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Genetic Divergence in Vegetable Mesta*

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Abstract: The genetic divergence in 26 genotypes of vegetable mesta was assessed utilizing Mahalanobsis D^2 statistic. These varieties were grouped into five clusters based on the D^2 values. Leaf area was contributed maximum to genetic diversity followed by total green yield, plant height, number of leaves, fresh weight of leaf, petiole length and fresh weight of stem per plant. Cluster I was the largest comprising of 22 genotypes, while cluster II,III,IV and were having solitary ones.The avereage inter cluster D^2 values ranged from 59.15 (Cluster I to cluster IV) to 81.62 (Cluster IV to V). The cluster IV (HS-1) and cluster V (GKK) with one genotype each were diverse from the rest of the clusters as evident from their high inter cluster D^2 values (81.62). Based on cluster mean analysis it was revealed that genotypes GKK and HS-1 were most divergent and they can be used for further breeding programme.

Introduction

Vegetable Mesta (*Hibiscus cannabinus* L.) is one of the under exploited leafy vegetable grown throughout the tropics and it belongs to the family Malvaceae. It is valued for its good nutritive value and fast growth with high yield potential. It is a regular leafy vegetable of the poor farmers of the Northern Karnataka and is commmonly consumed along with sorghum roti and rice. Hence, it has the potential to become an important leafy vegetable of this region. Genetically diverse parents giving more productive hybrids than those which are more closely related is a proven fact. The maximum contribution to total divergence is an important consideration for the purpose of further selection and choice of parents for hybridization. An attempt was therefore made to workout genetic diversity in 26 vegetable mesta genotypes.

Material and Methods

The material used for the study was comprised of 26 vegetable mesta genotypes obtained from Mesta Research Station, Amadalavasala, Andhra Pradesh, Central Jute and Allied Fibre Research Institute, Barrackpore, West bengal, KRCCH, Arabhavi and from different regions of the state. The experiment was conducted at the Department of Horticulture, University of Agricultural Sciences,Dharwad. Twenty six genotypes were sown in a randomised complete block design with three replications at a spacing of 30 x10 cm. The fertilizer dose of 40:20:20kg NPK/ha(50% N in +Full P&K at the time of sowing) was applied at the time of sowing seed and seeds were sown by hand dibbling. The remaining 50% N was applied after 2 weeks of sowing. Observations were recorded on five plants for all the characters in each plot and mean values were calculated. Mahalanobis D^2 statistic (Mahalonobis's, 1936) was used to assess to

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be divergence genotypes were grouped into different clusters using the Tocher's method as described by Rao (1952).

Results and Discussion

Analysis of variance indicated the existence of significant variation in the material studied for all the characters. Twenty six genotypes were grouped into five clusters (Table 1). Cluster I was the largest with 22 genotypes. Cluster II, III, IV and V formed solitary clusters.

The average intercluster D^2 values ranged from 51.18 to 62 (Table 2). Clusters IV (HS-1) and Cluster V (GKK) with one genotype each were most diverse from others clustes. The diveragence between these two clusters was also high as evident from their high intercluster D^2 value (81.62). Therefore in the present study the inter cluster distance was maximum between clusters IV and V (81.62) followed by Cluster III and IV(70.49) indicated that the genotypes belonging to these clusters, (CKD-1, GKK,HS-1) could be used as parents in hybridization programme. Therefore inter crossig of genotypes from divergent clusters (III and IV and IV and V) is likely to generate high yielding transgressive segregants in a population improvement programme. The minimum intercluster D^2 value (59.1) was observed between cluster I and V, indicating close genetic relationship between the genotypes of these two clusters. Similar findings were reported by (Krishnaveni and Krishnamurthy, 2000) in mesta.

