	3	Earligrande, Andross, Kanto-5		
21	Leaf blade: angle at base	Acute	1	Snow Queen, Early Red June	c	VG
		Right angle	2	Summer Glo, Stark Early White Giant		
		Obtuse	3	Elberta, July Elberta		
22	Leaf blade: color	Light green	3	Shan-i-Pinjab	c	VG
		Green	5	Peshawari, Elberta		
		Purplish red	7	Fertali		
23 (*)	Petiole: Nectaries	Absent	1	-	c	VG
		Present	9	Earligrande, Southland-2		
24 (*) (+)	Petiole: shape of Nectaries	Round	1	Silver King, Earligrande	c	VG
		Reniform	2	Peshawari, Early Red June		
25 (*)	Fruit: size (g)	Small 41-45	3	Snow Queen, Early Red June	d	MG
		Medium 46-50	5	Fantasia, Quetta		
		Large 51-55	7	Cresthaven, Glohaven		
26 (*) (+)	Fruit: shape (in ventral view)	broad oblate	1		d	VG
		Medium oblate	2	CITH-P-3, Earligrande		
		Circular	3	Red Globe, Southland-2, Mayfire		
		Broad elliptic	4	Fertalia, Andross, Nimla		
		Medium elliptic	5	Peshawari, Southland-1		
27 (*) (+)	Fruit: mucron tip at pistil end	Absent	1	Kanto-5, Fertalia	d	VG
		Present	9	July Elberta, Early Red June		
28 (*)	Fruit: shape of pistil end (excluding mucron tip)	Prominently pointed	1	Early Red June, Snow Queen	d	VG
		Weakly pointed	2	July Elberta, Elberta		
		Flat	3	Red Globe		
		Weakly	4	Fertalia, Kanto-5		

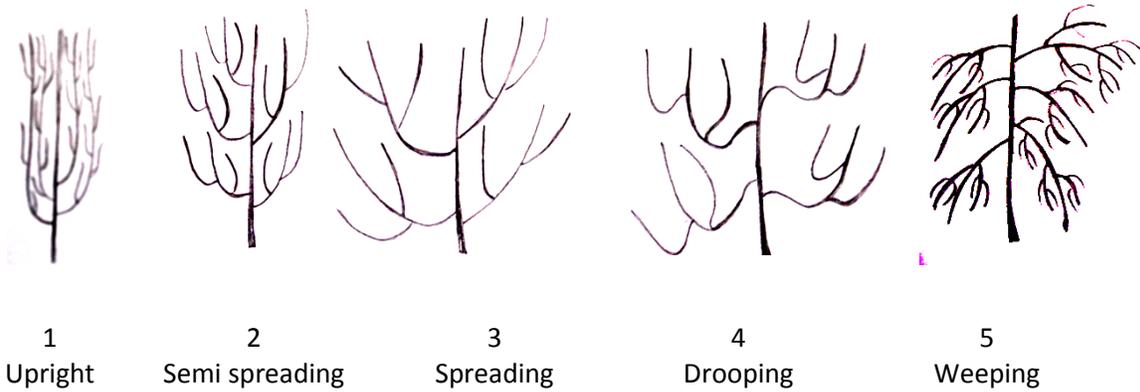
		depressed				
		Strongly depressed	5	Southland-1, Southland-2		
29 (*)	Fruit: prominence of suture	Weak	3	Early Red June, Nimla	d	VG
		Medium	5	Glohaven, Red Globe		
		Strong	7	Fertalia, Summer Glo		
30 (*)	Fruit: depth of stalk cavity	Shallow	3	Summer Glo, Nimla	d	VG
		Medium	5	Red Globe, Glohaven		
		Deep	7	Cresthaven, Fantasia		
31 (*)	Fruit: width of stalk cavity (mm)	Narrow (1-5)	3	Summer Glo, Peshawari	d	MG
		Medium (6-19)	5	Kanto-5, Red Globe		
		Broad (10-15)	7	Cresthaven, Fanatsia		
32 (*)	Fruit: ground color of skin	Green	3	Nimla, Peshawari	d	VG
		Cream	5	Elberta		
		Pink	7	Stark Early White Giant		
		Yellow	9	EEarly Red June		
33 (+) (*)	Fruit: relative area of over color of skin	Very small	1	Nimla, Peshawari	d	VG
		Small	3	Kanto-5, Elberta		
		Medium	5	July Elberta, Quetta		
		Large	7	Summer Glo, Early Red June		
		Very large	9	Glohaven, Cresthaven		
34 (*)	Fruit: pattern of over color of skin	Solid flush	1	Fantasia	d	VG
		Mottled	2	Early Red June		
		Striped	3	Kanto-5, Elberta		
		Marbled	4	Cresthaven		
35 (*)	Fruit: pubescence of skin	Absent	1	Fanatsia	d	VG
		Present	9	CITH-P-3, Earligrande		
36 (*)	Fruit: density of pubescence of skin	Sparse	3	Red Globe, Southland-1	d	VG
		Medium	5	Glohaven, Peshawari		
		Dense	7	Cresthaven, Elberta		
37	Only varieties with	Weak	1	Fantasia	d	VG

