Guidelines

For the Conduct of Tests for

Distinctiveness, Uniformity and Stability

On

Fenugreek

(*Trigonella foenum graecum* L.)

Protection of Plant Varieties & Farmers' Rights Authority

(PPV & FRA)

Government of India

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I. Subject

These test guidelines shall apply to all varieties/parental lines/ hybrids of Fenugreek (*Trigonella foenum graecum* L.)

II. Seed material required

1. The Protection of Plant Varieties and Farmers's Right Authority (PPV&FRA) shall decide when, where and in what quantity and quality of the seed material are required for testing a variety denomination applied for registration under the Protection of Plant Variety and Farmer's Rights (PPV& FR) Act, 2001. Applicants submitting such seed 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. The minimum quantity of the seed to be provided by the applicant shall be 250 g. Each of these seed lots shall be packed, sealed properly labeled with details in ten equal weighing packets and submitted in one lot. Parental lines should be packed separately in one packet
2. The seed submitted shall have at least 80% germination, 98% physical purity, highest genetic purity, uniformity, sanitary and phyto-sanitary standards. In addition the moisture content of the seed shall not exceed 8-9% to meet the safe storage requirement. The applicant shall also submit along with the seed a certified data on germination test made not more than one month prior to the date of submission.
3. The seed material submitted shall not have been subjected to any chemical or bio-physical treatment.

III. Conduct of test

1. The minimum duration of the DUS tests shall normally be at least two independent similar growing seasons.
2. The test shall normally be conducted at least at two test locations. If any essential characteristics of the candidate variety are not expressed for visual observation at these locations, the variety shall be considered for further examination at another appropriate test site or under special test protocol on expressed request of the applicant.
3. The field test shall be carried about under conditions favouring normal growth and expression of all test characteristics. The size of the plot shall be such that plants or parts of plants could be removed for measurement and observation without prejudicing the other observation on the standing plants until the end of the growing period. Each test shall include about 540 plants, in the plot size and planting space specified below across three replications. Separate plots for observations and for measurement can only be used if they have been subjected to similar environmental conditions. All the replications shall be sharing similar environmental conditions of the test locations.

4. Test plot design

Number of rows	:	6
Row length	:	2 m
Row to row distance	:	50 cm
Plant to plant distance	:	20 cm
Number of replications	:	3
Expected plants per replication	:	200

5. Observation should not be recorded on plants in border rows.

6. Additional test protocols for special test shall be established by the PPV&FR Authority.

IV. Methods and observation

1. The characteristics described in the Table of characteristics (see section VII) shall be used for the testing of variety/pure lines/hybrids for their DUS.
2. For the assessment of Distinctiveness and Stability, observations shall be made on 30 plants or parts of plants, which shall be equally divided among 3 replications (5 plants per replications).
3. For the assessment of uniformity of characteristics on the plot as a whole (visual assessment by a single observation of a group of plants or parts of plants), a population standard of with, an acceptance probability of at least 95% should be applied. In the case of same size of 100 plants, the number of off type allowed shall not exceed 5%.
4. All observations on growth habit shall be made at the time of appearance of king umbel. (Excluding basal leaf)
5. All observation on the seed shall be made on harvested dry seeds.
6. For the assessment of all colour characteristics the latest Royal Horticultural Society (RHS colour chart) shall be used.

V. Grouping of varieties based on characters

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 very 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 purposes.
2. The following characteristics shall be used for grouping of fenugreek varieties.
    1. Apex shape of first leaf blade (Characteristics No. 2)
    2. Size of leaf on first primary branches axis for length and width (L/W) (Characteristics No. 3)
    3. Apex shape of leaf blade on first primary branch (Characteristics No. 5)
    4. Size of leaf on first pod axis for length and width (L/W) (Characteristics No. 1)
    5. Size of leaf on fully grown terminal leaf for length and width (L/W) (Characteristics No. 9)

6. Apex shape of leaf blade on fully grown terminal leaf (Characteristics No. 11)
7. Number of primary branches (Characteristics No. 12)
8. Plant growth pattern (Characteristics No. 13)
9. Plant growth habit (Characteristics No. 14)
10. Pod length (Characteristics No. 17)
11. Pod curvature (Characteristics No. 18)
12. 1000 seed test weight (Characteristics No. 19)

VI. Characteristics and symbols

1. To assess Distinctiveness, Uniformity and Stability, the characteristics and their states as given in the Table of characteristics (section VIII) shall be used.
2. Note (1 to 9) shall be used to describe the state of each character for the purpose of digital data processing and this note is given against the states of each characteristic.
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 preceding phenological characteristics or by the environmental conditions of the testing region. Under such exceptional situation, adequate explanation should be provided.

