

Kodo millet (*Paspalum scorbiculatum* L.)

I Subject:

These test guidelines apply to all the varieties, hybrids and parental lines of Kodo millet (*Paspalum scorbiculatum* L.)

II Material required:

1. The Protection 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 material to be the applicant shall be 500 grams. The seed shall be packed and sealed in ten equal weighing packets of 50 grams each and submitted in one lot. In addition, 10 panicles need to be submitted, if required.
2. The seeds submitted shall have the following standards of seed germination:
 - a. Germination : 80% (Minimum)
 - b. Moisture content : 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 as per national requirement.
4. The seeds/planting 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 for new varieties and one season in case of farmers' varieties and varieties of common knowledge (VCK) under extant category.
2. The test shall normally be conducted at least at two test locations.
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 plants until the end of growing period. Each test shall include about 360 plants across three replications. Separate plots for observation on pest/ disease 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: 3

5. Observation 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 observation:

1. The characteristics described in the table of characteristics (Section VII) shall be used for the testing of varieties, parental lines and hybrids for their DUS.
2. For the assessment of Distinctness and Stability, observations shall be recorded on 30 plants or parts of 30 plants, which shall be divided among 3 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 off types (including plant parts) should not exceed 2 in 100.
4. For the assessment of all colour characteristics, the latest Royal Horticultural Society (RHS) color 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 to be used for grouping Kodo millet varieties

1. Leaf juncture pigmentation (Characteristic 6)
2. Panicle appearance (Characteristic 12)
3. Spikelet arrangement on rachis (Characteristic 14)
4. Spikelet irregular rows: Intensity (Characteristic 15)

5. Glume: Nerves on glumes (Characteristic 24)

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 (1-9) 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
15	2-4 Leaf stage
26	Vegetative
51	50 %Flowering
59	Complete flowering
67	Dough stage
77	Seed filling
83	Maturity
95	After harvest

5. Type of assessment:

MG: Single measurement 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 plant parts.

VS: Visual assessment by observation of individual plant or parts of plants.

VII Table of Characteristics

Sl no	Characteristics	States	Score/ Notes	Example Varieties	Stage of observations	Type of assessment
1 (+)	Plant: Growth habit	Erect	3	JK 155	15	VG
		Decumbent	5	JK 439		
		Prostrate	7	GPLM 302		
2	Basal tillers: Number	Very low (<10)	2	GPLM 16	26	MS
		Low (10-20)	3	RK 390-25		
		Medium (20.1-30.0)	5	GPLM 12		
		High (>30)	7	GPLM 5		
3 (* (+)	Leaf : Attitude	Erect	3	JK 48	26	VG
		Droopy	5	JK 155		
4 (* (+)	Days to 50% flowering	Early(<65)	3	GPLM 8	51	MG
		Medium (65-75)	5	JK 65		
		Late(75-85)	7	TNAU 86		
		Very late(>85)	9	GPLM 328		
5 (*	Leaf Sheath: Pigmentation	Absent	1	JK 48	54	VS
		Present	9	JK 155		
6 (*	Leaf juncture: Pigmentation	Absent	1	RK 390-25	54	VS
		Present	9	JK 48		
7 (*	Internode: Pigmentation	Absent	1	GPLM 23	54	VS
		Present	9	JK 155		
8	Leaf blade: Pigmentation	Absent	1	DPS 9-1	54	VG
		Present	9	-		
9 (+)	Flag leaf blade: Length (cm)	Short(<20.0)	3	RK 390-25	54	MS
		Medium (20.0-30.0)	5	DPS 9-1		
		Long(>30.0)	7	-		
10 (+)	Flag leaf blade: width(cm)	Narrow(<0.5)	3	-	54	MS
		Medium (0.5-1.0)	5	JK 98		
		Wide(>1.0)	7	JK 48		
11 (+)	Peduncle: Length (cm)	Short(<5.0)	3	-	54	MS
		Medium (5.0-10.0)	5	JK 48		
		Long(> 10.0)	7	RK 390-25		

