Guidelines for the conduct of Test for Distinctiveness, Uniformity and Stability

On

CROSSANDRA [*Crossandra infundibuliformis* (*L.*) *Nees.*]

Protection of Plant Varieties and Farmers Rights Authority (PPV&FRA),
Govt. Of India, New Delhi

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CROSSANDRA [*Crossandra infundibuliformis* (*L.*) *Nees.*]

Introduction

Crossandra [*Crossandra infundibuliformis* (*L.) Nees*] is commonly known as *firecracker flower* in English, *Kanaka-ambaram* in *Tamil*, *Malayalam* and *Telugu*, *Aboli* in *Marathi*, *Kanakambara* in *Kannada*. Its flowers are very popular due to their attractive bright colour, light weight, and free flowing nature. Flowers are used for making garlands, offered to temple deities and also used for adorning women's hair. It belongs to the family *Acanthaceae*. It is mainly grown in open field conditions and mostly grown under tropical climate. In India, crossandra is commercially cultivated in Southern States.

I. Subject

These Test Guidelines shall apply to all the varieties of *Crossandra* (*Crossandra infundibuliformis* (L.) Nees.)

II. Plant 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.
2. For both the varieties, hybrid selections or mutants, 100 terminal rooted cuttings in plugs or pro-trays (50 for each center) of 6 cm to 8 cm taken from mother plants shall be required for DUS testing. If, however, any material for DUS test has a specific requirement for the expression of characters, the same shall be specified by the applicant.

3. The plant material supplied shall be healthy, not lacking in vigour or affected by any pest or disease and it should certify that it shall also possess the highest genetic stability in the propagated material and uniformity.
4. The plant material shall not have undergone any chemical or bio-physical treatment, unless the Registrar of the Authority has requested for such treatment. If, it has been treated, full details of the treatment must be provided.

III. Conduct of Tests

1. The minimum duration of DUS tests shall normally be at least at two independent similar growing seasons. The test will normally be conducted at two test locations. If distinctiveness cannot be sufficiently established in these growing periods, the test should be extended for an additional growing period.
2. The field tests shall be carried out under conditions ensuring normal growth and expression of all test characteristics. The plants are planted on raised beds with a row to row spacing of 90 cm and plant to plant spacing of 60 cm and irrigation is to be given with inline drippers.
3. In particular, growth regulators should not be used.
4. One month old well rooted cuttings/seedlings which are hardened shall be used for transplanting in DUS test plot.

   Test Plot Design

   - Number of rows: 2
   - Row to row distance: 90 cm
   - Plant to plant distance: 60 cm
   - Number of replications: 5
   - Number of plants per replication: 10
5. Standard cultural practices specific to the location of the DUS test centres to be adopted with the approval of the 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 assessment of the characteristics should be at the optimum stage of development *i.e.* at full flowering.
3. All observations on vegetative parts shall be recorded from middle portion of the plant. The colour of vegetative parts shall be observed on plants exposed to natural light.
4. All observations on floral parts shall be made on terminal spikes. The colour of the flower shall be recorded at full open stage.
5. All observations should be made on 5 single plants in each replication or parts taken from 5 plants.
6. Each test shall include a total of at least 5 plants each in five replications. For assessment of Distinctiveness, Uniformity and Stability, all observations shall be made on all replicated plants.
7. For the assessment of colour characteristics, the Royal Horticultural Society (RHS) colour chart shall be used.
8. Additional tests protocols for special purpose shall be established by the PPV & FR Authority.
9. All characteristics that shall be observed during every growing season on all varieties shall always be included in the description of the varieties.
10. The relevant growth stages corresponding to the code numbers are described below.

Growth Stages	**Codes**
Vegetative phase (120 days after planting)	10
Flowering stage (180 days after planting)	20

V. Grouping of Varieties

1. The candidate varieties for DUS testing shall be divided into groups to facilitate the assessment of Distinctiveness. The characteristics and their

states which are known from experience not to vary or to vary only slightly within a variety are suitable for grouping purpose.

2. The following characteristics shall be used for grouping Crossandra varieties:

1. Plant growth habit	(characteristic 1)
2. Rachis length	(characteristic 9)
3. Peduncle length	(characteristic 10)
4. Flower diameter	(characteristic 12)
5. Flower colour (RHS colour chart)	(characteristic 17)

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

   (+): See explanations on the Table of characteristics.

