

**GUIDELINES**  
**FOR THE CONDUCT OF TEST FOR**  
**DISTINCTIVENESS, UNIFORMITY AND STABILITY**

On

**Jasmine**

*(Jasminum sambac L.)*



**Protection of Plant Varieties and Farmers' Rights Authority**  
**(PPV & FRA)**  
**Government of India**

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## **Jasmine (*Jasminum sambac* L.)**

### **I. Subject**

These Test Guidelines shall apply to all varieties of *Jasminum sambac* L. of the family Oleaceae.

### **II. Material required**

1. The Protection of Plant Varieties & Farmers Rights Authority (PPV&FRA) shall decide when, where and in what quantity and quality the plant material are required for testing of a variety denomination for registration under the Protection of Plant Varieties and Farmers Rights (PPV&FR) Act, 2001. Applicants submitting such 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. For all varieties bred for fresh flower purpose, landscaping and industrial uses, 20 numbers of 6 months old fully rooted plants of commercial standard has to be supplied for DUS testing. If however any material for DUS tests has a specific requirement for the expression of characters, the same shall be specified by the applicant.
2. The plant material supplied shall be healthy, not lacking in vigour or affected by any pest or disease.
3. The plant material shall not have undergone any chemical or bio-physical treatment which would affect the expression of the characteristics of the variety unless the competent authority allows or requests for such treatment. If it has been treated, full details of the treatment must be given.
4. The planting material supplied shall also possess the highest genetic purity, uniformity, sanitary and phyto-sanitary standards.

### **III. Conduct of Tests**

1. The minimum duration of the test shall normally be two similar complete growing cycles with reference to the ecosystem of the variety submitted for DUS test. An option is that a panel of experts shall visit the on- farm test sites for two similar crop seasons. However, in case the material entered does not meet the DUS criteria for any one or more than one character, then the test shall be extended up to the next growing cycle.
2. The tests shall normally be carried out in two locations under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination. All stages are indicated against each character in chapter VII (Table of characteristics).
3. If any essential characteristics of the variety are not expressed for visual observations at the test location, the variety shall be considered for further examination at another appropriate test site or under special test protocol on expressed request of the applicant.

4. The size of the plots shall be such that parts of plants could be removed for measurement and observation without prejudicing the other observations on the standing plants.
5. In particular, growth regulators should not be used.
6. The varieties will be evaluated under natural growing conditions and checked for distinctiveness.
7. The plants shall be planted in the test field/plot at a standard spacing recommended for each type.
8. Additional special test protocols shall be established by the PPV&FR Authority.

#### **IV. Methods and observations**

1. The characteristics described in the Table of characteristics shall be used for the testing of varieties for their DUS (Section VII).
2. The optimum stage of development for the assessment of the characteristics are indicated against each of the characteristics.

#### **System for growth stages in jasmine**

<b>Code</b>	<b>Growth stages</b>
01	Pre flowering stage
02	At the time of shoot emergence
03	At bud stage
04	At anthesis
05	At peak flowering
06	At seed set

3. All observations on vegetative parts shall be as specified and leaf characteristics will be recorded on the fourth fully opened leaf from the tip of the stem. Colours of vegetative parts shall be observed on plants exposed to natural growing conditions.
4. Unless otherwise indicated, all observations on single plants shall be made on all plants or parts taken from each of 10 plants.
5. Each test shall include a total of at least 10 plants in DUS test centres and 5 plants for on - site tests. For assessment of Distinctiveness and Stability, all observations shall be made on all plants.
6. For the assessment of Uniformity of vegetatively propagated varieties, a population standard of 1% and an acceptance probability of at least 95 % shall be applied. In the case of a sample size of 10 plants, 1 off-type is allowed.

