

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

**On Tamarind
(*Tamarindus indica L.*)**



**Protection of Plant Varieties and Farmer's Rights
Authority**

(PPV & FRA)

Government of India, New Delhi

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Tamarind (*Tamarindus indica* L.)

I. Subject

These test guidelines shall apply to all varieties and hybrids of Tamarind (*Tamarindus indica* L.), member of family Fabaceae. It is commonly known as imli and Indian date.

II. Planting Material required

1. The Protection of Plant Varieties and Farmers' Rights Authority (PPV & FRA) shall decide on the quantity and quality of the planting material(s) 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.
2. Applicants submitting such planting material(s) 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.
3. The minimum number of planting material to be supplied by the applicant is 09 grafts for each location.
4. The planting materials supplied shall be healthy, vigorous without any nutrient deficiency symptom, free from pests or diseases or any mechanical damage.
5. The plant material should be grown under normal conditions without any special treatment, which would affect the expression of the characteristics of the variety.
6. The age of the plant(s) shall be minimum nine months from the date of grafting (propagated through softwood grafting or veneer grafting) on the *Tamarindus indica* rootstock and raised in the polythene bags.

III. Conduct of tests

1. The minimum duration of the DUS tests shall normally be at least two consecutive fruiting seasons.
2. The tests should be carried out under similar conditions ensuring satisfactory growth for the expression of the relevant characteristics of the germplasm/variety.
3. Tests shall be conducted at least at two places. If any essential characteristic of the candidate variety are not expressed for visual observation at these locations, the variety shall be considered for further examination at another test site.

4. 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. The addition test protocol for special purpose if any may be established by PPV & FRA. As a minimum, each test shall include 9 plants per location, planted at DUS test centre, with a spacing of 8 m x 8 m.

5. On-site DUS testing

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.

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. On-site testing may be conducted at the places specified by the applicant. The age of the trees at on-site testing shall be minimum 7 years. Minimum, 9 plants planted in uniform spacing, should be available for inspection and examination for 'on site' DUS testing. The trees must be healthy and free from pest & disease and raised under standard and uniform 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.

On-site examination shall be arranged during the fruiting season, when 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.

The Expert Committee constituted by the PPV & FRA shall be authorized to inspect on-site testing and recording of the appropriate characters. Applicant shall supply the Expert Committee with summary of distinct characteristics supported by photographs. The Expert Committee shall take notes and observations on distinctiveness and shall confirm preliminary data and/or summary of distinctiveness from applicant.

The Expert Committee shall submit examination report to the Authority.

IV. Methods and observations

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

1. For the assessment of Distinctiveness and Stability observation shall be made on 5 plants or parts taken out of 9 plants. In the case of parts of plants, the number to be taken from each of the plants should be 10.
2. For the assessment of uniformity, a population standard of 5 per cent with an

acceptance probability of at least 95 per cent should be applied. In case of a sample size of 9 plants, the maximum off type allowed would be one.

3. Mature leaves in the middle portion of the shoots should be selected for the observations on the leaf.
4. Observations on the mature fruit should be recorded when fruit is ready for harvesting.

V. Grouping of varieties

1. The candidate varieties for DUS testing shall be divided into different groups to facilitate the assessment of Distinctiveness. Characteristics, which are known from experience without much variation at various stages of growth evenly distributed across all varieties in the collection are suitable for grouping purpose.
2. The following characteristics are recommended for grouping of varieties
 - i. Growth habit (Characteristic 1)
 - ii. Mature pod Shape (Characteristic 6)
 - iii. Mature pod length (Characteristic 8)
 - iv. Mature fruit pulp colour (Characteristic 9)
 - v. Pulp TSS (°Brix) at ripe stage (Characteristic 10)
 - vi. Ripening period (Characteristic 13)

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 given for each state of expression of characters for different characteristics for the purpose of data processing.

3. Legend

(a) Characteristics with astrick (*) sign: The observations shall be observed during 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 are rendered impossible by preceding phenological characteristics and/ or by the environmental conditions of the testing region, adequate explanation shall be provided.

(b) Characteristics with plus (+) sign: These characteristics are explained in Section VIII. It is to be noted that for certain characteristics, the plant parts on which observations are to be taken are given in the explanation or figure(s) for clarity.

Type of assessment of characteristics indicated in column seven of Table of Characteristics are as follows:

- a) VG:** *Visual assessments by a single observation of a group of plants or parts of plants*
 - b) VS:** *Visual assessments by a single observation of individual plants or parts of plant*
 - c) MG:** *Measurement by a single observation of a group of plants or parts of plants*
 - d) MS:** *Measurement by a single observation of individual plants or parts of plant*
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) Tree type and growth habit: Observations should be recorded on growth pattern during vegetative phase (before flowering).
 - b) Leaf characteristics: Observations should be recorded from the middle leaf (mature) of branches.
 - c) Observations on flowers should be made at the time of full bloom (75% flowering).
 - d) Fruit: Observations on the mature fruits should be taken with minimum sample of 10 fruits.

