Indian J. Genet., **54** (3): 300–303 (1994)

GENETIC VARIABILITY AND CHARACTER ASSOCIATION IN BROOMGRASS (*THYSANOLAENA MAXIMA* ROXB.)

S. RATH, P. N. JAGADEV* AND A. K. PATNAIK

Department of Horticulture, Orissa University of Agriculture and Technology Bhubaneswar 751003

(Received: April 25, 1994; accepted: August 17, 1994)

ABSTRACT

The nature and magnitude of genetic variability and their inter-relationship was studied for production of flowering shoots and its six component traits in seven morphotypes of broomgrass (*Thysanolaena maxima* Roxb.). Ambadola Local and Kainpur Local performed significantly better than others. High estimates of genotypic coefficients of variation, heritability and genetic advance were observed for production of flowering shoots, plant height and number of raches, indicating their reliability for effecting selections. Number of flowering shoots had high significant positive association with plant height, tillers per plant, raches per plant and panicle length both at genotypic and phenotypic levels. Hence, the studies revealed the importance of plant height, and number of raches as selection criteria for improvement of production of flowering shoots in broomgrass.

Key words: Genetic variability, character association, broomgrass.

Broomgrass (*Thysanolaena maxima* Roxb.), a reed-like perennial grass, is economically important due to the utilization of its panicles as soft brooms, which serve as a source of income to the poor tribals in the risk-prone farming system. But, for panicle initiation, it takes about 180–200 days and produces about 15–20 tonnes of biomass per hectare. Therefore, the present study aims at selection of better types as regards to early initiation and more production of panicles and to assess the degree of association between production of flowering shoots and its component traits in broomgrass.

MATERIALS AND METHODS

The study was carried out during 1987–88 on seven morphotypes of broomgrass (Table 1) at Baradapadar (Chakapada Block), Phulbani, in randomized block design with five replications. The tillers were planted on July 8, 1987 with a spacing of 50 x 50 cm in plots of

*Author for correspondence: C/o. Dr. K. C. Patnaik, Qrs. No. VF- 13, OUAT Colony, Bhubaneswar 751003.

10 x 10 m^2 size. The fertilizer dose of 40:20:20 NPK kg/ha was applied in which the N was given in two splits, i.e. 50% as basal and 50% at maximum tillering. Observations on plant height, tillers per plant, leaves per tiller, days to panicle initiation, raches per plant, panicle length and flowering shoots per plant were recorded on 10 random plants during the period of peak flowering. The mean data were considered for analysis of variance and covariance [1]. Coefficients of variation at phenotypic (PCV) and genotypic (GCV) level [2], heritability in broadsense (H) [3], expected genetic advance (GA) [4] and the genotypic and phenotypic correlation coefficients [5] were computed from the variance and covariance components.

RESULTS AND DISCUSSION

Studies on genetic variations and parameters revealed that all the seven traits exhibited significant differences, indicating the presence of sufficient genetic variability in the material. Among the types, Ambadola Local followed by Kainpur Local gave significantly higher values of plant height, tillers per plant, leaves per tiller, raches per plant, panicle length, and number of flowering shoots (Table 1). The period taken for panicle initiation, was shortest in Kuduki Local being at par with Kainpur Local.

The analysis of parameters (Table 2) showed that high H with minimum GCV and low GA for days to panicle initiation indicated its unsuitability for further improvement through selection. In the case of flowering shoots, plant height and number of raches, high values of H, GCV and GA suggest that selection for these characters may be effective. Similarly, high H with moderate GCV and GA for number of tillers and panicle length indicated that improvement for these characters is also possible whereas high H with low GCV and GA for number of leaves per tiller indicate little scope for selection.