7. In practice, it is not usual to perform tests of Stability that produce results as certain as those of the testing of Distinctiveness and uniformity. However, experience has demonstrated that for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable. Where appropriate or in cases of doubt, stability may be tested either by growing a further generation or by testing a new plant stock to ensure that it exhibits the same characteristics as those shown by the previous material supplied.
8. For the assessment of colour characteristics, the latest Royal Horticultural Society (RHS) colour chart shall be used.
9. Additional test protocols for special purpose if required shall be established by the PPV&FR Authority.
10. Standard cultural practices to be adopted and specified as may be relevant to the location of the DUS test centers for open conditions. If however, any material entered for the DUS test has any specific requirement for expression of characters, the same will be specified by the authority. The DUS test centers shall finalize the standard cultural practices with the approval of the Authority.

## **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. Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.
3. The following characteristics shall be used for grouping *Jasminum sambac* varieties:
  - a) Plant growth type (Characteristic 1)
  - b) Flower bearing habit (Characteristic 15)
  - c) Flower bud colour (Characteristic 23 )
  - d) Tinge on flower bud (Characteristic 24)
  - e) Flower type (Characteristic 32)

## 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 (1-9) shall be used to describe the state of each character for the purpose of digital 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 environment conditions of the testing region. Under such exceptional situation, adequate explanation shall be provided.

(+ sign) Characteristics are illustrated by explanation and drawings in Sl.No VIII “Explanations and Method”.

4. Characteristics denoted with symbols QL, QN and PQ in first column of the Table of characteristics shall be indicated as:

**QL:** Qualitative characteristic

**QN:** Quantitative characteristic

**PQ:** Pseudo-qualitative characteristic

5. Type of assessment of characteristics indicated in Column no. 7 of the Table of characteristics is as follows:

**MG:** Measurement by a single observation of a group of plants or parts of plants

**MS:** Measurement of a number of individual plants or parts of plants

**VG:** Visual assessment by a single observation of a group of plants or parts of plants

**VS:** Visual assessment by observations of individual plants or parts of plant

## VII. Table of characteristics

S.No. (1)	Characteristic (2)	State (3)	Note (4)	Stage of observation (5)	Example variety (6)	Type of assessment (7)
1. * PQ	Plant growth type	Shrub	3	01	<ul style="list-style-type: none"> <li>Ramanathapuram Gundumalli</li> <li>Arka Aradhana</li> </ul>	VG
		Climber	7		-	
2. * PQ (+)	Plant growth habit	Upright	1	01	<ul style="list-style-type: none"> <li>Soojimalli</li> </ul>	VG
		Semi upright	3		-	
		Intermediate	5		<ul style="list-style-type: none"> <li>Ramanathapuram Gundumalli</li> <li>Double Mogra</li> </ul>	
		Spreading	7		<ul style="list-style-type: none"> <li>Iruvatchi</li> </ul>	
		Strongly spreading	9		-	
3. QN	Plant height (at flowering)	Short (<45 cm)	1	05	-	MS
		Medium (45-100 cm)	3		<ul style="list-style-type: none"> <li>Arka Aradhana</li> </ul>	
		Tall (> 100 cm)	5		<ul style="list-style-type: none"> <li>Ramanathapuram Gundumalli</li> <li>Khoya</li> </ul>	
4. * QL	Young shoot anthocyanin colouration (Shoots up to 30 cm from growing tip)	Absent	1	02	<ul style="list-style-type: none"> <li>Ramanathapuram Gundumalli</li> <li>Arka Aradhana</li> </ul>	VG
		Present	9		<ul style="list-style-type: none"> <li>Iruvatchi</li> </ul>	
5. PQ	Young shoot intensity of anthocyanin colouration	Weak	1	02	<ul style="list-style-type: none"> <li>Iruvatchi</li> </ul>	VG
		Medium	3		-	
		Strong	5		-	
6. * QL (+)	Ridges on the stem	Absent	1	01	<ul style="list-style-type: none"> <li>Ramanathapuram Gundumalli</li> </ul>	VG
		Present	9		-	
7. * PQ (+)	Leaf arrangement/ Phyllotaxy	Opposite	1	01	<ul style="list-style-type: none"> <li>Ramanathapuram Gundumalli</li> <li>Arka Aradhana</li> </ul>	VG
		Alternate	3		-	
		Whorled	5		-	
		Both opposite and whorled	7		<ul style="list-style-type: none"> <li>Iruvatchi</li> </ul>	
8. PQ	Leaf size	Small	1	01	-	VG