   (+) See Explanations on the Table of characteristics in Section VIII. It is to be noted that for certain characteristics, the plant parts on which observation to be taken are given in the explanation of figure(s) for clarity and not the colour variation.

4. A decimal code number in the sixth coloum of table of characteristics indicates the optimum stage of observation of each characteristic during the growth and development of plant. The relevant growth stages corresponding to those decimal codes numbers are described below:

Decimal code for the growth stages

Decimal Code	Growth Stage
10	At the emergence of first leaf
20	At the 50% flowering
30	At the time of pod initiation
40	At the time of Maturity
50	After the harvesting and drying of mature seed

5. Type of assessment of characteristics indicated in column seven of 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 observation of individual plants or parts of plants

VII. **Table of Characteristics**

S.No	Characteristics	States	Note	Example varieties	Stage of observation	Type of assessment
1	**2**	**3**	**4**	**5**	**6**	**7**
1. (+)	Basal shape of first leaf blade	Acute	3	RMt-351, Pant Ragini	10	MS
		Obtuse	5	GM-2, RMt-1,RMt-143, AFg-1, GM-1, CO-2, Hisar Sonali, AFg-2, Rajendra Kanti, RMt-305		
		Rounded	7	Hisar Madhavi, Hisar Suvarna, Hisar Mukta, Azad Methi-1, RMt-303, Lam Selection-1		
2. (*) (+)	Apex shape of first leaf blade	Obtuse	3	RMt-1, Hisar Suvarna, Hisar Mukta, RMt-305	10	MS
		Rounded	5	GM-2, RMt-351, Hisar Madhavi, Azad Methi-1, RMt-143, RMt-303, AFg-1, GM-1, CO-2, Hisar Sonali, AFg-2, Rajendra Kanti, Lam Selection-1, Pant Ragini		
3. (*)	Size of leaf on first primary branches axis for length and width (L/W)	Small in length & width	3	GM-2, RMt-1, RMt-351	30	MG
		Small in length but wider	5	Hisar Madhavi, Hisar Suvarna, Azad Methi-1		
		Large length but narrow	7	Hisar Mukta, RMt-143, RMt-303, AFg-1, GM-1, CO-2		
		Larger & wider	9	Hisar Sonali, AFg-2, Rajendra Kanti, Lam Selection-1, RMt-305, Pant Ragini		
4. (+)	Basal shape of leaf blade on first primary	Acute	3	GM-2, Hisar Sonali, Hisar Suvarna, RMt-305, AFg-1, Pant Ragini, AFg-2, GM-1, Lam Selection-1, CO-2,	30	MS

	branch axis	Obtuse	5	Azad Methi-1, Hisar Mukta, RMt-143, RMt-303, RMt-1,Hisar Madhavi, RMt-351,Rajendra Kanti,		
5. (*) (+)	Apex shape of leaf blade on first primary branch axis	Acute Obtuse Rounded	3 5 7	GM-1 GM-2, Rajendra Kanti, CO-2 Hisar Suvarna, RMt-351, Hisar Sonali, AFg-2,Lam Selection-1, RMt-305, Azad Methi-1, Pant Ragini, Hisar Mukta, RMt-143, RMt-303, AFg-1, RMt-1,HisarMadhavi	30	MS
6.	Size of leaf on first pod axis for length and width (L/W)	Small in length & width Small in length but wider Large length but narrow Large & wider	3 5 7 9	Hisar Mukta Hisar Suvarna, RMt-303, AFg-1, RMt-351, Pant Ragini, Rajendra Kanti Hisar Madhavi, GM-1, Hisar Sonali, AFg-2, RMt-143 GM-2, RMt-305, CO-2, RMt-1, Lam Selection-1, Azad Methi-1	40	MG
7. (+)	Basal shape of leaf blade on first pod axis	Acute Obtuse	3 5	Hisar Mukta, RMt-143, RMt-303, GM-1 RMt-305, CO-2, Pant Ragini, AFg-1, RMt-1, Lam Selection-1, Hisar Madhavi, GM-2, Hisar Sonali, RMt-351, Hisar Suvarna, AFg-2, Azad Methi-1, Rajendra Kanti	40	MS
8. (+)	Apex shape of leaf blade on first pod axis	Acute	3	RMt-305, CO-2, Pant Ragini, AFg-1, RMt-1, Lam Selection-1, GM-2, Hisar Sonali, RMt-351, AFg-2, Azad Methi-1, Rajendra Kanti	40	MS

