

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

On

Foxtail millet
(Setaria italica (L.) Beauv)



Protection of Plant Varieties and Farmers' Rights Authority

(PPV & FRA)

Government of India

Foxtail millet (*Setaria italica* (L.) Beauv)

I. Subject

These test guidelines shall apply to all varieties, hybrids and parental lines of Foxtail millet (*Setaria italica* (L.) Beauv).

II. Material required

1. The Protection of Plant Varieties and Farmers' Right Authority (PPV&FRA) shall decide when, where and in what quantity and quality of the seed material is required for testing a varietal denomination applied for registration under the 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 grams. The seed shall be packed and sealed in ten equal weighing packets (25 gm each) and submitted in one lot. If requested by the competent authority, the applicant shall submit 10 panicles.
2. The seeds submitted shall have the following standards for germination capacity, moisture content and physical purity.
 - a) Germination : 80% (Minimum)
 - b) Moisture content : 10 – 12% (Maximum)
 - c) Physical purity : 97% (Minimum)
 - d) Inert matter : 3% (Maximum)
3. 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. It also shall possess the highest genetic purity, uniformity, sanitary and phyto-sanitary standards.
4. The plant material shall not have been subjected to any chemical and bio-physical treatment.

III. Conduct of tests

1. The minimum duration of the DUS test shall normally be at least two independent similar growing seasons.
2. The test shall normally be conducted at least in two locations. If any essential characters of the candidate variety are not expressed 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 out under conditions favouring normal growth and expression of all test characteristics. The size of the plots shall be such that plants or its parts could be removed for measurement and observation without prejudicing the other observations on the standing plant until the end of growing period. Each test shall include about 480 plants across four replications. Separate plots for observation on disease/ pest resistance for those varieties claiming resistance shall be laid out in two replications.

4. Test plot design:

Number of rows	:	04
Row length	:	3.0 m
Row to row distance	:	30cm
Plant to plant distance	:	10 cm
No. of replication	:	04

5. Observations shall not be recorded on plants in border rows.
6. Additional tests for special purpose shall be established by the PPV& FR Authority.

IV. Methods and observations

1. The characteristics described in the table of characteristics (see Section VII) shall be used for testing of varieties, inbred lines and hybrids for their DUS.
2. For the assessment of Distinctness and Stability, observations shall be recorded on 40 plants or parts of 40 plants, which shall be divided among 4 replications (10 plants in each replication).
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), the number of deviants (including plant parts) should not exceed 2 in 100.
4. For the assessment of all colour characteristics, the latest Royal Horticultural Society (RHS) colour chart shall be used.

V. Grouping of varieties

1. The candidate varieties for DUS testing shall be divided into groups to facilitate assessment of Distinctness. Characteristics which are suitable for grouping purpose are those which do not vary or vary slightly, within a variety. Their various states of expression should be fairly evenly distributed throughout the collection.

2. The following characteristics are proposed to be used for grouping Foxtail millet varieties:
 - a) Plant Pigmentation (Characteristic 3)
 - b) Days to 50% flowering (Characteristic 10)
 - c) Inflorescence Shape (Characteristic 11)
 - d) Inflorescence bristles(Characteristic 12)
 - e) Seed colour(Characteristic 21)

VI Characteristics & symbol

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 characteristic 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 decimal 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.

Decimal code for the growth stage

Stage code	General Description
04	Seedling
15	2-4 Leaf stage
26	Vegetative
54	Flowering
67	Dough stage
77	Seed filling
83	Maturity
87	Harvest
95	After harvest

5. The optimum stage of plant growth for assessment of each characteristic is given in the sixth column.
6. Type of assessment of characteristics indicated in column 7 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