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

   QL: Qualitative characteristics

   QN: Quantitative characteristics

5. Type of assessment of characteristics indicated in column number seventh 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 plants

VII. Table of Characteristics

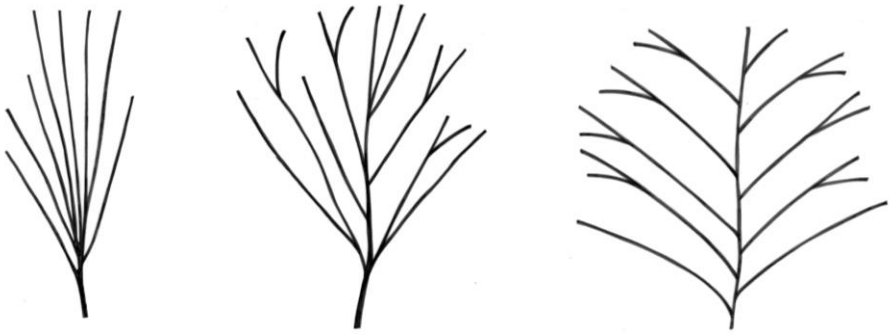
Sl. No.	Characteristics	States	Notes	Example varieties	Stage of observation	Type of assessment
1 QL (+) (*)	Plant Growth Habit	Erect	1	-	10	VG
		Semi-erect	2	Arka Ambara, Arka Kanaka, Arka Shreeya		
		Spreading	3	Arka Shravya, Mangalore Local		
2. QN (*)	Plant Height	Short (<60cm)	3	-	10	MS
		Medium (60 to 80cm)	5	Arka Ambara, Arka Kanaka, Arka Shravya, Arka Shreeya		
		Tall (>80cm)	7	Mangalore Local		
3. QN (*)	Plant Number of branches (Density)	Sparse (<10 Nos.)	3	-	10	MS
		Medium (10-20 Nos.)	5	Arka Ambara, Arka Kanaka, Arka Shreeya		
		Dense (>20 Nos.)	7	Arka Shravya, Mangalore Local		
4. QN (*)	Stem Thickness	Thin (<8 mm)	3	-	10	MS
		Medium (8 to 12 mm)	5	Arka Ambara, Arka Kanaka, Arka Shreeya, Mangalore Local		
		Thick (>12 mm)	7	Arka Shravya		
5. QL (*)	Stem Hairiness	Absent	1	Arka Ambara, Arka Kanaka, Arka Shravya, Arka Shreeya, Mangalore Local	10	VG
		Present	9	-		

6. QL (*)	Stem Color	Green	3	Arka Ambara, Arka Kanaka, Arka Shreeya, Mangalore Local	10	VG
		Pinkish brown	5	Arka Shravya		
7 QL (+) (*)	Leaf Lamina margin	Entire	3	-	10	VS
		Wavy	5	Arka Ambara, Arka Shravya, Arka Shreeya,		
8 QL (*)	Leaf Venation	Not prominent	1	Arka Ambara	10	VS
		Prominent	9	Arka Shravya, Mangalore Local, Arka Shreeya, Arka Kanaka		
9. QN (+) (*)	Inflorescence Rachis length	Short (4- 6cm)	5	Arka Ambara, Arka Shreeya, Arka Kanaka, Mangalore Local	20	MS
		Long (>6 cm)	7	Arka Shravya		
10 QN (+) (*)	Inflorescence Peduncle length	Short (2-4 cm)	5	Local	20	MS
		Long (> 4 cm)	7	Arka Ambara, Arka Shreeya, Arka Kanaka, Mangalore Local, Arka Shravya		
11 QL (*)	Inflorescence Peduncle colour	Green	1	Arka Ambara, Arka Kanaka, Arka Shreeya, Mangalore Local	20	VS
		Pinkish brown	3	Arka Shravya		
12 QN (+) (*)	Flower Diameter	Small (2 to 3 cm)	5	Local, Mangalore Local	20	MS