12 (* (+)	Panicle: Appearance	Compact	3	RK 390-25	54	VG
		Semi compact	5	JK 155		
		Open	7	Indira kodo 1		
13 (+)	Panicle: Exertion	Partial	1	RK 390-25	54	VS
		Complete	9	JK 13		
14 (* (+)	Spikelet: Arrangement on rachis	Regular	2	TNAU 86	67	VG
		Irregular	8	RK 390-25		
15	Spikelet irregular rows: Intensity	Two-three	3	JK 48	67	VG
		Two -four	5	-		
		Lower half (regular at upper half)	7	RK 390-25		
16 (+)	Spike: Branching	Absent	1	DPS 9-1	67	VG
		Present	9	RK 390-25		
17 (+)	Spike: Curvature	Straight	2	TNAU 86	67	VG
		Curved	4	RK 390-25		
18	Spikelet: Density	Lax	4	JK 48	67	VG
		Dense	6	RK 390-25		
19 (+)	Culm: Branching	Low (<3)	3	GPLM 37	67	MG
		Medium(3-7)	5	JK 48		
		High (>7)	7	TNAU 86		
20 (+)	Panicle: Length (cm)	Short (<5.0)	3	GPLM 610	77	MS
		Medium (5.1-8.0)	4	JK 13		
		Long (>8.0)	5	JK 62		
21 (+)	Thumb raceme: Length (cm)	Short (< 5)	3	-	77	MS
		Medium (5-7)	5	JK 62		
		Long (>7)	7	JK 48		
22 (+)	Raceme: Length (cm)	Short(< 5.0)	3	GPLM 6	77	MS
		Medium (5.0-10.0)	5	JK 48		
		Long (10.1-15.0)	7	GPLM 54		
		Very long (>15.0)	9	-		
23 (* (+)	Raceme: Number (Above thumb)	Low (<2)	3	GPLM 101	77	MS
		Medium (2-4)	5	GPLM 1		
		High (4-6)	7	DPS 9-1		
		Very high	9	-		

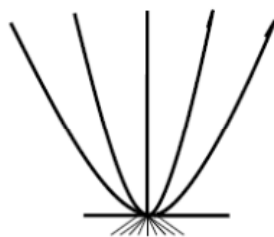
		(>6.0)				
24 (* (+)	Glume: Appearance of Nerves	Narrow (7 nerves)	3	JK 48	77	VG
		Broad (5 nerves)	5	DPS 9-1		
25 (* (+)	Plant: Height (cm)	Semi dwarf (<30.0)	1	GPLM 196	83	MS
		Dwarf (30.0-50.0)	3	GPLM 193		
		Medium (50.1-70.0)	5	JK 13		
		Tall (>70.0)	7	JK 65		
26	Lodging	Absent	1	TNAU 86	83	VG
		Present	9	DPS 9-12		
27	Seed: Shattering	Absent	1	GPLM 2	83	VG
		Present	9	TNAU 86		
28 (*	Grain: Colour	Light brown RHS NO 177D	3	GPLM 68	83	VG
		Brown RHS NO177C	4	-		
		Dark brown RHS NO 177B	5	JK 155		
29	Grain: Shape	Elliptical	2	JK 439	95	VG
		Oval	4	RK 390-25		
30 (*	1000- grain weight (g)	Low (<5.0)	3	GPLM 129	95	MG
		Medium (5.0-6.0)	5	RK 390-25		
		High (>6.0)	7	GPLM 54		