	fruit pubescence: absent: Fruit: glossiness	Medium	3	Elberta		
		Strong	5	Snow Queen		
38	Only varieties with fruit pubescence: absent: Fruit: conspicuousness of lenticels	Weak	1	Fantasia	d	VG
		Medium	3	Elberta		
		Strong	5	Snow Queen		
39	Fruit: adherence of skin to flesh	Weak	3	Nimla, Quetta, Southland-1	d	VG
		Medium	5	Elberta, Kanto-5		
		Strong	7	Red Globe, Andross		
40 (* (+)	Fruit: firmness of Flesh (RI)	Very soft <30	1	Kanto-5,	d	MG
		Soft 30-35	3	Quetta, July Elberta		
		Medium 36-40	5	Peshawari, Glohaven		
		Firm 40-45	7	Elberta, Snow Queen		
		Very firm >45	9	Fantasia		
41 (*	Fruit: Flesh colour	Greenish white	1	Nimla, CITH-P-2, CITH-P-3, Earligrande	d	VG
		White	2	Peshawari, Stark Early,		
		Cream white	3			
		Light yellow	4	CITH-P-1, Paradelux, Southland-1		
		Yellow	5	Elberta, Quetta, Early Red June		
		Orange yellow	6	Cresthaven, Silver King, Fantasia		
		Orange	7	-		
42	Fruit: anthocyanin colouration of flesh next to skin	Very weak	1	Glohaven, Early Red	d	VG
		Weak	2	Quett		
		Strong	3	Fantasia		
43	Fruit: anthocyanin colouration of flesh in central part of flesh	Absent	1	Nimla, CITH-P-2	d	VG
		Weak	2	Red Globe, Peshawari		
		Strong	3	Glohaven		
44 (*	Fruit: anthocyanin colouration	Very weak	1	Nimla, Peshawari, Southland-1	d	VG
		Week	2	Glohaven, Early Red June,		

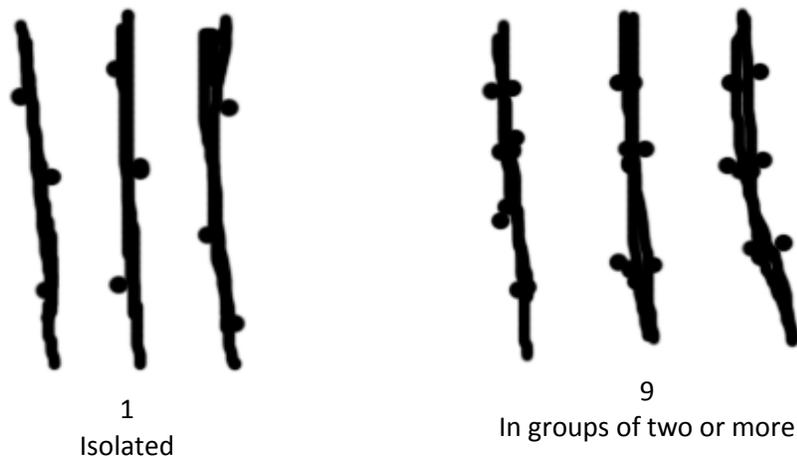
	of flesh around stone	Strong	3	Kanto-5, Cresthaven		
45	Fruit: flesh fiber	Absent	3	Fantasia, Red Globe	d	VG
		Moderate	5	Nimla, Glohaven		
		Strong	7	Peshawari , CITH-P-2, CITH-P-3		
46 (+)	Fruit: sweetness (° B)	Low <10	3	Nimla, Early Red June, Elberta	d	MG
		Medium 10-14	5	July Elberta, Stark Early		
		High >14	7	Cresthaven, Glohaven		
47 (* (+)	Stone: size compared to fruit	Small	3	Earligrande, Glohaven	d	MG
		Medium	5	Early Red June, Cresthaven		
		Large	7	Peshawari, Kanto-5		
48 (* (+)	Stone: shape (in lateral view)	Oblate	1	-	d	VG
		Circular	2	Cresthaven, Nimla		
		Elliptic	3	Glohaven, Elberta		
		Obovate	4	Peshawari , Quetta		
49	Stone: anthocyanin colouration	Weak	3	Nimla, Peshawari	d	VG
		Medium	5	Summer Glo, CITH-P-3		
		Strong	7	Cresthaven		
50 (*	Stone: relief of surface	Only pits	1	-	d	VG
		Predominantly pits	2	CITH-P-2, Nimla		
		Equally pits and grooves	3	Red Globe, Elberta		
		Predominantly grooves	4	Glohaven, Cresthaven		
		Only grooves	5	-		
51 (*	Stone: adherence to flesh	Absent	1	Red Globe, Glohaven, Cresthaven,	d	VG
		Present	9	Nimla, CITH-P-2 , Summer Glo		

VIII. Explanation for the Table of characteristics

Character 3: Tree habit



Character 9: General distribution of flower buds



Character 10: Time of beginning of flowering

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

Character 11: Flower: type

“Campanulate” (bell shaped) is also referred to as “non-showy” : these types have small petals and stamens often higher than the petals

“Rosette” (rose shaped) is also referred to as “showy”: these types have large petals.



