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GENETIC VARIABILITY AND ASSOCIATION OF COMPONENT CHARACTERS FOR SEED YIELD IN *OLITORIUS* JUTE

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ABSTRACT

Study indicated that pod length, seeds per pod, seed weight per pod, 100 seed weight and days to 50% flowering were likely to be operated by non-additive gene action in olitorius jute. Correlation study indicated that the seeds of late flowering genotypes have higher volume than the early flowering genotypes. It is also suggested that good pod length is required for more number of seeds per pod as well as high seed weight per pod. From the path-coefficient analysis it is suggested that a medium flowering genotype with high 100-seed weight, followed by seeds per pod and pod length is most suitable for better seed production in olitorius jute.

Key words: Variability, character, association, seeds, olitorius jute.

Jute being a fibre crop, so long major emphasis has been given on the production of high amount of good quality fibre. Since seeds are the planting material in jute, their importance cannot be ignored. Ghosh and Sen [1] found a profound influence of seed size on growth characters in *Corchorus olitorius*. Chattopadhyay et al. [2] reported a true breeding *C. olitorius* mutant with improved seed yield components obtained from JRO-632. Genetic variability and association of seed characters in *C. olitorius* jute is reported here.

MATERIALS AND METHODS

Seeds of five cultivated varieties (JRO-632, JRO-620, JRO-5408, JRO-4407, IR-2), five macromutants (palmate leaf, short internode, tobacco leaf, stiff stem, crumpled leaf), five exotic collections (Tanganika-1, Olitorius-3-Burma, Germany, Egypt, Sudan green) and five wild types (Wild olitorius-Sen, Wild olitorius-Rakshit, Wild olitorius-Rajendranagar, Wild olitorius-Red, Wild olitorius-Green) were tested at Mohanpur Teaching Farm of Bidhan Chandra Krishi Vishwavidyalaya. The seeds of all the strains were sown in randomized block design with four replications. Each strain was represented by five rows, 30 cm apart,

and 1.5 m long. Observations were recorded on five random plants excluding the border ones from each plot for five plant characters, viz., pod length, seeds per pod, weight of seeds per pod, 100-seed weight and days to 50% flowering. Ten random pods from each plant were taken individually to record all the characters except days to 50% flowering.

Analyses of variances were done from the mean data obtained in each character. Estimates of genetic parameters were computed following the method of Johnson et al. [3]. Phenotypic and genotypic correlation coefficients (PCV, GCV) for all pairs of five characters were also estimated [4]. Path coefficient analysis was carried out as described by Dewey and Lu [5] at phenotypic level only.

RESULTS AND DISCUSSION

Significant differences were obtained among the genotypes for all the characters except 100-seed weight, indicating the presence of adequate variability in only four characters. Estimates of phenotypic and genotypic coefficients of variation (PCV, GCV), genetic advance (GA) as per cent of mean and heritability are given in Table 1. It revealed that majority of the characters had low estimates of GCV, heritability and GA per cent of mean. Characters with low GCV were characterised earlier by low heritability and poor GA as per cent of mean [6]. Days to 50% flowering had high heritability, low GCV and low GA per cent over mean. A character with high heritability and high genetic advance may positively be due to additive gene action [7]. The characters without such combination appear generally because of nonadditive gene action, including dominance and epistasis [8]. It may, therefore, be suggested that all the five characters (seed weight per pod, pod length, seeds per pod, 100 seed weight and days to 50% flowering), are likely to be operated by nonadditive gene action. Number of seeds per pod, seed yield per pod and 100-seed weight were reported to be controlled by both additive and nonadditive gene action in olitorius jute [9].

Table 1. Estimates of genetic parameters for five characters in olitorius jute

Character	PCV	GCV	GA (% over mean)	Heritability (%)
Seed weight/pod	24.3	10.7	9.7	19.3
Pod length	13.6	10.5	16.7	59.5
Seeds/pod	14.8	8.3	0.1	31.4
100-seed weight	22.3	7.6	5.3	11.6
Days to 50% flowering	4.8	4.5	8.9	89.3

The genotypic and phenotypic correlation coefficients between all pairs of five characters are presented in Table 2. Significant positive correlations were observed between 100-seed weight with days to 50% flowering and seed weight per pod separately as well as

Table 2. Phenotypic (P) and genotypic (G) correlations among different characters in olitorius jute

Character		Seeds per pod	100-seed weight	Days to 50% flowering	Seed weight per pod
Pod length	P	0.44**	0.08	-0.04	0.57**
	G	0.76	-0.05	-0.05	0.57
Seeds per pod	P		-0.15	-0.22	0.41**
	G		0.04	0.33	0.77
100-seed weight	P			0.51**	0.77**
	G			0.81	0.69
Days to 50% flowering	P				0.52**
	G				0.28

**Significant at 1% level.

among themselves. It, therefore, follows that selection for any one of these three characters is likely to generate a correlated response over the remaining two characters. From the above finding it can also be suggested that the seeds of late flowering genotypes have higher volume than the early flowering genotypes, and the seed weight per pod may also be increased in the former. Again, from observation of strong correlations among seed weight per pod, pod length and number of seeds per pod, it can be suggested that a good pod length is required for more number of seeds per pod as well as high seed weight per pod.

The direct and indirect effects of different characters on seed weight per pod were worked out, using path coefficient analysis at phenotypic level (Table 3). Among the different contributing characters, 100-seed weight registered highest positive direct effect on seed weight per pod followed by seeds per pod, pod length and days to 50% flowering.

Table 3. Direct (in bold) and indirect effects of different characters on seed yield in olitorius jute

Character	Pod length	Seeds per pod	100-seed weight	Days to 50% flowering	Phenotypic correlations with yield
Pod length	**0.334**	0.191	0.056	-0.013	0.566
Seeds per pod	0.146	**0.436**	-0.102	-0.066	0.415
100-seed weight	0.028	-0.067	**0.662**	0.150	0.773
Days to 50% flowering	-0.014	-0.097	0.335	**0.296**	0.523*

Residual effect = $\sqrt{-0.03}$.

Due to substantial amount of positive direct effect of 100-seed weight on seed weight per pod, significantly high positive correlation was obtained between 100-seed weight and seed weight per pod. Days to 50% flowering, which had lowest direct path values (0.296), influenced seed weight per pod indirectly through 100-seed weight. Seeds per pod showed high direct effect but due to its negative indirect effects via 100-seed weight and days to 50% flowering, the correlation between seeds per pod and seed weight per pod became lower. On the other hand, owing to very high positive indirect effect of pod length via seeds per pod, higher value of correlation was obtained between pod length and seed weight per pod. The residual effect of all the characters on seed weight per pod was very small indicating that there was no characters which might have influenced the seed yield significantly. This study of direct and indirect effects indicated that the breeder should lay emphasis on a medium flowering genotype with higher 100 seed weight followed by high number of seeds per pod and pod length for better seed production in olitorius jute.

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