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Analysis of Variability and Heritability in Amaranthus [*Amaranthus hypochondrious* (L.)]

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Suceess of any crop improvement programme depends on the magnitude of genetic variability and the extent to which the desirable characters are heritable. The estimates of variability in respect of yield, and its heritable components in the material with which the breeder is working, are therefore, prerequisite for any breeding programme. Hence, it becomes necessary to split the phenotypic variability in to heritable and non heritable components such as genotypic and phenotypic coefficients (GCV and PCV), heritability and genetic advance.

Heritable improvement in the yield is an ultimate aim of the plant breeder which calls for selection on the basis of yield components which are heritable. There is hardly any report on this aspects in Amaranthus. The present investigation in Amaranthus [*Amaranthus hypochondrious* (L.)] were therefore, carried out on fifty genotypes having wide genetic diversity studied by Pawar, 1995. The above material was raised in a randomised block design, with three replications during *rabi* 1993 at Instructional farm of Dept. of Botany, Mahatma Phule Krishi Vidyapeeth, Rahuri. Each genotype was sown with a spacing of 50 cm between the rows and 15 cm within the plants. Each genotype was evaluated in two rows of three meter length in each replication. The observations were recorded on five randomly selected plants in each replication for ten characters.

A wide range of variability was observed in respect of all the characters studied (Table 1). This indicated an ample scope of exploitation of the above traits. Hauptli (1984), Hauptli and Jain (1984) and Rangaswamy *et al.*, (1980) also reported ample variability for various components in Amaranthus. The characters like girth of inflorescence and protein content however exhibited comparatively less variability.

In the present investigation, higher estimates of genotypic and phenotypic coefficients of variation were observed for number of branches per plant, grain yield per plant, leaf area per plant, plant height at flowering and number of spikelets per plant indicating more variability and scope for selection in improving these traits. Other characters viz., length of infloerscence, protein content, girth of inflorescence and days to maturity indicated low to medium genotypic and phenotypic coefficients of variation respectively indicating limited scope for

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TABLE 1

Estimation of range, genotypic variance ($\delta^2 g$), phenotypic variance ($\delta^2 p$), environmental variance ($\delta^2 e$) genotypic coefficients of variation (GCV), phenotypic coefficients of variation (PVC), heritability and genetic advance (GA) for various characters.

Sr. No.	*Character*	*Range*	$\delta^2 g$	$\delta^2 p$	$\delta^2 e$	*GCV*	*PCV*	*Heritability (%)*	*GA*	*GA as per cent of mean*
1.	Days to 50% flowering.	48–78	71.57	72.57	1.00	12.95	13.04	98.60	17.30	26.49
2.	Plant height at flowering (cm).	40.73–124	448.23	562.81	114.58	24.11	27.02	79.60	38.90	44.30
3.	No. of branches/ plant.	0–12	8.6	9.03	0.97	52.38	55.65	89.30	5.53	101.84
4.	No. of spikelets/ plant.	22.2–79.8	155.04	188.89	33.85	24.01	26.50	82.10	23.24	44.82
5.	Length of inflorescence (cm).	34.07-67.07	36.55	53.94	17.39	12.23	14.86	67.80	10.36	20.95
6.	Girth of infloresence (cm).	19.27–29.47	2.42	13.09	10.67	6.44	14.98	18.50	1.74	7.21
7.	Leaf area per plant (cm).	626.59–2129.08	104481.1	121205.7	16724.60	25.28	27.23	86.20	618.21	48.36
8.	Days to maturity	89–113.67	31.07	32.93	1.86	5.40	5.56	94.40	11.16	10.80
9.	Protein content (%)	8.75–15.17	2.67	2.88	0.21	14.17	14.71	92.90	3.25	28.14
10.	Grain yield per plant (g).	10.12–50.89	43.71	62.17	18.46	28.62	34.13	70.30	11.42	49.43

selection in these traits. Estimates of genotypic and phenotypic coefficients of variation were nearly equal in the case of days to 50% flowering, days to maturity and protein content indicating that the variability existing in these characters was due to genetic factors and there is less influence of environmental factors in the expression of these characters.

The heritability of the characters indicated that almost all characters under study had high heritability, except girth of inflorescence in which moderate heritability was observed. High estimates of heritability in broad sense accompanied with high genetic advance in percentage of mean (Table 1) was observed in characters like number of branches per plant, leaf area per plant, number of spikelets per plant, plant height at flowering, grain yield per plant indicating that these traits are governed by additive gene action and selection for these traits in the genetically diversed material would be more effective for desired genetic improvement. Rangaswamy *et al.* (1980) also reported similar results.

In the present study considering the estimate of genetic parameters like genotypic coefficient of variation, heritability and genetic advance together, it is evident that number of branches per plant, leaf area per plant, grain yield per plant, plant height at flowering and number of spikelets per plant are the most important characters. Selection for these traits in the segregating generations could be more effictive for improving grain yield in Amaranthus.

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