Table 1. Genetically divergent clusters and their composition in vegetable Mesta

Cluster number	Number of genotypes	Name of genotype
I	22	AMV-1,AMV-2, AMV-3, AMV-4, AS-73-CP-560,HS-2, HS-583, HS-7910, HS-4288, AMC-108, DWD,SDT, KRN, HRG, ATN, RBG, BGM, GTB, HBD, ARD, CKD-2
II	1	LTR
III	1	CKD-1
IV	1	HS-1
V	1	GKK

Table 2. Average Intra-cluster (in bold) and inter-cluster D^2 values

Cluster	I	II	III	IV	V
I	51.18	60.45	59.21	59.15	64.12
	(7.15)	(7.77)	(7.69)	(7.69)	(8.00)
II		0.00	69.36	62.32	64.86
		(0.00)	(8.33)	(7.89)	(8..05)
III			0.00	59.47	70.49
			(0.00)	(7.71)	(8.39)
IV				0.00	81.62
				(0.00)	(9.02)
V					0.00
					(0.00)

Note: Figures in parentheses indicate D^2 values

Table 3.Cluster mean values of different characters in vegetable mesta

Sl. No.	Cluster Characters	I	II	III	IV	V
1	Plant height (cm)	33.54	23.76	42.68	22.55	35.62
2	Leaf length (cm)	5.93	4.86	7.39	4.63	7.72
3	Leaf width (cm)	5.36	4.61	6.51	3.64	6.92
4	Leaf area (dm2)	148.28	101.92	199.82	87.84	205.25
5.	Number of leaves per plant (No.)	18.14	10.45	32.78	10.23	36.30
6	Petiole length (cm)	7.46	4.73	12.54	4.29	6.78
7	Stem girth (cm)	0.44	0.29	0.26	0.29	0.49
8	Internodal length (cm)	4.06	2.64	3.00	2.09	6.60
9	Root collar diameter (cm)	0.64	0.30	0.37	0.38	0.68
10	Fresh weight of leaf (g)	17.32	9.79	26.18	8.10	35.82
11	Fresh weight of stem (g)	15.83	8.58	26.39	5.11	33.6
12	Total green yield (g)	32.91	17.89	44.44	14.46	58.18
13	Leaf to stem ratio	1.22	1.14	1.05	1.19	1.06
14	Dry weight of leaf (g)	1.89	1.09	2.88	1.04	3.62
15	Dry weight of stem (g)	1.75	0.99	2.77	0.56	3.54
16	Total dry weight (g)	3.64	2.14	5.65	1.70	7.07

Clusters means (Table 3) for different characters indicated that the mean values for leaf length, leaf width, leaf area, number of leaves per plant, stem girth, internodal length, root collar diameter, fresh weight of leaves fresh weight of stem, total green yield, dry weight of leaves, dry weight of stem and total dry weight were highest in cluster V (GKK). Cluster III exhibited highest values for plant height and petiole length. Cluster I recorded higher values for leaf to stem ratio. Cluster IV (HS-1) had higher values for majority of characters. Considerable variation in cluster means was observed for all the characters studied.

The leaf area was the maximum (94.15%) contributing character for the divergence of the cluster, (Table 4). The other contributing characters are total green yield (2.15%) plant height (1.23%) and number of leaves per plant (1.23%) also influence on the diversity of the genotypes. There results were in conformity with Fatukun (1985) in amaranthus, Patil *et al*. (1996) in Okra and Patil and Thombre (1981) in mesta.

It could be concluded that the cultivars GTB, CKD-1,HS-1, and GKK were recorded higher leaf yield and they also congrugated in Cluster-1,III, IV and V, respectively. Therefore these genotypes can be commercially exploited among mesta growers and can also be used further in breeding programme.

Table 4. Relative contribution of different characters towards divergence in vegetable mesta genotypes

Sl.No.	Characters	Times ranked 1st	Per cent contribution
1	Plant hieght (cm)	4	1.23
2	Leaf length (cm)	0	0.00
3	Leaf width (cm)	0	0.00
4	Leaf area (dm2)	306	94.15
5	Number of leaves per plant (No.)	4	1.23
6	Petiole length (cm)	1	0.31
7	Stem girth (cm)	0	0.00
8	Internodal length (cm)	0	0.00
9	Root collar diameter (cm)	0	0.00
10	Fresh weight of leaf (g)	2	0.62
11	Fresh weight of stem (g)	1	0.31
12	Total green yield (g)	7	2.15
13	Leaf to stem ratio	0	0.00
14	Dry weight of leaf (g)	0	0.00
15	Dry weight of stem (g)	0	0.00
16	Total dry weight (g)	0	0.00

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