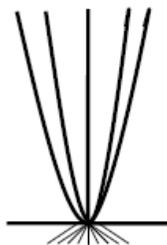
S. No.	Character	Status	Note	Example Varieties	Stage of observations	Type of assesment
1	2	3	4	5	6	7
1 (* (+)	Plant: Growth habit	Erect	1	SiA 3088 (Surya Nandi)	04	VG
		Decumbent	5	EC-104309		
		Prostrate	7	-		
2	Leaf: Colour	Light Green (RHS NO 149C)	1	Pratap Kangini (SR 51)	26	VG
		Green (RHS NO 134A)	2	HMT 100-1		
		Dark green (RHS NO 141A)	3	SiA 3088 (Surya Nandi)		
		Yellow (RHS NO 2B)	5	ISe 148(IC0077803)		
		Purple (RHS NO N78B)	7	IC 77732		
		Deep purple (RHS NO N79C)	8	ISe 294(IC0077952)		
3 (*	Plant: Pigmentation at auricle	Absent	1	SiA 3088 (Surya Nandi)	54	VG
		Present	9	SiA 2644 (Sri Lakshmi)		
4 (+)	Leaf: Attitude	Erect	3	IC 78130	54	VG
		Droopy	7	Meera (SR 16)		
5	Leaf Sheath: Pubescence	Absent	1	-	54	VG
		Present	9	Pratap Kangini		
6	Leaf sheath: Intensity of Pubescence	Low	3	SiA 3085	54	VG
		Medium	5	Meera(SR 16)		
		High	7	Pratap Kangini(SR 51)		
7	Leaf Blade: Pubescence	Absent	1	Meera (SR 16)	54	VG
		Present	9	Krishnadevaraya		

8 (+)	Flag leaf: Blade length(cm)	Short(<20)	3	ISe 175	54	MS
		Medium(20-35)	5	Meera (SR 11)		
		Long(>35)	7	Surya Nandi (SiA 3088)		
9 (+)	Flag leaf : Blade width (cm)	Narrow(<1.5)	3	GS 678	54	MS
		Medium(1.5-3.0)	5	SiA 2644 (Sri Lakshmi)		
		Wide(>3.0)	7	IC 46616		
10 (* (+)	Days to 50% flowering	Early(<40)	3	ISe 5	54	MG
		Medium(40-55)	5	Surya Nandi (SiA 3088)		
		Late(>55)	7	GS 731		
11 (* (+)	Inflorescence: Shape	Oblong	1	Pratap Kangini	54	VG
		Pyramidal	3	IC 600968		
		Cylindrical	5	SiA 3088 (Surya Nandi)		
12 (* (+)	Inflorescence: Bristles	Absent	1	IC 600968	54	VG
		Present	9	Sri Lakshmi (SiA 2644)		
13 (* (+)	Inflorescence: Length of bristles	Short	3	Surya Nandi (SiA 3088)	54	VG
		Medium	5	SiA 3085		
		Long	7	Sri Lakshmi (SiA 2644)		
14 (+)	Peduncle: Length(cm)	Short(<20)	3	GS 1929	54	MS
		Medium(20.0-30)	5	SiA 3156		
		Long(30.1-40)	7	ISe 335		
		Very long(>40)	9	ISe 59		
15 (+)	Inflorescence: Apical sterility	Absent	1	IC 78073	67	VG
		Present	9	Sri Lakshmi (SiA 2644)		
16 (* (+)	Inflorescence: Compactness	Lax	3	TNAU 186	67	VG
		Medium	5	Meera (SR 11)		
		Compact	7	Surya Nandi		
17 (+)	Inflorescence: Lobes	Absent	1	IC 600968	67	VG
		Present	9	Meera (SR 11)		
18 (+)		Short (<80)	3	ISe 42	83	MS

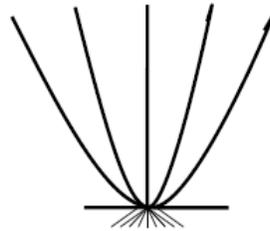
	Plant: Height at maturity (cm)	Medium (80.0-120)	5	SiA 3085		
		Tall (>120)	7	ISe 241		
19	Number of Productive tillers per plant	Low(<4)		SiA 3085	83	MS
		Moderate(4.0-8)		IC 46638		
		Profuse(>8)		GS 2095		
20 (+)	Earhead : Length(cm)	Short(<10)	1	ISe 58	83	MS/MG
		Medium (10.0-15.0)	3	CO 7		
		Long(>15)	5	HMT 100-1		
21 (*)	Seed : Colour	Whitish (RHS NO 161C)	1	Krishnadevaraya	83	VG
		Yellow (RHS NO 163C)	3	K 221-1		
		Brown (RHS NO 187B)	4	IC 77687		
		Orange (RHS NO N172C)	6	IC 78285/PRK 1		
		Black (RHS NO 203 A)	7	IC 78073		
22 (*)	Seed: Shape	Elliptical	2	Lepakshi (AK 132-1)	95	VG
		Oval	4	Pratap Kangini		
23 (*)	1000 grain weight (g)	Low(<2)	2	GS 145	95	MG
		Medium(2.0-4)	4	SiA 3156		
		High(>4)	6	GS 128		