		Medium	3		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Iruvatchi</li> </ul>	
		Large	5		<ul style="list-style-type: none"> <li>• Khoya</li> </ul>	
9. PQ	Intensity of green colour (upper surface of mature leaf)	Light	1	01	<ul style="list-style-type: none"> <li>• Arka Aradhana</li> <li>• Ramabhanam</li> </ul>	VG
		Medium	3		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> </ul>	
		Dark	5		<ul style="list-style-type: none"> <li>• Khoya</li> </ul>	
10. * QL	Leaf anthocyanin colouration (young leaf)	Absent	1	01	<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Arka Aradhana</li> </ul>	VG
		Present	9		<ul style="list-style-type: none"> <li>• Iruvatchi</li> </ul>	
11. * QL	Leaf glossiness on upper surface (mature leaf)	Absent	1	01	-	VG
		Present	9		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Arka Aradhana</li> </ul>	
12. * PQ (+)	Shape of leaf blade	Lanceolate	1	01	<ul style="list-style-type: none"> <li>• Soojimalli</li> </ul>	VG
		Elliptic	3		-	
		Ovate	5		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Arka Aradhana</li> </ul>	
		Circular	7		-	
13. PQ (+)	Leaf tip	Sharp	1	01	<ul style="list-style-type: none"> <li>• Soojimalli</li> </ul>	VG
		Medium	3		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Single Mogra</li> </ul>	
		Blunt	5		-	
14. PQ (+)	Shape of base of leaf blade	Acute	1	01	<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Soojimalli</li> </ul>	VS
		Obtuse	3		-	
		Rounded	5		-	
		Cordate	7		-	
		Asymmetric	9		-	
15. * QL (+)	Flower bearing habit	Solitary	1	05	-	VG
		Cluster	3		<ul style="list-style-type: none"> <li>• Soojimalli</li> </ul>	
		Both	5		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Arka Aradhana</li> </ul>	
16. QL (+)	Flower bearing position	Terminal	1	05	<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Soojimalli</li> </ul>	VG
		Axillary	3		-	
		Both	5		-	



17. QN	Number of forks per cyme	Few (1-5 forks)	3	05	<ul style="list-style-type: none"> <li>• Khoya</li> <li>• Ramabhanam</li> </ul>	MS
		Intermediate (6-9 forks)	5		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Double Mogra</li> </ul>	
		More (>9 forks)	7		<ul style="list-style-type: none"> <li>• Iruvatchi</li> </ul>	
18. * QL (+)	Calyx	Rudimentary	3	05	<ul style="list-style-type: none"> <li>• Iruvatchi</li> </ul>	VG
		Well Developed	7		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Arka Aradhana</li> </ul>	
19. QN	Size of calyx lobes	Short (<0.5cm)	1	05	-	MS
		Medium (0.5-1cm)	3		<ul style="list-style-type: none"> <li>• Double Mogra</li> <li>• Khoya</li> </ul>	
		Long (>1cm)	5		<ul style="list-style-type: none"> <li>• Soojimalli</li> </ul>	
20. QN	Flower bud length	Short (1.0-2.0cm)	1	03	<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Double Mogra</li> </ul>	MS
		Medium ( 2.1-3.0cm)	3		<ul style="list-style-type: none"> <li>• Iruvatchi</li> </ul>	
		Long (>3.0cm )	5		<ul style="list-style-type: none"> <li>• Soojimalli</li> <li>• Arka Aradhana</li> </ul>	
21. * PQ (+)	Boldness of flower bud	Thin	1	03	<ul style="list-style-type: none"> <li>• Sankarapuram Malligae-1</li> </ul>	VG
		Medium	3		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> </ul>	
		Bold	5		<ul style="list-style-type: none"> <li>• Double Mogra</li> <li>• Arka Aradhana</li> </ul>	
22. * PQ (+)	Flower bud shape	Round and Short	1	03	<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli</li> <li>• Khoya</li> </ul>	VS
		Round and Long	3		<ul style="list-style-type: none"> <li>• Ramabhanam</li> <li>• Arka Aradhana</li> </ul>	
		Pointed and Short	5		<ul style="list-style-type: none"> <li>• Shankarapuram Malligae 1</li> </ul>	
		Pointed and Long	7		<ul style="list-style-type: none"> <li>• Soojimalli</li> </ul>	
23. * PQ	Flower bud colour (RHS colour chart reference indicate number)	Pure white	1	03	-	VG
		Off white	3		<ul style="list-style-type: none"> <li>• Ramanathapuram Gundumalli (White 155B)</li> <li>• Soojimalli (White 155B)</li> </ul>	
		Yellow	5		-	
		Pink	7		-	