VII. Table of characteristics

S.N.	Characteristics	States	Notes	Example accessions/ varieties	State of observation	Type of assessment
1	2	3	4	5	6	7
1 (* (+)	Growth habit	Spreading	3	Pratishthan	a	VS
		Semi-spreading	5	PKM-1, T-263		
		Upright	7	Ajanta, Urigam		
2	Tree foliage type	Sparse	1	Ajanta	a	VS
		Dense	9	Pratishthan, T-263		
3 (*	New flush color	Reddish green	5	T-263, PKM-1	b	VG
		Reddish brown	7	Pratishthan		
4 (*	Inflorescence (panicle) length (cm)	Low (<10.0)	3	Ajanta, Urigam	c	MS
		Medium (10.0 to 12.0)	5	T-263, PKM-1, Pratishthan		
		High (>12.0)	7	Goma Prateek		
5 (*	Matured fruit colour	Brown	3	T-263, PKM-1, Ajanta	d	VG
		Reddish brown	5	Goma Prateek		
		Grey	7	CHEST-10		
6. (* (+)	Mature pod shape	Curved	3	Goma Prateek Urigam, Pratishthan	d	VG
		Straight	7	T-263, PKM-1, Ajanta		
7 (*	Mature pod weight (g)	Low (<15.0)	3	Pratishthan	d	MS
		Medium (15.0 to 25.0)	5	Urigam, T-263, PKM-1, Ajanta		
		High (>25.0)	7	Goma Prateek		
8 (* (+)	Mature pod length (cm)	Short (<10.0)	3	Pratishthan	d	MS
		Medium (10.0 to 15.0)	5	PKM-1, T-263, Ajanta		
		Long (>15.0)	7	Goma Prateek		
9	Mature fruit pulp colour	Brown	5	T-263, PKM-1, Ajanta, Urigam	d	VG
		Reddish Brown	7	Goma Prateek		
10 (*	Pulp TSS at ripe stage	Low (<60 °B)	3	PKM-1	d	MG
		Medium (60-70 °B)	5	T-263, Pratishthan		

		High (>70 °B)	7	Goma Prateek		
11 (*)	Titrateable Acidity	Low (<8.0 %)	3	Sweet Type	d	MG
		Medium (8.0-10.0 %)	5	Red Type, Bantoor		
		High (>10.0%)	7	PKM-1, T-263, Urigam, Ajanta, Pratishthan		
12	Seed weight/pod	Low (<5.0 g)	3	Pratishthan, T-263	d	MG
		Medium (5.0-6.0g)	5	Sweet Type, Urigam		
		High (>6.0g)	7	PKM-1, Ajanta		
13	Ripening period	Early (255 days)	3	Pratishthan, Goma Prateek	d	VG
		Medium (270 days)	5	T-263, Urigam, Ajanta		
		Late (280 days)	7	PKM-1		

VIII. Explanation on the Table of Characteristics

Characteristic 1: Growth habit



(3)
Up right

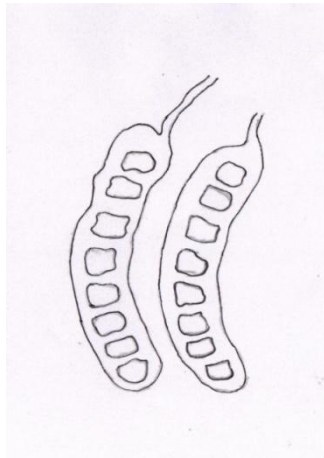


(5)
Semi- Spreading

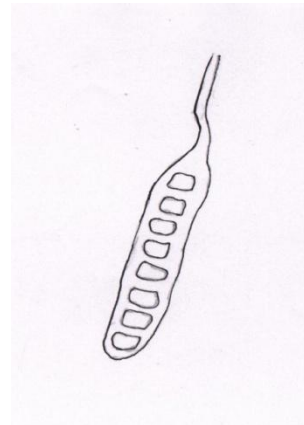


(7)
Spreading

Characteristic 14 : Mature fruit shape



(3 Curved)



(7 Straight)

IX. Working Group details:

The test guidelines developed by the task force (**1/2017**) constituted by the PPV & FR Authority for **Tamarind** with consultation by Nodal officer, ICAR-CHES, Godhra. Technical inputs also provided by the PPV & FR Authority.

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X. DUS testing centers

Nodal DUS Centre	Other DUS Centre
Central Horticulture Experiment Station, Godhra (CIAH, Bikaner)	Nil