VIII. Explanations for Table of Characteristics

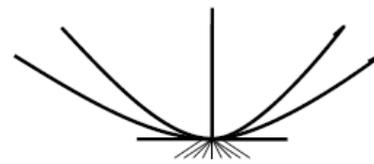
Characteristic 1. Plant: Growth habit



(1)
Erect



(5)
Decumbent



(7)
Prostrate

Characteristic 4. Leaf: Attitude



(3)
Erect



(7)
Droopy

Characteristic 8. Flag leaf: Blade length (cm)

Flag leaf blade length is measured from ligule to flag leaf blade tip.

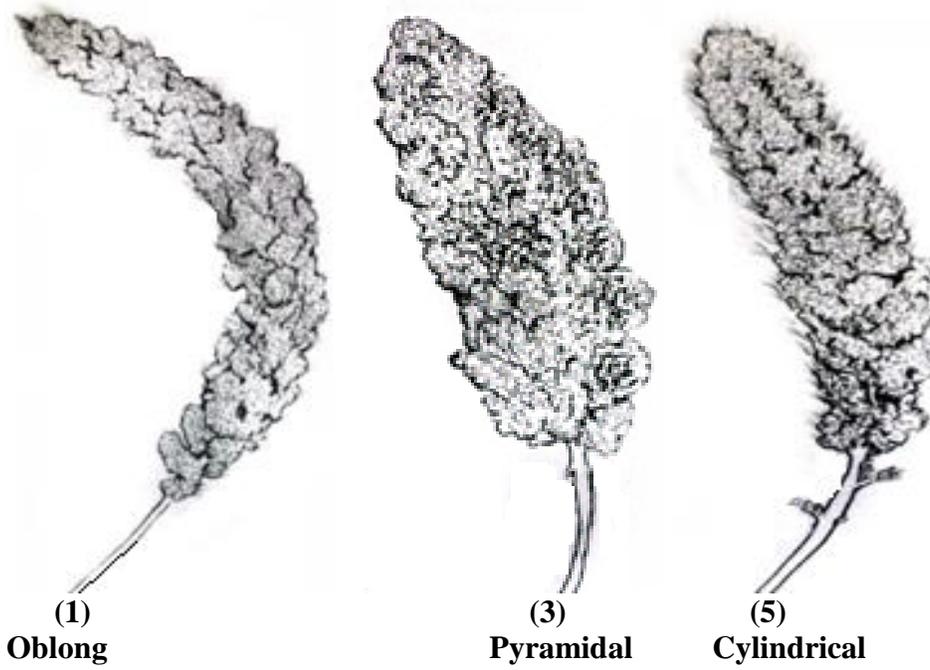
Characteristic 9. Flag leaf: Blade width (cm)

Flag leaf blade width is measured at the widest point of the flag leaf

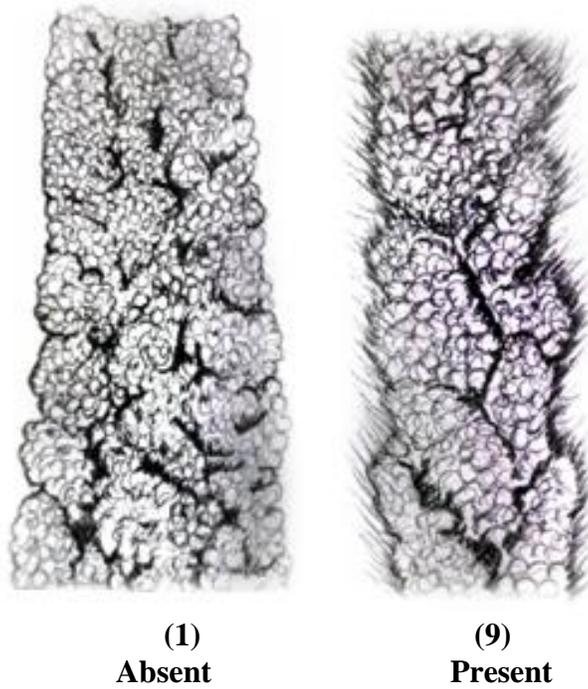
Characteristic 10. Days to 50 % flowering

Days to 50% flowering is from sowing to the stage, when ears have emerged from 50% of main tiller.