24. * QL	Tinge on flower bud	Absent	1	03	• Ramanathapuram Gundumalli	VG
		Present	9		-	
25. * PQ	Flower colour on opening (RHS colour chart reference indicate number)	Pure white	1	04	-	VG
		Off white	3		• Ramanathapuram Gundumalli (White 155C)	
		Yellow	5		-	
		Pink	7		-	
26. * PQ (+)	Shape of open corolla	Rounded	1	04	• Ramanathapuram Gundumalli	VG
		Star shaped	9		• Soojimalli	
27. * PQ (+)	Shape of corolla lobe	Rounded	1	04	• Ramanathapuram Gundumalli	VG
		Lanceolate	9		• Double Mogra • Soojimalli	
28. QN	Corolla length	Short (0.5-1.0cm)	1	03	• Ramanathapuram Gundumalli	MS
		Medium (1.1-1.5cm)	3		• Single Mogra • Iruvatchi	
		Long (> 1.5cm)	5		• Arka Aradhana	
29. QN	Corolla tube length	Short (0.5-1.0cm)	1	03	• Double Mogra	MS
		Medium (1.1-1.5cm)	3		• Ramanathapuram Gundumalli • Single Mogra	
		Long (> 1.5cm)	5		-	
30. PQ (+)	Flower petal tip	Blunt	1	04	• Ramanathapuram Gundumalli	VG
		Sharp	9		• Soojimalli	
31. QL (+)	Reflexing of flower	Absent	1	04	• Double Mogra	VG
		Present	9		• Ramanathapuram Gundumalli	

32. * PQ (+)	Flower type	Single	1	04	• Ramanathapuram Gundumalli	VS
		Double	3		• Ramabhanam • Iruvatchi	
		Multi- whorled	5		• Khoya	
33. * QL	Seed setting	Absent	1	06	• Ramanathapuram Gundumalli • Double Mogra	VG
		Present	9		-	

## VIII. Explanations on the table of characteristics:

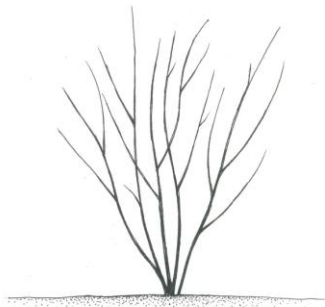
### 8.1: Explanations covering several characters

All characteristics shall be recorded at the stages indicated against each of the characteristics.

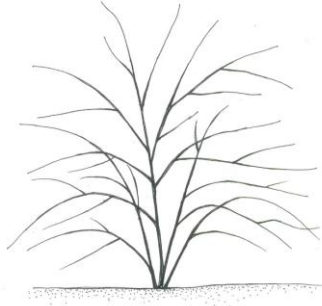
- In all flower types, observation will be recorded when the flower is fully open but before senescence sets in.
- Bud characteristics shall be observed when the buds are showing full colour, just before they begin to open.
- Stem and stipule characteristics shall be observed on the middle third of the stem except for characters requiring young shoot for which new flush will be used.
- Leaf characteristics shall be observed on fourth leaf from the top of the stem.