		Large (>3 cm)	7	Arka Ambara, Arka Shreeya, Arka Kanaka, Arka Shravya		
13 QL (*)	Flower Petal margin	Plain	3	Mangalore Local	20	VS
		Wavy	5	Arka Ambara, Arka Kanaka, Arka Shravya, Arka Shreeya,		
		Ruffled	7	-		
14 QL (*)	Flower Arrangement	Loose	5	Arka Shravya, Mangalore Local	20	VS
		Compact	7	Arka Ambara, Arka Kanaka, Arka Shreeya, Local		
15 QN (*)	Number of flowers per inflorescence	Few (<4)	3	Local	20	VS
		Many (≥4)	5	Arka Ambara, Arka Kanaka, Arka Shreeya		
16 QN (*)	Flower Remain open at a time in inflorescence	Few (<4)	3	Local	20	MS
		Many (≥4)	5	Arka Ambara, Arka Kanaka, Mangalore Local, Arka Shreeya, Arka Shravya		
17 QL (*)	Flower colour (RHS colour chart)	Orange	3	Arka Kanaka (Orange group 24. A)	20	VS
		Orange-Red	5	Arka Ambara (Orange-Red 31.B) Arka Shravya (Orange-Red 35.B) Arka Shreeya (Orange-Red 32.C)		
		Red	7	Local (Red 37.A) Mangalore Local (Red 41.C)		

VIII. Explanation on the Table of Characteristics

Characteristic 1. Plant: type



Erect (1) **Semi-erect (2)** **Spreading (3)**

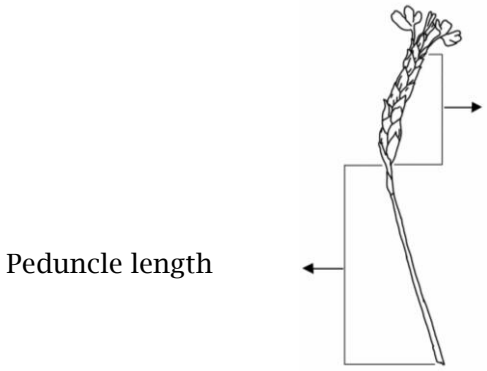
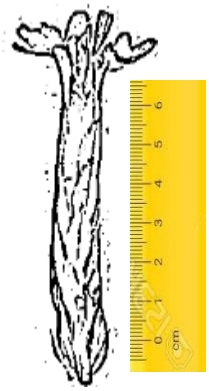
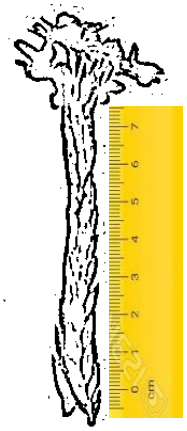


Figure 1. Sketch of Crossandra inflorescence

Characteristic 9. Inflorescence: Rachis length



Short
(5)



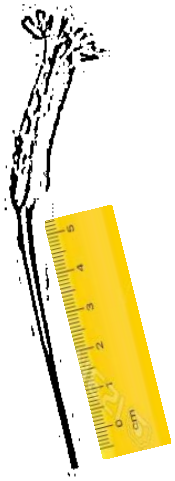
Long
(7)

Short
(5)

Long
(7)

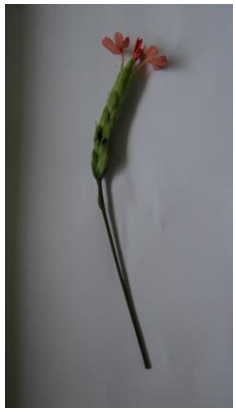
Characteristic 10. Inflorescence: Peduncle length

Short
(5)



Long
(7)

Short
(5)



Long
(7)

Characteristic 12. Flower: Diameter

Small
(5)

Large
(7)

Small
(5)

Large
(7)

IX. Working Group Details

The DUS test guidelines developed by the Task force (**3/2019**) constituted by the PPV & FR Authority for **Crossandra (***Crossandra infundibuliformis* (L.) Nees.) with consultation by Nodal officer, ICAR-IIHR, Hessaraghatta, Bangalore. Technical inputs also provided by the PPV & FR Authority.

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X. Name of DUS Test Centre:

Nodal DUS Test Centre	Other DUS Test Centre
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