II Explanations for Table of Characteristics

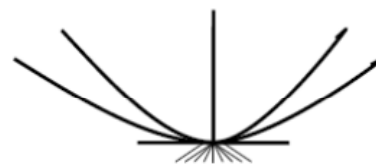
Characteristic 1 Plant: Growth habit



1
Erect

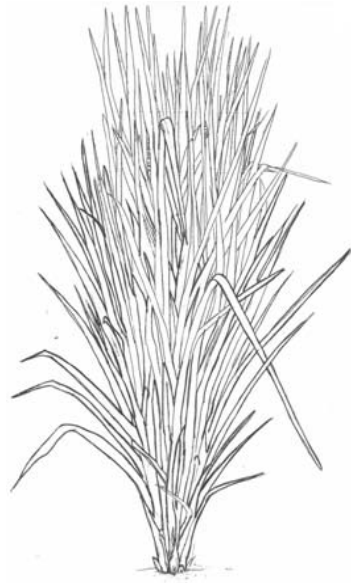


5
Decumbent



7
Prostrate

Characteristic 3 Leaf: Attitude



3
Erect



5
Droopy

Characteristic 4 Days to 50 % flowering

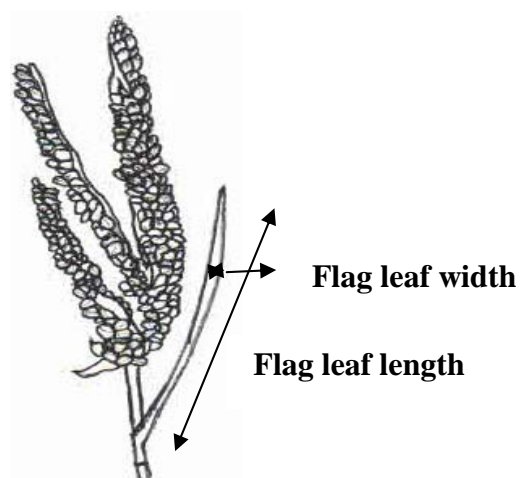
Days to 50% flowering is from sowing to the stage when ears have emerged from main tiller in 50 percent population.

Characteristic 9 Flag leaf blade: Length (cm)

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

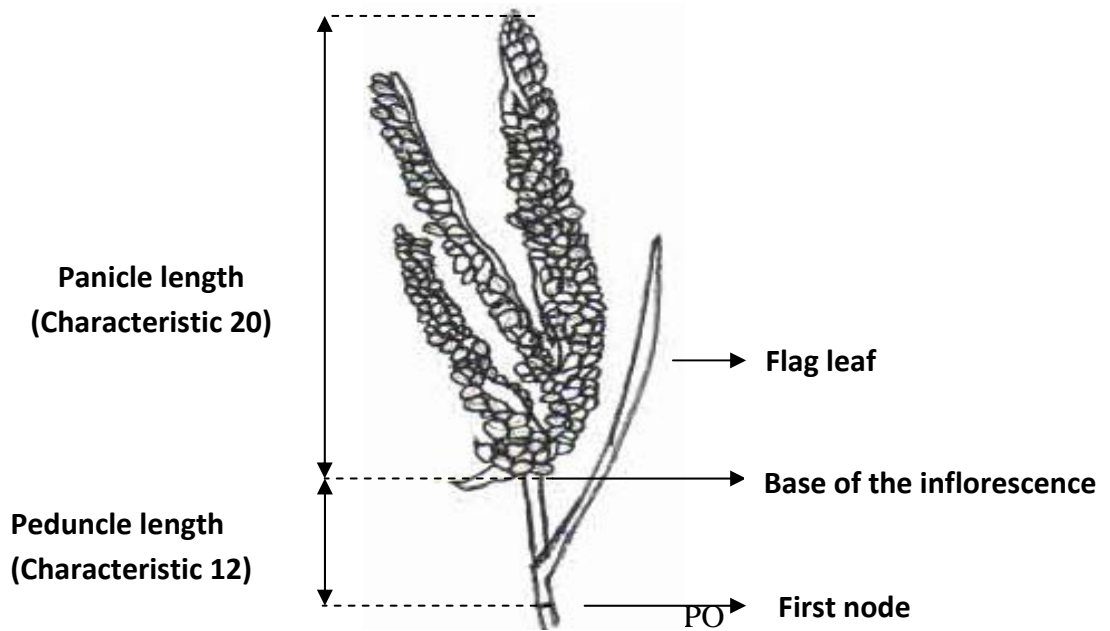
Characteristic 10 Flag leaf blade: Width (cm)