## 8.2: Explanations for individual characters

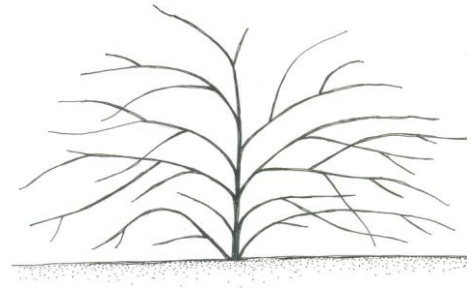
### Characteristic 2: Plant growth habit



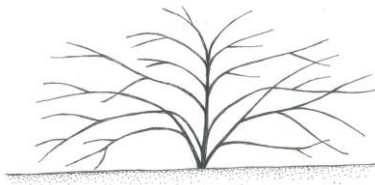
**Upright**



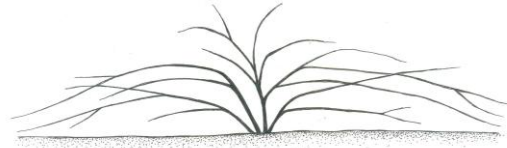
**Semi upright**



**Intermediate**

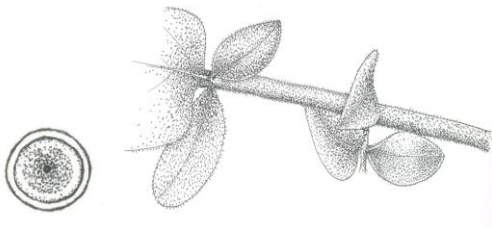


**Spreading**

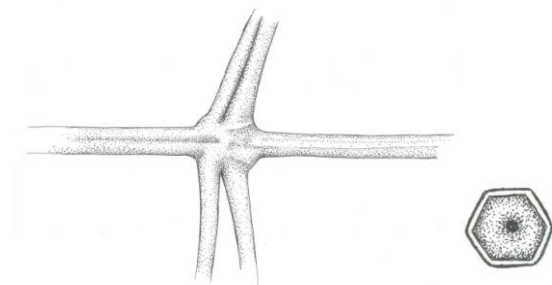


**Strongly spreading**

### Characteristic 6: Ridges on the stem



**Absent**



**Present**

**Characteristic 7: Leaf arrangement/Phyllotaxy**



**Opposite**

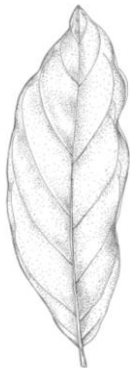


**Alternate**



**Whorled**

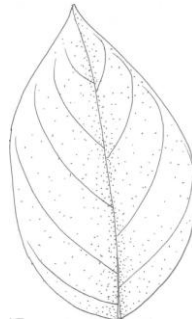
**Characteristic 12: Shape of leaf blade**



