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DIVERSITY IN MARVEL GRASS GERMPLASM

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A wide diversity in 91 collections of Marvel grass (*Dichanthium annulatum*) from gangetic plains of Uttar Pradesh, Madhya Pradesh, Maharashtra, Karnataka and Andhra Pradesh was assessed for their habit, forage yield and regrowth potential. The forage yield was higher in accessions from gangetic plains of Uttar Pradesh. The winter regrowth potential in accessions from Maharashtra, Karnataka and Andhra pradesh was higher, while the North Indian accessions proved better in their regrowth during summer. Tiller dynamics played an important role in grouping accessions for high forage yield and classifying them for their suitability and adaptability to varying agroclimatic regions. The extent of variability for morphological characters viz., tiller height, leaf length, leaf width, circumference and tussock weight was considerable for utilization of these accessions in breeding programme.

Key words : Marvel grass, *Dicanthium annulatum*, germplasm, diversity

Marvel grass (*Dichanthium annulatum* L. (Stapf) is the most prominent native grass species forming an important component of one of the largest grass covers *Sehima-Dichanthium* of India. It is also fairly distributed in almost all other grass covers of the country. (Dabadghao and Shankarnarayan, 1973). It shows ecological plasticity to the extent that its distribution ranges from peninsular region upto Northern plains, inclusive of Gujarat, Haryana, Punjab and the sub-temperate hills (1500 m above msl) (Arora *et. al.*, 1975; Kanodia, 1987). In the present studies, an attempt has been made to document the diversity in habit, forage yield, regrowth potential and tiller dynamics of the germplasm collected from different parts of the country.

MATERIALS AND METHODS

Ninety one collections from a range of sites and ecological situations of gangetic plains of Uttar Pradesh, Madhya Pradesh, Maharashtra, Karnataka and Andhra pradesh, were raised in nursery in 1989 and later transplanted in to the field of sandy loam (*Rakar*) soil at C.R. Farm, Jhansi (latitude 25° 27'N, longitude 78° 25'E, normal rainfall 958 mm). For single plant evaluation, five plants of each collection from different locations were planted in each plot of 5m × 6m where row to row and plant to plant distance was 70 cm.

All the plots were under rainfed conditions and no fertilizer or irrigation was applied, except one irrigation during establishment phase. The data recorded for the habit, forage yield during monsoon season and regrowth harvest during winter and summer, were documented in accordance to the forage grass descriptors (Tyler *et al.*, 1985). Seven harvests made over a period of two years were one each during monsoon, winter and summer (October, January and April respectively) every year and one additional harvest of summer early monsoon growth during second year. The extent of variability in other growth characters. i.e. tiller weight, leaf length, leaf width, tussock circumference were also recorded. The tillering capacity and number of tillers per kg harvest of green fodder of monsoon, winter and summer seasons formed the basis of tiller dynamics for classifying the accessions for their suitability and adaptability to varying agroclimatic regions.

RESULTS AND DISCUSSION

Marvel grass exhibited wide diversity in habit of the species - erect, semi erect and prostrate type. All the forms are represented by collections of different regions/states of the country, however erect forms were more frequent in south Indian accessions (Table 1). The varying habit of this species adapted

Table 1 : Statewise diversity in habit of *D. annulatum* accessions

State/No. of accessions	Erect	Semi-erect	Prostrate	Total
U.P.	02	05	04	11
M.P.	00	04	16	20
Maharashtra	02	02	00	04
Karnataka	02	06	02	10
A.P.	25	12	09	46
Total	29	24	38	91

to different ecological situations provides reason for its wide distribution in most of the grass covers of the country (Dabadghao and Shankarnarayan, 1973; Skerman and Riveros, 1990). The green forage yield of accessions from gangetic plains of Uttar Pradesh was highest after seven cuts over a period of two years (Table 2). This showed that accessions from northern plains are more productive in comparison to those from southern states. This may be attributed to the isoclimatic environment of evaluation and region of collection of the accessions. The winter regrowth after two cut harvest provided higher forage yield in accessions from Maharashtra, Karnataka and Andhra Pradesh, while the north Indian accessions proved better in their regrowth irrespective of the site and location of collection and gave highest green forage yield. The

lowering temperature during winter season caused growth inhibition, while rising temperature of summer favoured regeneration growth of northern

Table 2 : Green forage yield and regrowth potential in 91 accessions of *D. annulatum*

State	Green forage yield (kg/tussock)-period 2 years				
	Yield Ist cut	Total yield 7 cuts	Monsoon regrowth 3 cuts	Winter regrowth 2 cuts	Summer regrowth 2 cuts
U.P.	1.94	4.85	3.15	0.73	0.93
M.P.	1.47	3.67	2.38	0.56	0.73
Maharashtra	1.54	3.85	2.50	0.71	0.64
Karnataka	1.33	3.32	2.15	0.66	0.51
Andhra Pradesh	1.37	3.42	2.22	0.68	0.52

accessions. Conversely, the south Indian accessions remained productive in winter also. A wide range of variation in other growth parameters was found amongst accessions for tiller height, leaf length, leaf width, tussock circumference and tiller weight, which was documented in Table 3 for the utilization of accessions in breeding programme.

Table 3 : Range of variability in growth characters of *D. annulatum* (91 accessions)

Character	Range			
	1	2	3	4
Tiller height (cm)	78.0-120.0	120.1-160.0	160.1-200.0	200.1-245.5
	(36)	(29)	(14)	(12)
Leaf length (cm)	8.7-25.0	25.1-40.0	40.1-55.0	55.1-67.5
	(26)	(24)	(28)	(13)
Leaf width (cm)	0.3-0.5	0.6-0.7	0.8-0.9	1.0-1.1
	(11)	(29)	(26)	(25)
Tussock	30.25-42.0	42.1-54.0	54.1-66.0	66.1-83.2
circumference (cm)	(47)	(20)	(14)	(10)
Tiller weight (g)	0.30-0.60	0.61-0.90	0.91-1.20	1.21-1.56
	(24)	(18)	(26)	(23)

Figures in parenthesis indicate number of accessions

There was considerable variation in tiller number per plant in different seasons ranging from 101-205 in monsoon through 265-576 in winter to 287-377

in summer. In general tiller number increased in winter from monsoon season of the establishment year and decreased sharply in summer of subsequent year. But this trend was more conspicuous in accessions from southern India. However the increase in number of tiller was reported throughout the year by Chatterjee and Singh (1968). The tillering capacity was higher in accessions exhibited both winter and summer regrowth after monsoon harvest. The tillering behaviour, therefore, was an important attribute determining the ecotypic development of the species. This was in confirmation of the reports on *Panicum* and *Heteropogan* by Richards *et al.*, 1986.

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