CORRELATION AND REGRESSION BETWEEN FIBRE YIELD AND OTHER PLANT CHARACTERS IN TOSSA JUTE

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ABSTRACT

Five cultivated varieties of *Corchorus olitorius* L. were studied for variability and correlations between 6 characters. Wide ranges of variability were observed for most of the characters. Simple correlation analysis revealed that plant height, base diameter, green weight and stripped weight had strong and positive correlation with fibre yield. Partial correlation analysis indicated that fibre yield was dependent on both plant height and base diameter with a high magnitude of correlation with base diameter. Multiple correlation analysis showed that the combined effect of plant height and base diameter on fibre yield was highly significant in all the cultivars.

Key words: Correlations, tossa jute, fibre yield.

INTRODUCTION

A plant breeder often finds instance where one or two characters are in association. The degree of association of plant characters, which may statistically be determined by correlation analysis, has always been helpful as a basis for selecting desired strains. The measurement of correlation between yield and other characters has been the basic method to find out guidelines for plant selection. Roy (1962, 1965) studied only simple correlation in tossa jute (*Corchorus olitorius* L.) and thought that criteria like fibre stick ratio, plant height and base diameter might be used in selecting jute plants for fibre yield.

Kundu *et al.* (1959) reported that yield of fibre was closely correlated with the height and base diameter of plants. Paul and Ennus (1976) studied the phenotypic, genotypic, environmental, partial and multiple correlation in tossa jute (*Corchorus olitorius* L.). Shukla and Singh (1967) worked out the combined phenotypic, genotypic and environmental correlation coefficients for different quantitative characters in white jute (*Corchorus capsularis* L.). Gupta and Das (1977) made correlation and regression studies in white jute and found positive and significant correlation between fibre yield and its components, particularly plant height and base diameter.

The present experiment was, therefore, aimed at estimating coefficient of variation, correlation coefficient and the contribution of each component in improved cultivars of tossa jute.

MATERIALS AND METHODS

Five cultivars of *Corchorus olitorius* L. viz. C.G., 0_2, 0_3, 0_4, and 0_5 were grown in Bangladesh Jute Research Institute, Central Station, Dhaka. Each cultivar was grown in 6m long rows in each block laid out in randomized block design with 4 replications. The seeds were sown by adopting an inter and intrarow spacing of 30cm and 5cm, respectively. From each replication 25 plants were randomly selected and observation were recorded on plant height, base diameter, green weight, stripped weight, stick weight and fibre yield. To study the relationship between fibre yield and its components in all combinations, the correlation coefficients were calculated.

The significance of contribution of any one character to fibre yield after eliminating the effect of other characters was studied by testing the significance of partial correlation coefficients. Partial and multiple correlation and regression studies were done between fibre yield (Y), plant height (X_1) and base diameter (X_2) following Snedecor and Cochran (1967).

RESULTS

The mean, range and coefficient of variation of six characters as observed in this study are presented in table 1. Base diameter, green weight, stripped weight, stick weight and fibre yield showed higher variability. Simple correlation analysis revealed that plant height, base diameter, green weight, stripped weight and stick weight showed positive and significant correlation with fibre yield in all the cultivars and also with each other with exception to 0_3 where there was a weak positive correlation between plant height and base diameter and in C.G., 0_2 and 0_5 where fibre yield showed positive insignificant correlation with stick weight (Table 2). Green weight had highly significant

and positive correlation with stripped weight and stick weight and also the relation between stripped weight and stick weight was highly significant and positive in all the cultivars.

The estimates of partial correlation coefficients indicated that fibre yield was dependent on both plant height and base diameter independently, whereas both the correlations, $ryx_{1.x_2}$ and $ryx_{2.x_1}$ were positively significant in all the cultivars (Table 3).

The combined effect of plant height and base diameter showed highly significant correlation (r=0.81 to 0.97) with fibre yield in all the cultivars (Table 3).

DISCUSSION

Wide ranges of variability were observed in base diameter, green weight, stripped weight, stick weight and fibre yield. Khatun and Sobhan (1985) reported that the wide range of variability would help a great deal in detecting the range of genetic diversity for various traits in a population.

