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## Genetic Variability and Performance of Tossa Jute (*Corchorus olitorius* L.)

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**Abstract:** Genetic variability, genetic performance and correlation coefficients for yield and its components of 4 exotic varieties along with 5 strains/ varieties of Bangladesh Jute Research Institute were studied. The estimates of variance for all the characters showed significant differences among the nine genotypes. The improved variety O-9897 of BJRI gave the highest plant height, base diameter, green weight, stick weight and fibre weight. The genotypic and phenotypic coefficient of variation, heritability and genetic advance were observed for fibre yield. Fibre weight showed positive significant correlation with plant height ( $r=0.95$ ), base diameter ( $r=0.92$ ), green weight ( $r=0.98$ ) and stick weight ( $r=0.93$ ).

**Key words:** Genetic variability, yield performance, correlation, tossa jute

### Introduction

Jute is an important cash crop of Bangladesh. *Corchorus olitorius* L. is not tolerant to flooding but produce quality fibre as compared *C. capsularis* L. (Begum, 1991). *C. olitorius* is grown suitably in high and medium high land areas of Bangladesh under the agro-ecological condition of Jessore-Kushtia zone. The farmers are using some exotic tossa jute varieties in addition to jute varieties of *C. olitorius* recommended by Bangladesh Jute Research Institute. Causes behind performances given by the farmers on using the exotic varieties over BJRI recommended varieties are not known. The reason might be unavailability of BJRI recommended jute seed in proper time or wider adaptability of the exotic varieties particularly in Jessore-Kushtia zone. Genetic characters of the exotic varieties are not known. Chowdhury *et al.* (1983) suggested that knowledge of genetic variability among different parameters contributing to yield is important for yield improvement. Dudby and Moll (1969) reported that the improvement of a crop mainly depends upon the magnitude of genetic variability and the degree to which the yield and its components are heritable. Sobhan (1982) studied genetic variability in tossa jute. Very little study has been made on the exotic tossa jute and improved tossa jute of BJRI, under the agro-ecological conditions of Jessore-Kushtia zone.

A study was therefore, conducted to estimate the variability, correlation and performance in their yield contributing characters and identify superior variety for Jessore-Kushtia zone and the information would be useful to utilize in future breeding programme for the improvement of tossa jute varieties.

### Materials and Methods

The study was conducted at Monirampur Jute Research Sub-station, Jessore during the year 1995-97. Four exotic varieties JRO-524, JRO-632, JRO-7835 were collected from Jessore-Kushtia zone and five cultivars/strains CH-2, Chaitali, O-9897, OM-1 and O-4 were collected from Bangladesh Jute Research Institute. The experiment was conducted in a randomized complete block design with 3 replications. The unit plot size of the experiment was 3.0x3.90m<sup>2</sup>. The plants were grown in rows 30cm apart and 6.7cm distance between the plants. The recommended cultural practices were done. The recommended doses of fertilizers for O-9897 were applied. After 140 days the plants were harvested. Ten plants were selected randomly from each plot for plant height and base diameter. The plants were counted and green weights were measured. The plants were retted for fibre extraction. After fibre extraction the fibers were dried in the sun and the weight of fibers were measured. Data were analyzed statistically according to Zaman *et al.* (1982).

Genotypic variance ( $s^2_g$ ) and phenotypic variance ( $s^2_p$ ) were

calculated as per Johnson *et al.* (1955). Broad sense heritability ( $H_b$ ) and genetic advance (GA) were estimated by using the formula of Hanson *et al.* (1956). Genotypic and phenotypic coefficient of variations (GCV and PCV) were worked out following the formula of Burton *et al.* (1953). Correlation coefficients were calculated according to Al-Jibouri *et al.* (1958).

### Results and Discussion

Analysis of variance revealed that significant difference existed among the genotypes for characters studied). The mean values for six characters of nine genotypes are presented in Table 1. The variety O-9897 showed the highest plant height (4.38) followed by OM-1 (4.35), Chaitali (4.23m) but the plant height was statistically identical except JRO-632 and O-4 varieties. The highest base diameter was observed in OM-1 (24.69mm) which showed significant difference but statistically identical with O-9897. The green weight maximum for the variety O-9897 (58.72 kg) showed significant difference. The highest stick weight was found in the variety O-9897 (14.65 kg). The highest fibre weight of (4.39 t/ha) found for the variety O-9897 was statistically identical with OM-1 (4.29 t/ha) and showed significant difference among other varieties/strains. The varieties JRO-632 and O-4 were sown on mid April. These two varieties produce premature flower due to early sowing, which also gave lower fibre yield. Except the two varieties none of the varieties/strains produced premature flower. A mixture of red pigment plants with the variety JRO-524 was observed.

Range, mean, standard error, genotypic variance, phenotypic variance, GCV, PCV, heritability (broad sense), genetic advance and F-value are presented in Table 2. Phenotypic and genotypic variances were similar for fibre weight. Phenotypic variance was higher than genotypic variance for all other characters. But the differences between GCV and PCV were very close.