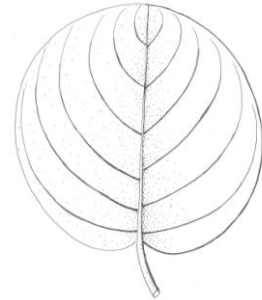
**Lanceolate**



**Elliptic**

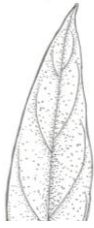


**ovate**

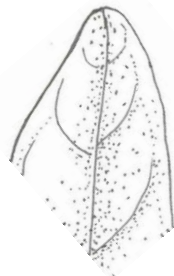


**Circular**

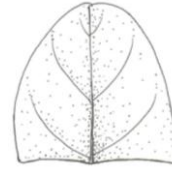
**Characteristic 13: Leaf tip**



**Sharp**

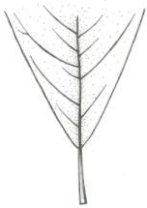


**Medium**

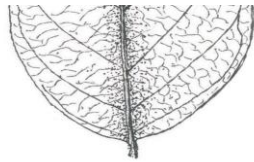


**Blunt**

**Characteristic 14: Shape of the base of leaf blade**



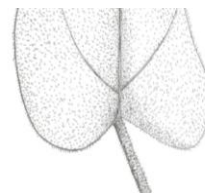
**Acute**



**Obtuse**



**Rounded**



**Cordate**

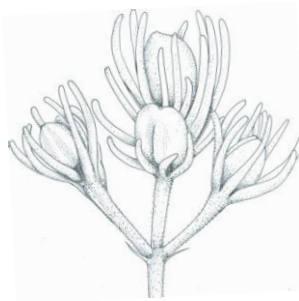


**Asymmetric**

**Characteristic 15: Flower bearing habit**



**Solitary**



**Cluster**



**Solitary and cluster in  
single plant**

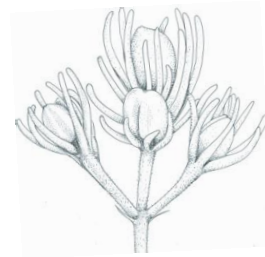
**Characteristic 16: Flower bearing position**