The results of simple correlation coefficient for individual varieties indicated that plant height, base diameter, green weight, and stripped weight showed positive and significant correlation with fibre yield and also with each other. It was thus indicated the importance of tall plants with greater base diameter for obtaining higher yield of fibre. These results are in conformity with that of Eunus (1968). Stripped weight was highly significant and positively correlated with stick weight in all the cultivars indicating that these are not independent variables. The magnitude of relationship between fibre yield and base diameter was higher in all the cultivar than the relationship between fibre yield and plant height. It was thus indicated that base diameter of *Corchorus olitorius* L. was a good indicator of its yield potentiality. These results are in conformity with the findings of Kundu *et al.* (1959) but contrary to those of Sinhamahapatra and Rakshit (1977). A combined effect of plant height and base diameter showed highly significant correlation with fibre yield in all the five cultivars. Shukla and Singh (1967) also reported a high positive association between pairs of characters at phenotypic, genotypic and environmental levels in white jute.

Table 1. Range, Mean, standard deviation and Co-efficient of variability in 5 cultivars of *Corchorus olitorius* L.

Characters	Range	Mean	S.D.	C.V%
Plant height (m)	2.29-4.17	3.29	0.30	9.12
Base diameter (mm)	9.00-24.00	14.67	3.25	22.15
Green weight/plant (g)	35.7-463.00	129.52	67.30	51.96
Stripped weight/plant (g)	4.61-61.72	20.41	9.32	45.66
Stick weight/ plant (g)	15.88-179.50	52.13	26.86	51.53
Fibre yield/ plant (g)	2.00-39.45	13.46	6.15	45.69

Table 2. Correlation between fibre yield and other plant characters in *Corchorus olitorius* L.

Correlation Co efficient	C.G.	0_2	0_3	0_4	0_5
$ry\ x_1$	0.70**	0.70**	0.66**	0.79**	0.86**
$ry\ x_2$	0.73**	0.91**	0.80**	0.93**	0.96**
$ry\ x_3$	0.83**	0.96**	0.95**	0.96**	0.99**
$ry\ x_4$	0.94**	0.99**	0.98**	0.97**	0.99**
$ry\ x_5$	0.09	0.11	0.93*	0.91*	0.20
$rx_1\ x_2$	0.57**	0.48*	0.32	0.74**	0.80**
$rx_1\ x_3$	0.63**	0.61**	0.58**	0.84**	0.66**
$rx_1\ x_4$	0.72**	0.66**	0.66**	0.80**	0.83**
$rx_1\ x_5$	0.56**	0.62**	0.64**	0.81**	0.79**
$rx_2\ x_3$	0.91**	0.91**	0.86**	0.93**	0.95**
$rx_2\ x_4$	0.80**	0.89**	0.84**	0.91**	0.95**
$rx_2\ x_5$	0.92**	0.83**	0.82**	0.87**	0.93**
$rx_3\ x_4$	0.90**	0.97**	0.97**	0.95**	0.99**
$rx_3\ x_5$	0.72**	0.97**	0.98**	0.92**	0.99**
$rx_4\ x_5$	0.81**	0.94**	0.96**	0.92**	0.98**

*,** P = 0.05 and 0.01 level of significant, respectively.

y, fibre yield; x_1, plant height; x_2, base diameter; x_3, green weight; x_4, stripped weight; and x_5, stick weight.

Table 3. Partial and multiple correlation and regression of different attributes in *Corchorus olitorius* L.

Variety	Partial correlation coefficient	Multiple correlation coefficient	Regression equation
C.G	$ryx_1.x_2 = 0.51^*$ $ryx_2.x_1 = 0.56^{**}$	0.81^{**}	$Y = -18.83 + 0.06x_1 + 0.77x_2$
0_2	$ryx_1.x_2 = 0.72^{**}$ $ryx_2.x_1 = 0.92^{**}$	0.96^{**}	$Y = -27.07 + 0.07x_1 + 1.22x_2$
0_3	$ryx_1.x_2 = 0.71^{**}$ $ryx_2.x_1 = 0.83^{**}$	0.91^{**}	$Y = -22.07 + 0.07x_1 + 0.84x_2$
0_4	$ryx_1.x_2 = 0.41^*$ $ryx_2.x_1 = 0.84^{**}$	0.94^{**}	$Y = -28.37 + 0.05x_1 + 1.81x_2$
0_5	$ryx_1x_2 = 0.55^{**}$ $ryx_2x_1 = 0.89^{**}$	0.97^{**}	$Y = -26.31 + 0.05x_1 + 1.66x_2$

*,** p = 0.05 and 0.01 respectively; y, fibre yield; x_1, plant height; x_2, base diameter.

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