PLANT CHARACTER CORRELATIONS AND PATH ANALYSIS OF POD YIELD IN OKRA (ABELMOSCHUS ESCULENTUS)

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INDEX WORDS
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SUMMARY
Genotypic, phenotypic and environmental correlation coefficients were calculated for fifteen characters during two growing seasons. Correlation coefficients vary between seasons. Edible pod weight, edible pod length, edible pod width, number of seeds per plant, weight of 100 seeds, length of mature pods and number of branches per plant showed significant genotypic correlation with pod yield per plant; only number of branches per plant, edible pod length and weight of 100 seeds were phenotypically correlated with pod yield. Environmental correlation coefficients were generally low but edible pod length, final plant height and edible pod weight showed significant environmental correlation with pod yield during the two seasons.

The genotypic correlation coefficients of selected eight characters with pod yield were partitioned into direct and indirect causes. In the early seasons, edible pod weight had the largest positive direct effect on pod yield with its largest indirect effect through reduction in edible pod width. Edible pod width which was highly correlated with pod yield had a negative direct effect on pod yield. In the late season, edible pod weight had the largest direct effect on pod yield, with large indirect effects through reduction in number of days to flowering and number of pods per plant. Number of days to flowering had a large direct effect on pod yield with its largest indirect effect through reduction in edible pod weight. The residual factors during the two seasons were negative. The study indicated that only number of branches per plant, edible pod length and weight of 100 seeds would be useful for indirect selection for pod yield. The path analysis indicated that edible pod weight was the most reliable and effective character to select for when high yield is the objective.

INTRODUCTION
Knowledge of inter-character relationships is very important in plant breeding for indirect selection for characters that are not easily measured and for those that exhibit low heritability. Correlation studies between characters have also been of great value in the determination of the most effective breeding procedures. As the number of independent characters affecting a dependent character increases, there is bound to be some amount of interdependence. Under such a complex situation, correlations alone become insufficient to explain relationships among characters. Path analysis permits

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identification of direct and indirect causes of association and measures the relative importance of each character.

Rao & Ramu (1975) and Kaul et al. (1978) showed that the pod yield in a number of okra varieties was influenced chiefly by the number of pods per plant. Singh & Sing (1977) reported that pod yield had a positive and significant association with the number of pods per plant, number of branches per plant, edible pod length and plant height while plant height had the largest direct effect on pod yield. The present study determined phenotypic, genotypic and environmental correlations among fifteen characters of okra at Ibadan, S.W. Nigeria.

MATERIALS AND METHODS

In a randomised complete block design with 3 replications, 30 Okra genotypes were grown during the early (April planting) and late (September planting) rainy seasons of 1982. Each row was 3.15 m long and 90 cm between rows and plants were spaced 45 cm apart within the row to give eight plants in a row. Three weeks after sowing, plants were thinned to one plant per hill. From five competitive plants in each row, data were collected on the following characters: pod yield per plant, number of pods per plant, edible pod length, edible pod width, edible pod weight, final plant height and lifespan. The remaining 3 plants in each row were observed for number of seeds per pod, weight of 100 seeds, and length of mature pods.

The number of leaves per plant was determined by counting the number of nodes on the main stem and all branches while lifespan was determined as the period between planting date and when the plants had shed their leaves and floral apparatus. Length of mature pods was determined when pods turned yellow on the plants. Duration of flowering was determined as the difference between lifespan and the number of days to flowering. Number of days to flowering was determined at the average of the number of days to flowering of the five competitive plants.

Phenotypic and genotypic correlation were calculated from the mean values of the genotypes using the procedure outlined by Miller et al. (1958). Environmental correlations coefficients were calculated according to the procedure of Falconer (1981). Path analysis was done according to Dewey & Lu (1959). The nature of the causal scheme including eight characters and pod yield is illustrated in Fig. 1.

RESULTS

The genotypic, phenotypic and environmental correlation coefficients among different characters are presented in Tables 1, 2 and 3, respectively. In some cases, differences in both magnitude and direction of correlation coefficients were observed in different seasons. Edible pod length, edible pod width, number of branches per plant, number of seeds per pod, weight of 100 seeds, length of mature pod and edible pod weight exhibited significant positive genotypic correlations with the pod yield per plant during early and late seasons.

Only edible pod length and edible pod weight showed significant phenotypic correlations with pod yield in the two seasons.

Edible pod weight showed significant positive genotypic and phenotypic correlation