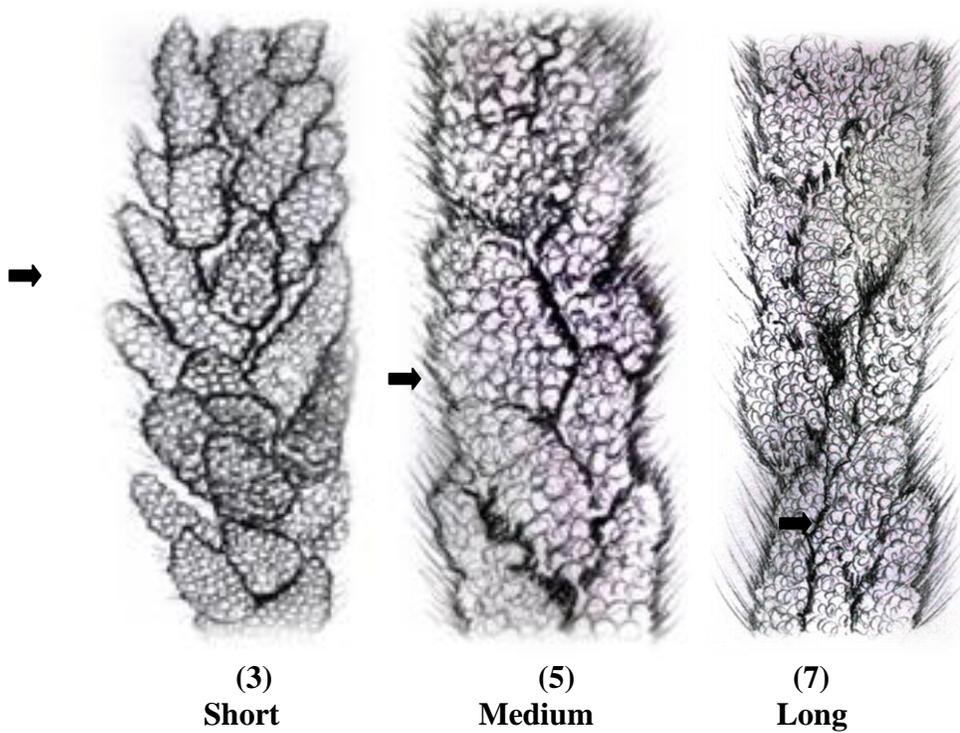
Characteristic 11. Inflorescence: Shape



Characteristic 12. Inflorescence: Bristles



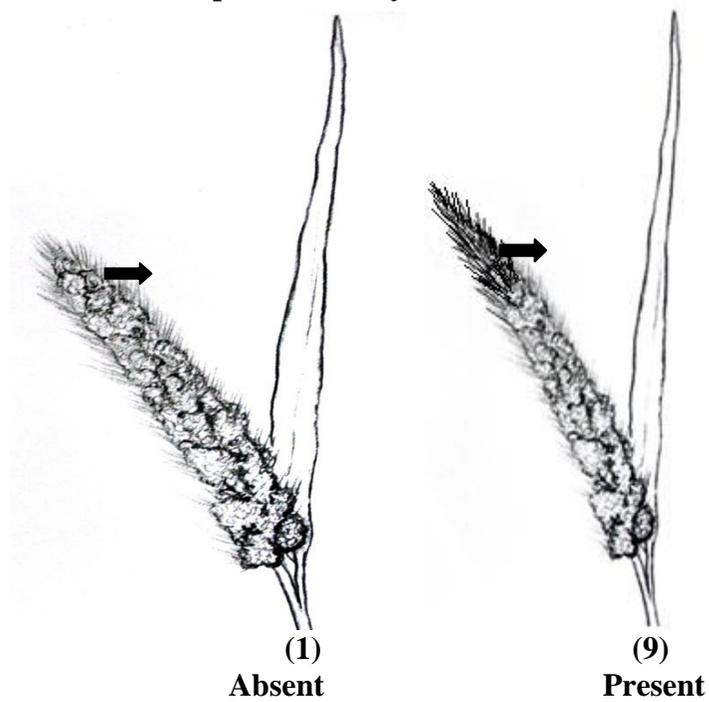
Characteristic 13. Inflorescence: Length of bristles