**Terminal**

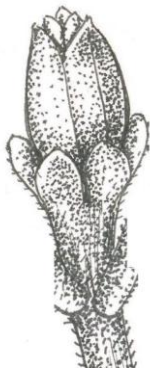


**Axillary**

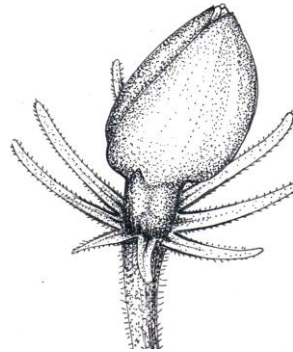


**Terminal and axillary**

**Characteristic 18: Calyx**



**Rudimentary**



**Well developed**

**Characteristic 21: Boldness of flower bud**



**Thin**

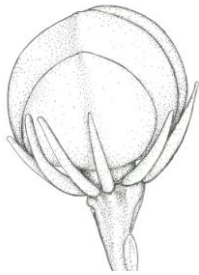


**Medium**

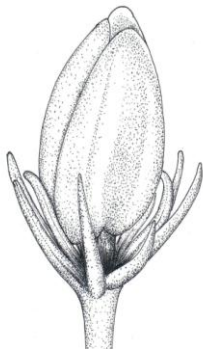


**Bold**

**Characteristic 22: Flower bud shape**



**Round and short**



**Round and long**



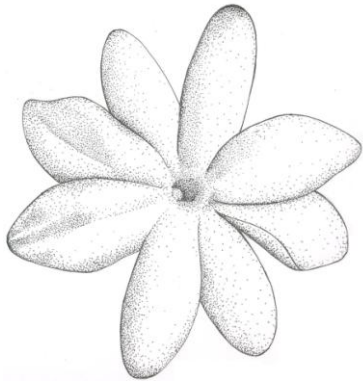
**Pointed and short**



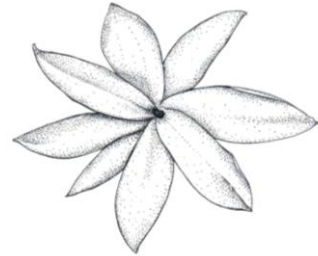
**Pointed and long**



**Characteristic 26: Shape of open corolla**

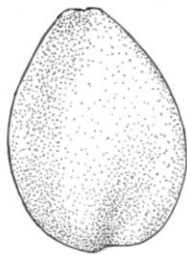


**Rounded**



**Star shaped**

**Characteristic 27: Shape of corolla lobe**

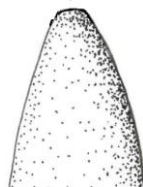


**Rounded**

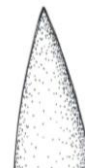


**Lanceolate**

**Characteristic 30: Flower petal tip**

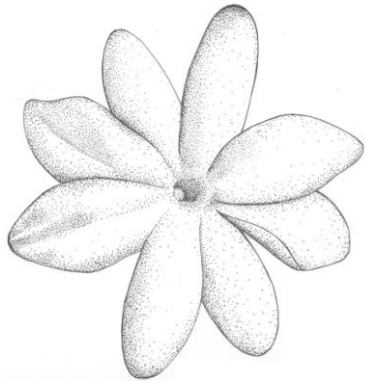


**Blunt**

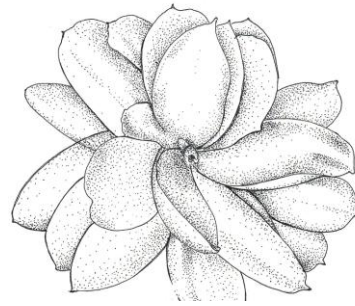


**Sharp**

**Characteristic 31: Reflexing of flower**

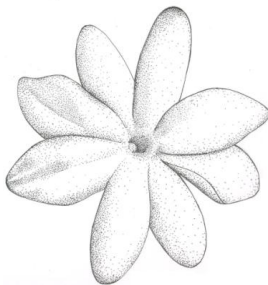


**Absent**

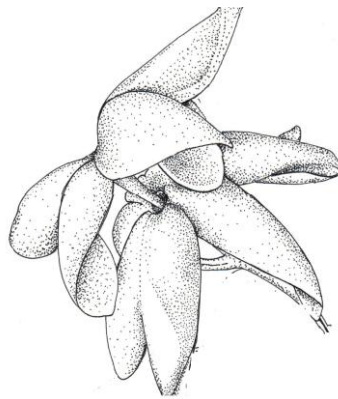


**Present**

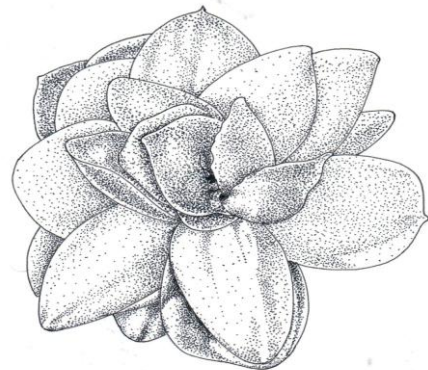
**Characteristic 32: Flower type**



**Single**



**Double**



**Multi whorled**

## IX. Biochemical characters (Additional character)

1.	Aroma profiling	Aroma profiles to be generated for jasmine flowers harvested from plants provided for testing.
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### Methods of extracting essential oils and aroma profiling of jasmine

#### Solvent extraction

The flowers are covered by a solvent such as ether, petroleum, hexane or acetone and then heated to 40-45 degree Celsius to extract the essential oil. This is then filtered which leaves a paste called concrete made up of wax and fragrance which is then mixed with alcohol and distilled at low temperatures, the alcohol absorbs the fragrance and when the alcohol is evaporated off an aromatic absolute remains. This method is used on delicate flowers and it is a relatively time consuming process.

#### Aroma profiling

Volatile compounds obtained from jasmine flowers are concentrated by headspace solid phase micro extraction and analyzed by MS-GC. HS extraction can be done by SPME fiber which can directly analyze the different contents present.

A commercial library (NIST) and an FFC (Flavor and Fragrance Components) bank provided with Linear Retention Indices are used interactively with MS data for compounds identification.

## **X. Working group details**

The test guidelines were developed by the Principal Investigators at the Nodal centre at ICAR- Indian Institute of Horticultural Research, Hessaraghatta, Co-nodal centre at Tamil Nadu Agricultural University and the Task Force (11/2011) constituted by the PPV&FR Authority. Technical input was also provided by Dr. Kameshwar Rao, Retired Taxonomist of Bangalore University and Dr. Ravi Prakash, Registrar, PPV&FRA.

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### **XI. Name of DUS Test Centres:**

<b>Nodal DUS Centre</b>	<b>Co-Nodal Centre</b>
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