		Obtuse Rounded	5 7	Hisar Madhavi, Hisar Suvarna, RMt-143, RMt-303 Hisar Mukta, GM-1		
9. (*)	Size of leaf on fully grown terminal leaf for length and width (L/W)	Small in length & width Small in length but wider Large length but narrow Large & wider	3 5 7 9	Hisar Mukta, LamSelection-1, RMt-1, Hisar Sonali, AFg-2, RMt-305, RMt-351 RMt-143, GM-2, Pant Ragini, Hisar Madhavi Hisar Suvarna, RMt-303, Rajendra Kanti, AFg-1, GM-1, CO-2, Azad Methi-1	20	MG
10. (+)	Basal shape of leaf blade on fully grown terminal leaf	Acute Obtuse	3 5	RMt-305, GM-1, CO-2,Lam Selection-1, Azad Methi-1, Pant Ragini, Hisar Sonali, Hisar Madhavi, RMt-351, RMt-1, RMt-143, GM-2, Hisar Suvarna, RMt-303, Rajendra Kanti, AFg-1 AFg-2, Hisar Mukta	20	MS
11. (*) (+)	Apex shape of leaf blade on fully grown terminal leaf	Acute Obtuse	3 5	CO-2, AFg-2, Hisar Sonali,Hisar Madhavi, Hisar Mukta, RMt-1, RMt-143, GM-2, Rajendra Kanti, RMt-351, Pant Ragini, Lam Selection-1, GM-1, AFg-1, Azad Methi-1, Hisar Suvarna, RMt-303, RMt-305	20	MS

12. (*)	Number of Primary Branches	Less (<6)	3	Hisar Sonali, GM-2, GM-1, Hisar Mukta, AFg-1	40	MG
		More (>6)	5	RMt-143, RMt-303, RMt-305, Rajendra Kanti, CO-2, AFg-2, Hisar Suvarna, Lam Selection-1, Azad Methi-1, Pant Ragini, RMt-1, Hisar Madhavi, RMt-351and		
13. (*) (+)	Plant Growth Pattern	V type	3	AFg-1, RMt-305, AFg-2, GM-2, RMt-143, RMt-351, GM-1 and Hisar Madhavi, Lam Selection-1, RMt-1, RMt-303, Rajendra kanti, CO-2, Hisar Mukta and Hisar Suvarna	20	VG
		U type	5	Hisar Sonali, Azad Methi-1, Pant Ragini,		
14. (*)	Plant Growth habit	Determinate	3	RMt-305	40	MG
		Indeterminate	5	AFg-1, AFg-2, RMt-143, Hisar Sonali, Azad Methi-1, Lam Selection-1, CO-2, Pant Ragini, RMt-351, Hisar Suvarna, RMt-1, Hisar Mukta, RMt-303, Rajendra kanti, GM-1, GM-2 and Hisar Madhavi		
15.	Plant height	Short (<45 cm)	3	Hisar Sonali, RMt-305, Lam Selection-1, Pant Ragini, RMt-351, Hisar Mukta, Rajendra kanti, GM-2, RMt-1	40	MG
		Tall (>45cm)	5	RMt-143, Hisar Madhavi, AFg-2, Hisar Suvarna, GM-1, Azad Methi-1, RMt-303, CO-2, AFg-1		
16.	Pod/plant	Low(<50)	3	GM-2 and Hisar Sonali, RMt-303, Rajendra kanti, CO-2, AFg-1, Hisar Suvarna, Pant Ragini, RMt-143, RMt-351 and RMt-1	40	MG
		High (>50)	5	Hisar Madhavi, AFg-2, GM-1, Hisar Mukta, Azad Methi-1, RMt-305, Lam Selection-1		

