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Limitation of Single Trait Phenotypic Selection in Tossa Jute (*Corchorus olitorius* L.)

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Abstract: A study was conducted with a view to predict the correlated response in yield taking plant height as the criterion for single trait phenotypic selection in jute. Results indicated that selection on plant height did not reflect a corresponding response in yield. Application of high selection intensity may be risky. So a low intensity selection on plant height should be applied when selection is done based on plant height only. In such situation, yield estimation of the plants above mean height may increase selection efficiency. But for higher yield direct selection appeared to be efficient over indirect selection.

Key words: Phenotypic selection, jute (*Corchorus* spp.)

Introduction

In jute correlated selection for yield has been practiced on the phenotypic value of plant height, because of high correlation between them. Paul and Eunus (1976) reported that base diameter, plant height leaf angle and leaf area contribute most to fibre yield and selection for theses characters would be worth while. But recent experimental findings (Shukla and Singh 1967; Singh, 1970; Alam and Husain, 1986) on phenotypic inter dependence have indicated the importance of direct selection for yield over indirect selection. Probably, a high heritability of yield has rendered indirect selection inefficient in jute. But literatures on different aspects of selection efficiency are scanty. In this study we would like to comment on the effectiveness of phenotypic selection based on plant height for fibre yield in jute on the basis of the present experimental findings.

Materials and Methods

In the year 1995 an experiment was conducted at the green house premises of Bangladesh Jute Research Institute (BJRI) to study the inheritance of fibre yield and other morphological characters. The crop was sown on 5th May and harvested on 120 days after sowing. Intercultural operations and fertilizer application were done as per BJRI recommendations. Data for plant height (m) and fibre yield (g) were collected on single plant basis from crosses Dhuldi x 0-4 and Palnarsingdhi x 0-4. All the plants grown from each of the F_1 and F_2 generations of both the crosses were studied.

Results and Discussion

Analysis revealed that F_2 variation for fiber yield was significant in both the crosses.

From the distribution pattern of F_1s (Figs. 1, 3) of both the crosses it can be seen that plant height and yield did not complement each other. For example, the tallest plant (251 cm) yielded only 8 g fibre, which is lower than the plants with below average height (180 cm) in both the cases tallest plants, gave comparatively low yields (Fig. 1).

In the F_2 distributions (Figs. 2, 4) the shortest plants have registered high yields. Besides, in both the crosses there was recombinant that could be selected for desirable yield, but accompanying short plant type. The tallest plants gave unexpectedly low yield as it was in F_1. From F_2 distributions it was indicated that (at least) in segregating generation plant height alone could not indicate the yield potential of a plant. Therefore, perhaps direct selection for yield might be efficient, as suggested by earlier

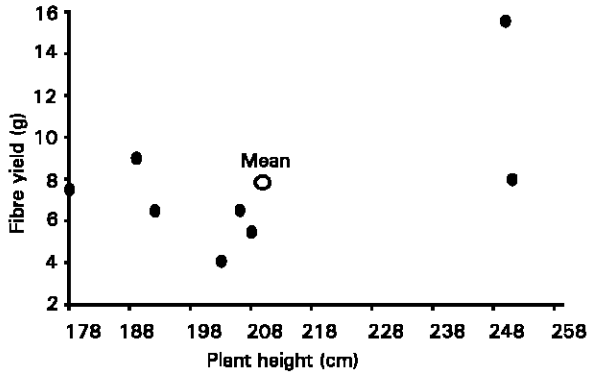

Fig. 1: Distribution of plant height (cm) and corresponding yield (g) of F1 plants of cross between Dhuldi OX-4

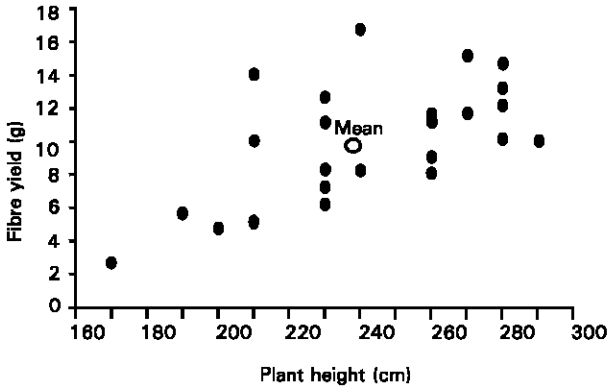

Fig. 2: Distribution of plant height (cm) and corresponding yield (g) of F2 plants of cross between Dhuldi OX-4

workers (Shukla and Singh, 1967). Direct selection on yield may also help to isolate shorter plant type with higher yield. On the contrary, selection of tallest plants (high intensity) is likely to result tall plants with poor yield (Figs. 2, 4). Therefore high selection intensity for plant height may be risky. In addition to plant height other parameters should also be considered (Islam *et al.*, 1998-99). The above discussion suggests that influence of plant height on yield is not always additive as generally assumed to be. Though mainly additive gene action for plant height

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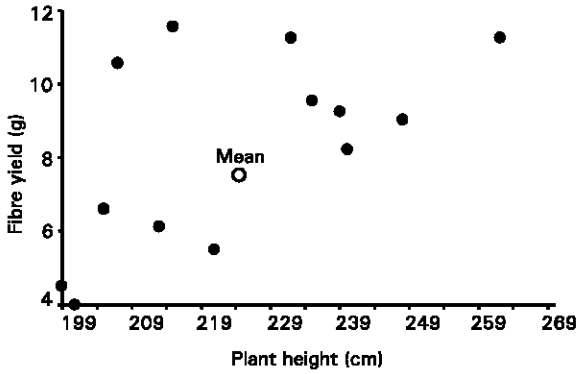

Fig. 3: Distribution of plant height (cm) and corresponding yield (g) of F1 plants of cross between Palnarsingdhi OX-4

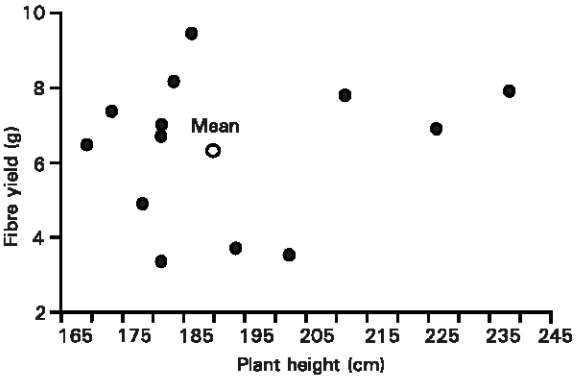

Fig. 4: Distribution of plant height (cm) and corresponding yield (g) of F2 plants of cross between Palnarsinghdhi XO-4.

was reported by Sobhan *et al.* (1995) in *Hibiscus sabdariffa*. On the other hand both additive and dominance effects were involved in plant height reported by Sinhamahapatra and Dostidar (1986), Basak *et al.* (1974) and Eunus (1974). That is, height of the plant should not be the only criteria for selection of yield as both dominance and additive effects influence plant height in jute. So selection based on only plant height may not effective. Hence other traits may be taken into consideration during selection. Multi-trait indirect selection was reported to be efficient in many crops where single trait selection proved less effective (Gallais, 1983). Selection having simultaneously high green stem weight and plant height could be more effective than the fibre yield itself (Singh and Tuteja, 1986).

It may be summarized that in jute direct selection for yield appeared to be promising and that phenotypic selection for plant height, on single plant basis will be risky, unless done with low selection intensity.

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