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

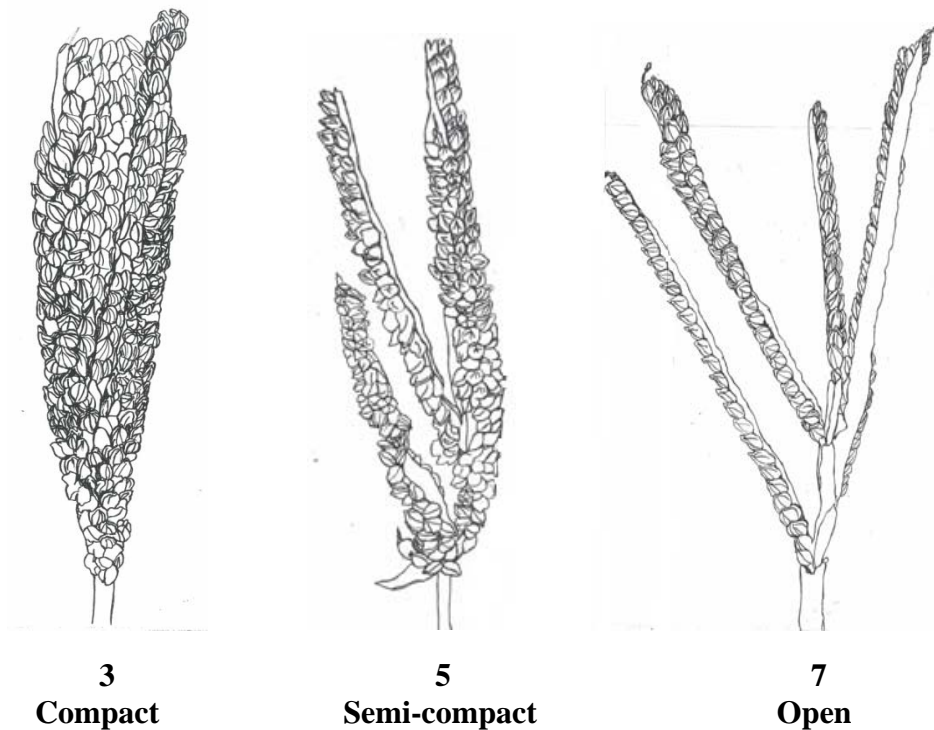


Characteristic 11 Peduncle: Length (cm)

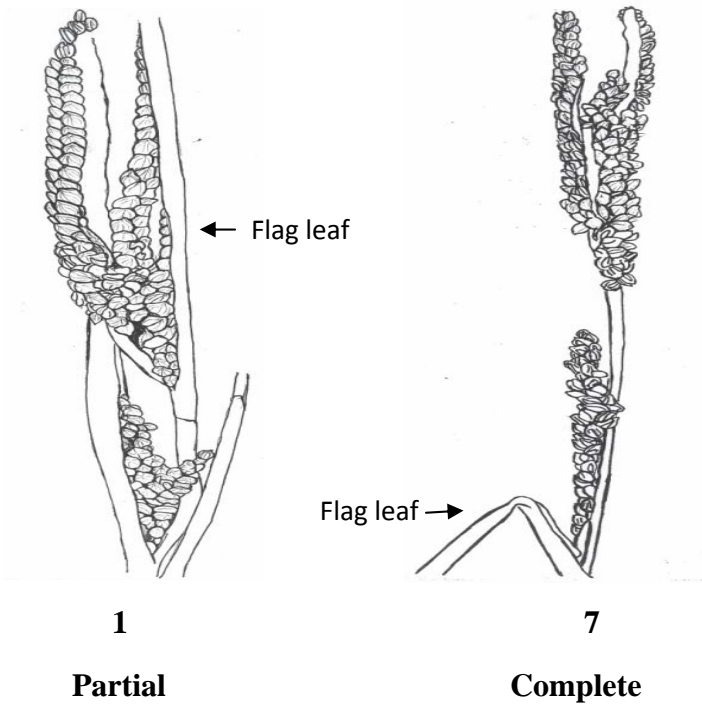
Peduncle length is measured from earhead base to the top most node on main tiller.