The highest Genotypic and phenotypic coefficient of variation (17.76 and 18.14) was observed in the fibre weight. Heritability estimate was the highest (93.37) for fibre weight/plot. Genetic advance was found to be high for fibre weight/plot. Correlation coefficient among the six characters are presented in Table 3. Correlation coefficients indicated that fibre yield had positive significant correlation with plant height ( $r=0.95$ ), base diameter ( $r=0.92$ ), green weight ( $r=0.98$ ) and stick weight ( $r=0.93$ ). The results are in agreement with Akter (2001).

The results of the present investigation showed considerable genetic variability in tossa jute for plant height, base diameter and green weight. It appeared from the results (Tables 1 and 2) that the recommended variety of Bangladesh Jute Research Institute (O-9897) gave the highest fibre yield. Similar results were obtained by Sobhan *et al.* (1993). The variety O-9897 also showed

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Table 1: Mean performance of yield contributing characters of tossa jute

Treatments	Plant population per plot	Plant height (m)	Base diameter (mm)	Green weight (kg/plot)	Stick weight (kg/plot)	Fibre weight (kg/plot)
JRO-524	324.00	4.20	22.45	52.50	13.10	4.03
JRO-632	315.00	3.12	19.54	39.89	9.54	2.62
JRO-878	318.00	4.05	23.13	54.90	12.96	3.88
JRO-7835	312.00	4.08	22.25	52.40	11.90	3.49
CH-2	354.00	4.14	22.48	55.75	13.50	4.20
CHAITALI	317.00	4.23	23.52	53.67	12.34	4.10
OM-1	322.00	4.36	24.69	58.17	13.60	4.29
O-9897	346.00	4.38	24.61	58.72	14.65	4.39
O-4	342.00	3.16	20.67	44.75	9.85	2.69
Range	312.00-354.00	3.12-4.38	19.54-24.69	39.89-58.72	9.85-14.65	2.62-4.39
Mean	327.00	3.96	22.59	52.30	12.38	3.74
SE	9.00	0.20	0.48	1.96	0.65	0.13
LSD	19.08	0.44	1.03	4.16	1.37	0.28
CV(%)	3.36	6.46	2.63	4.59	6.46	4.33

Table 2: Estimation of genetic parameters for different characters of tossa jute

Characters	Genotypic variance (s <sup>2</sup> <sub>g</sub> )	Phenotypic variance (s <sup>2</sup> <sub>p</sub> )	GCV (%)	PCV (%)	Heritability H <sub>g</sub> (%)	Genetic advance Mean %	F-value
Plant height (m)	0.21	0.27	11.59	13.29	76.17	20.83	10.60**
Base diameter (mm)	2.63	2.99	7.17	7.65	87.95	13.85	23.26**
Plant population/plot	196.15	317.76	4.27	5.43	61.00	6.82	5.83**
Green weight/plot (kg)	36.48	42.27	11.54	12.42	82.30	22.08	19.93**
Stick weight/plot (kg)	2.71	3.35	13.29	14.78	1480.89	24.60	13.73**
Fibre weight/plot (kg)	0.44	0.46	17.76	18.14	95.80	35.79	51.15**

\*\*Significant at 1% level of probability.

GCV : Genotypic coefficient of variance.

PCV : Phenotypic coefficient of variance.

Table 3: Correlation coefficient among the six characters of tossa jute

Characters	Plant height	Base diameter	Plant population	Green weight	Stick weight	Fibre weight
Plant height (m)	1	0.134	0.040	0.947**	0.801**	0.953**
Base diameter (mm)		1	0.079	0.888**	0.834**	0.925**
Plant population/plot			1	0.191	0.260	0.205
Green weight/plot				1	0.895**	0.986**
Stick weight/plot					1	0.932**
Fibre weight/plot						1

\*\* Indicates significant at 1% level of probability

maximum plant height, green weight and fibre weight. The similar results were found by Akter (2001).

High heritability coupled with high phenotypic coefficient of variation and genetic advance as percent of mean were observed for fibre weight. Heritability estimate alone indicate the basis for selection of phenotypic expression but Johnson *et al.* (1995) suggested that Heritability estimates coupled with genetic advance should be simultaneously considered. Our findings are in agreement with the findings of Sobhan *et al.* (1993) in *C. capsularis* plant height and base diameter have positive significant correlation with green weight, stick weight and fibre weight. The findings are in agreement with Eunus (1969), Roy (1969) and Sobhan (1982). Plant height and base diameter have been used as the chief criteria for selection, since these two characters have positive correlation with fibre yield (Gupta, 1997). It can be concluded here that the improved variety O-9897 of BJRI is superior to exotic varieties in respect of yield. Due to the unavailability of O-9897 seed at proper time the farmers of Jessore-Kushtia zones have been using the exotic jute seeds for cultivation.

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