Table 1. Genetic variations in broomgrass

Genotype	Plant height (cm)	Tillers per plant	Leaves per tiller	Days to panicle initiation	Raches per plant	Panicle length (cm)	Flowering shoots per plant
Ambadola Local	176.2	29.6	25.8	177.4	158.8	84.4	25.4
G. Udayagiri Local	75.2	16.8	17.0	181.2	71.6	51.4	6.8
Charichhak Local	73.0	20.6	17.6	179.0	73.0	48.8	5.8
Chakapada Local	76.2	14.6	15.0	184.6	72.6	37.6	7.2
Kuduki Local	161.6	24.4	24.0	162.6	150.6	75.6	17.6
Gochhapada Local	147.4	15.2	16.8	181.2	142.8	50.2	10.6
Kainpur Local	160.8	29.8	23.6	163.0	157.0	78.8	19.4
S.E. (m) ±	6.0	1.6	1.7	3.6	6.6	3.4	1.4
C.D. (0.05)	12.3	3.4	3.4	7.4	13.7	7.0	2.8

Table 2. Estimates of genetic parameters in broomgrass

Character	Mean ± SE (m)	Range	Variance	PCV (%)	GCV (%)	H (%)	GA (% of mean)
Plant height (cm)	124.34 ± 5.97	61–182	11089.05*	38.48	37.72	96.10	76.18
No. of tillers/plant	21.57 ± 1.63	12–33	210.89*	32.82	30.58	86.79	58.68
No. of leaves/tiller	19.97 ± 1.66	13–29	93.83*	26.03	22.47	74.55	39.97
Days to panicle initiation	175.57 ± 3.61	157–190	405.23*	6.24	5.33	72.91	9.37
No. of raches/plant	118.06 ± 6.65	60–170	9252.11*	37.72	36.65	94.43	73.37
Panicle length (cm)	60.97 ± 3.38	29–87	1652.29*	31.32	30.07	92.18	59.48
No. of flowering shoots/ plant	13.26 ± 1.36	3–27	287.58*	59.01	56.75	92.48	112.42

*Significant at 1% level.

Correlation studies (Table 3) showed that for all the character pairs, genotypic and phenotypic associations were in the same direction and the GCV estimates were higher than PCV, indicating an inherent association between the characters. Number of flowering shoots had high significant positive association with plant height, tillers per plant, raches per plant and panicle length both at genotypic and phenotypic levels. Days to panicle initiation had nonsignificant negative correlation with number of flowering

Table 3. Genotypic (G) and phenotypic (P) correlation coefficients in broomgrass

Character		No. of tillers/ plant	No. of leaves/ tiller	Days to panicle initiation	No. of raches/ plant	Panicle length	No. of flowering shoots/ plant
Plant height	G	0.70	0.81	−0.61	0.98**	0.85*	0.92**
	P	0.63	0.68	−0.50	0.98**	0.80*	0.87*
No. of tillers/plant	G		0.91**	−0.69	0.68	0.92**	0.86*
	P		0.69	−0.55	0.61	0.82*	0.80*
No. of leaves/tiller	G			−0.71	0.78*	0.94**	0.92**
	P			−0.48	0.64	0.80*	0.75
Days to panicle initiation	G				−0.63	−0.73	−0.58
	P				−0.50	−0.56	−0.44
No. of raches/plant	G					0.82*	0.88**
	P					0.77*	0.83*
Panicle length	G						0.94**
	P						0.89**

*,**Significant at 5% and 1% levels, respectively.

shoots. Other significant positive correlations recorded were plant height with number of panicles and panicle length; panicle length with number of tillers, number of leaves, and number of raches both at genotypic and phenotypic levels. Thus, the findings clearly indicate that plant height, and number of raches were the most important component traits to improve the production of flowering shoots in broomgrass.

REFERENCES

1. V. G. Panse and P. V. Sukhatme. 1967. Statistical Methods for Agricultural Workers (2nd edn.). ICAR, New Delhi: 51–69.

2. G. W. Burton. 1952. Quantitative inheritance in grasses. Proc. VIth Intern. Grassland Cong., **1**: 277–283.

3. J. L. Lush. 1940. Intra-sire correlation of offsprings of dams as a method of estimating heritability characteristics. Records of Proceedings, American Soc. Animal Pdn., **33**: 293–301.

4. H. W. Johnson, H. F. Robinson and R. E. Comstock. 1955. Estimates of genetic and environmental variability in soyabean. Agron J., **47**: 314–318.

5. P. A. Miller, J. C. Williams, H. F. Robinson and R. E. Comstock. 1958. Estimates of genotypic and environmental variances and covariances in upland cotton and their implication in selection. Agron. J., **50**: 126–131.