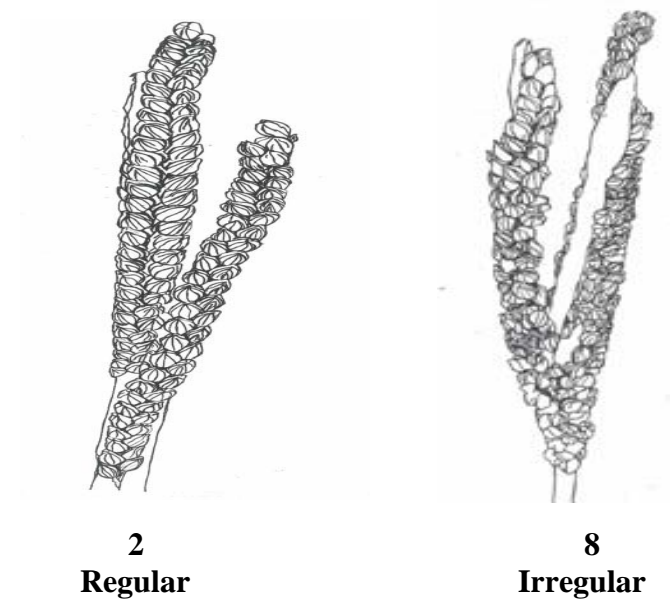
Characteristic 12 Panicle: Appearance



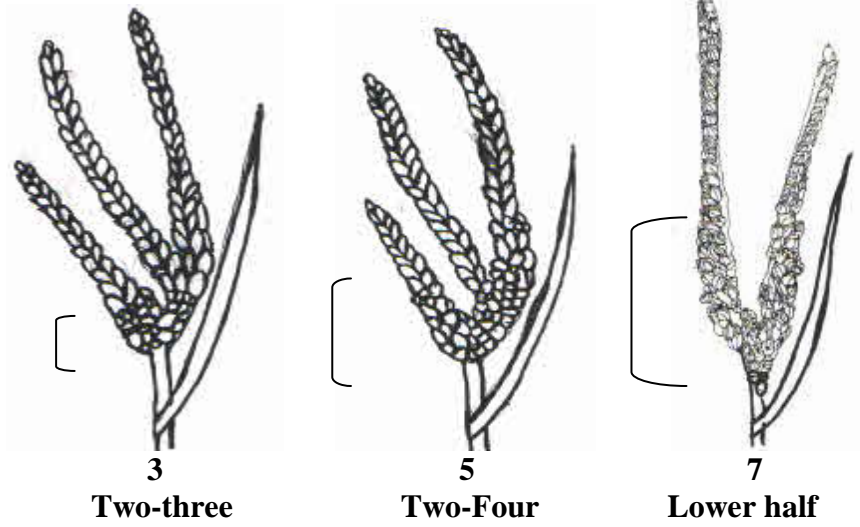
Characteristic 13 Panicle: Exertion



Characteristic 14 Spikelet: Arrangement on rachis



15 Spikelet irregular rows: Intensity



Characteristic 16 Spike: Branching

Characteristic 17 Spike: Curvature

Characteristic 19 Culm: Branching

- Low - Upper nodes rarely produce branches
- Medium -Upper 2 – 4 nodes produce branches
- High- Most nodes produce branches