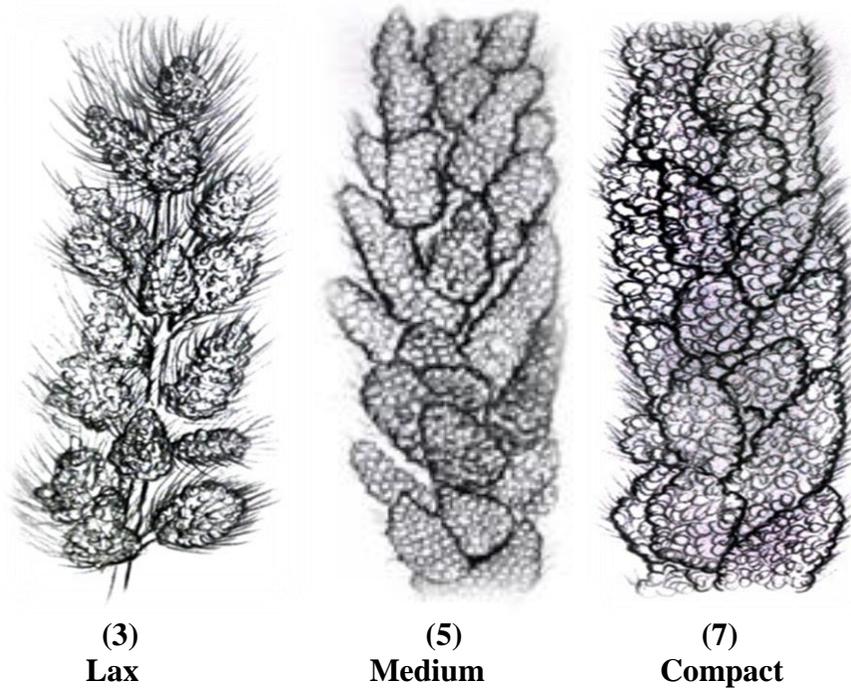
Characteristic 14. Peduncle: Length (cm)

Peduncle length is measured from earhead base to the top most node of main tiller.

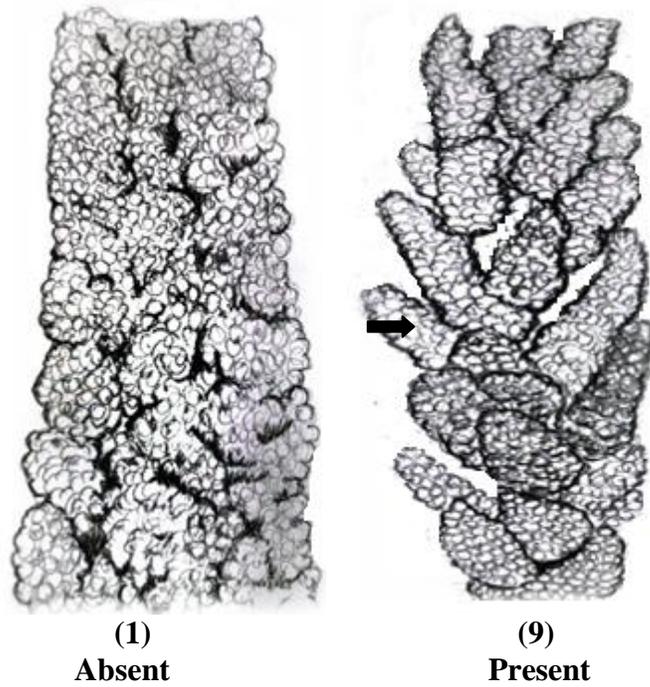
Characteristic 15. Inflorescence Apical: Sterility



Characteristic 16. Inflorescence: Compactness



Characteristic 17. Inflorescence: Lobes



Characteristic 18. Plant: Height at maturity(cm)

Plant height is measured from ground level to the tip of the ear head of main tiller.

Characteristic 20. Ear head length (cm)

Ear head length is measured from base of inflorescence to its tip .

IX. Working Group Details:

These Test guidelines have been developed by the National Core Committee? in consultation with the Project Coordinator, All India Coordinated Small Millets Improvement Project at UAS, GKVK, Bangalore-560 065 and the Nodal Officer, DUS Test Centre and Task Force constituted by the Authority. Technical inputs was also provided by Dr. D.S. Pilania (Technical Assistant), Dr. Ravinder Kumar (Technical Examiner), Ms. Vijaya Chaudhary (Technical Examiner) and Mr. Suneet Kumar (Technical Examiner).

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X. DUS Test Centres

Nodal Center	Co -nodal Centers
PC AICSMIP, UAS, Bengaluru	ZARS, Nandyal, AP