1

Campanulate (Non showy)



2

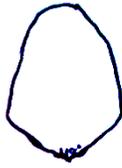
Rosette (Showy)

Character 13: Petal: shape



1

Narrow Ovate



3

Medium Ovate



5

Narrow elliptic



7

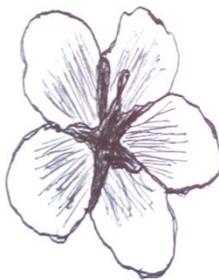
Medium elliptic



9

Circular

Character 14: Flower: number of Petals



1

Five



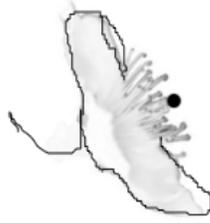
2

More than five

Character 15: **Stigma: position compared to anthers** (To be observed on 5 flowers per tree)



1
Below

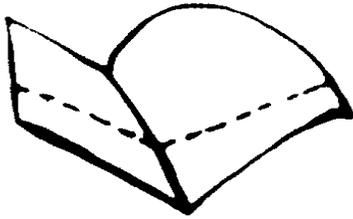


2
At same level



3
Above

Character 19: **Leaf blade: shape in cross section**



1
Concave

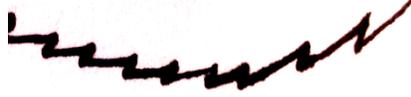


2
Flat

Character 20: **Leaf blade: margin**



1
Crenate

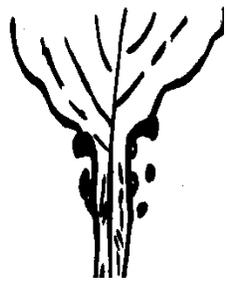


2
Shallow serrate

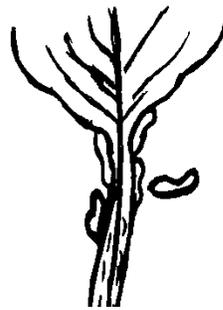


3
Deep serrate

Character 24: **Petiole: shape of Nectarines**

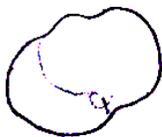


1
Round

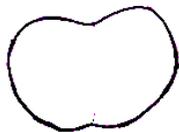


2
Reniform

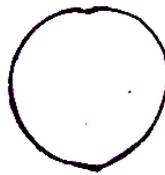
Character 26: **Fruit: shape (in ventral view)**



1
Broad oblate



2
Medium oblate



3
Circular



4
Broad elliptic



5
Medium elliptic

Character 27: **Fruit: mucron tip at pistil end**



1
Absent



9
Present

Character 33: Fruit: relative area of over color of skin

To be observed without the bloom. The ground color is the first color to appear chronologically during the development of the skin and upon which other colors will develop in time in the form of spots, a macule, or a color flush or blush. It is not always necessarily the largest area of the fruit. The over color is the second color developing over time over the ground color. The coloration does not necessarily cover the smallest area of the fruit and consists of a pattern such as a flush or flecking.

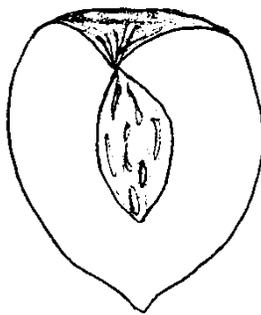
Character 40: Fruit firmness

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

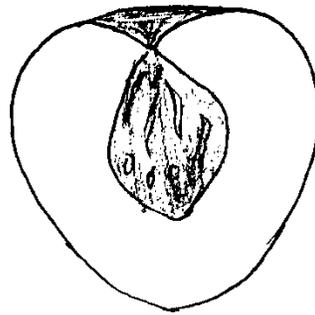
Character 46: Fruit: sweetness

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.

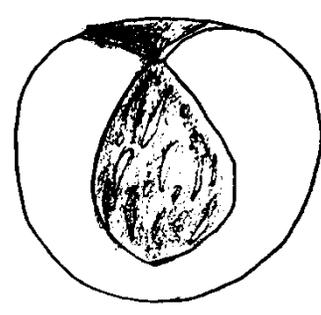
Character 47: Stone: size compared to fruit



3
Small

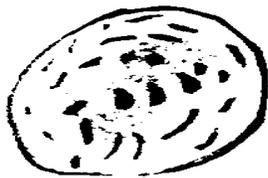


5
Medium



7
Large

Character 48: Stone: shape (in lateral view)



1
Oblate



2
Circular



3
Elliptic



4
Obovate

Working Group details:

The Task Force has finalized the DUS test guideline for **Peach** with support of Dr. Javid Iqbal Mir, Nodal Officer, Sh. Shiv Lal, Co-nodal Officer, 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 (4/2012)

1	Dr. J. P. Tiwari Ex-Dean, College of Agriculture G. B. Pant University of Agriculture and Technology	Chairman
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Co-Nodal Person

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Nodal DUS Test Centre	Other DUS Test Centre
Central Institute of Temperate Horticulture, Rangreth, Srinagar (J&K)	---