Characteristic 20 Panicle: Length (cm)

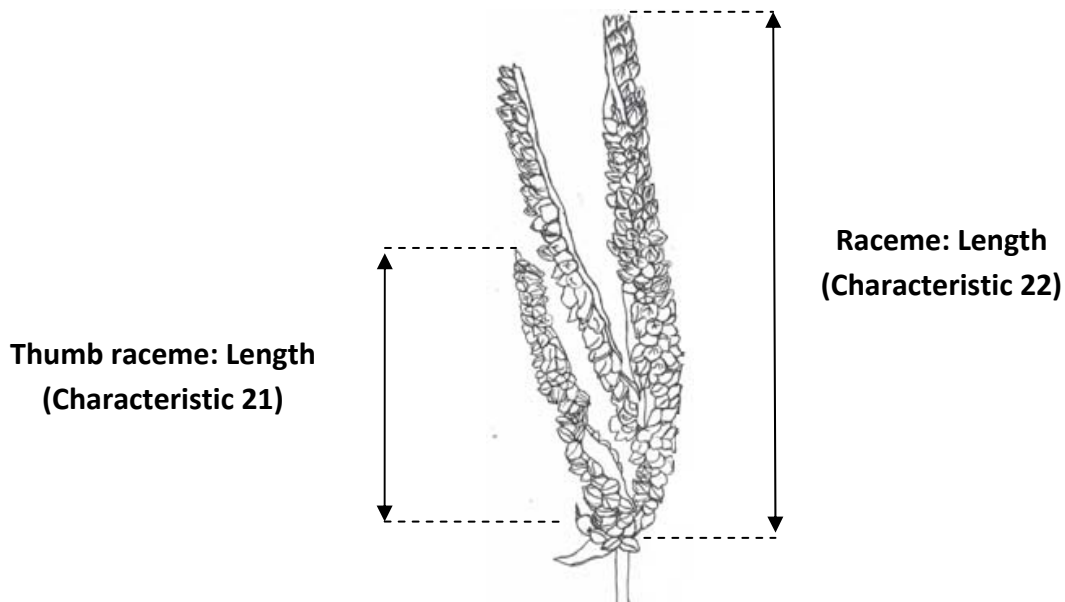
Panicle length is measured from base of the inflorescence to the tip of the panicle.

Characteristic 21 Thumb raceme: Length (cm)

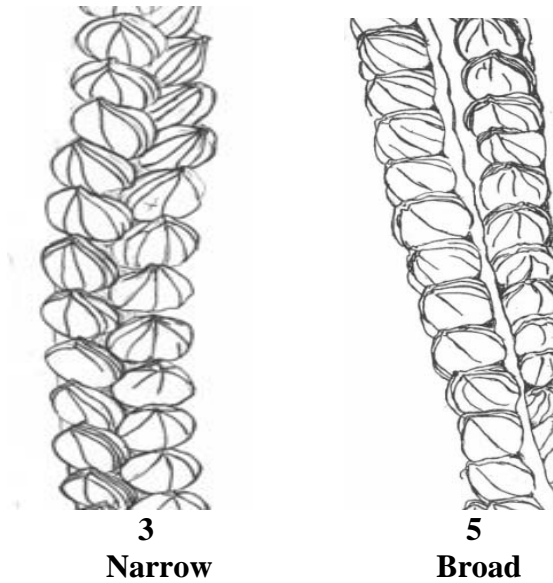
Thumb raceme length is measured from base to the tip of the thumb raceme

Characteristic 22 Raceme: Length (cm)

Raceme length is measured from base of the longest raceme in the inflorescence to the tip of the raceme.



Characteristic 24 Glume : Appearance of nerves



.Characteristic 25 Plant: Height (cm)

Plant height is measured from ground level to the tip of the earhead on main tiller.