17. (*)	Pod length (cm)	Short (<11) Medium (11-12) Long (>12)	3 5 7	Hisar Suvarna, RMt-351 RMt-303, RMt-305, Rajendra kanti, AFg-2, Lam Selection-1, and RMt-1, Azad Methi-1, Pant Ragini Hisar Sonali, Hisar Madhavi, RMt-143, GM-2, GM-1, Hisar Mukta, CO-2, AFg-1,	40	MG
18. (*) (+)	Pod curvature	Moderately curved Strongly Curved	3 5	Azad Methi-1, RMt-305, Lam Selection-1, CO-2, Pant Ragini, Hisar Suvarna, RMt-1, RMt-303, Rajendra kanti, GM-1, RMt-143, Hisar Sonali, Hisar Madhavi, AFg-2, GM-2, RMt-351, Hisar Mukta, AFg-1	40	MS
19. (*)	1000 seed weight	Low (<16g) Medium(16-18g) High (>18g)	3 5 7	Rajendra kanti, Lam Selection-1, RMt-351, RMt-303, GM-1, Pant Ragini, RMt-1, Hisar Sonali, AFg-2, Hisar Suvarna, Azad Methi-1, CO-2, Hisar Madhavi, RMt-305, Hisar Mukta, GM-2, RMt-143, AFg-1,	50	MG

VIII. Explanations of Table of characteristics

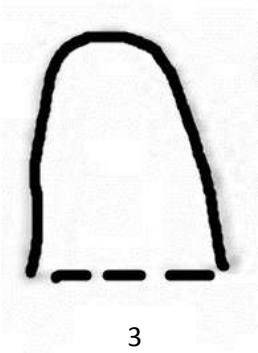
Characteristic 1. Basal shape of first leaf blade

3
Acute

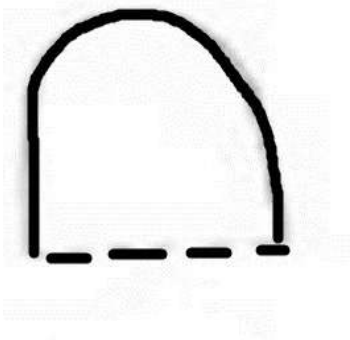
5
Obtuse

7
Rounded

Characteristic 2. Apex shape of first leaf blade



3
Obtuse



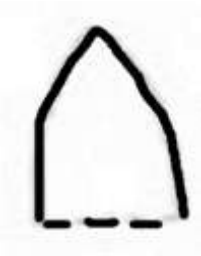
5
Rounded

Characteristic 4. Basal shape of leaf blade on first primary branch axis
Characteristic 7. Basal shape of leaf blade on first pod axis
Characteristic 10. Basal shape of leaf blade on fully grown terminal leaf

3
Acute

5
Obtuse

Characteristic 5. Apex shape of leaf blade on first primary branch axis
Characteristic 8. Apex shape of leaf blade on first pod axis



3

Acute

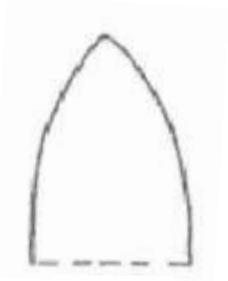
5

Obtuse

7

Rounded

Characteristic 11. Apex shape of leaf blade on fully grown terminal leaf



3
Acute

5

Obtuse

Characteristic 13. Plant Growth Pattern

3	5	7
Erect	V Shape	U Shape

Characteristic 18. Pod curvature

3	5
Moderately Curved	Strongly curved

IX. Working group details

These test guidelines have been developed by National Research Centre on Seed Spices, Ajmer, in consultation with the Task Force No. 5/2012 constituted by the PPV&FR Authority.

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