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SELECTION INDICES IN CLUSTERBEAN (*CYAMOPSIS TETRAGONOLOBA* (L.) TAUB.)

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ABSTRACT

Selection indices were constructed using 81 genotypes of clusterbean (*Cyamopsis tetragonoloba* (L.) Taub.). Four characters viz., pods/plant, pods/cluster, 1000-seed weight and seed yield/plant were selected for the formulation of selection indices for seed yield. High expected genetic advance of 3.82 and high relative efficiency of 126.5% were exhibited by score involving all the four traits. The discriminant function revealed 26.5% higher efficiency over straight selection based on seed yield itself.

Key words: Clusterbean, *Cyamopsis tetragonoloba*, selection indices, relative efficiency.

Yield is a complex quantitative character influenced by environmental fluctuations. Therefore, direct selection of seed yield per se will not be reliable and fruitful. Thus, selection criteria based on yield components would be helpful in selecting suitable plant type.

Discriminant function analysis developed by Fisher [1] and first applied by Smith [2] for plant improvement offers an effective method to formulate selection indices. Construction of selection indices or scores using discriminant function technique will be highly helpful to discriminate undesirable genotypes on the basis of their phenotypic performance. Hence, the present study was undertaken to construct suitable selection indices in clusterbean.

MATERIALS AND METHODS

Eighty one genotypes of clusterbean (*Cyamopsis tetragonoloba* (L.) Taub.) were grown in randomized block design with three replications at Agricultural Research Station, Mandor during kharif 1993 under rainfed condition. Each plot consisted of two rows, 3 m long and 45 cm apart. Plant-to-plant distance was maintained at 15 cm. Five plants taken at random from each plot were used for recording observations. Data recorded on four characters, viz.,

pods per plant (X_1), pods per cluster (X_2), 1000-seed weight (X_3), and seed yield per plant (X_4) were used to formulate selection indices and genetic advance was calculated assuming 5% selection intensity by the method suggested by Robinson et al. [3] with the help of phenotypic and genotypic variances and covariances as reported earlier [4].

RESULTS AND DISCUSSION

Three traits viz., pods/plant, pods/cluster and 1000-seed weight which exhibited maximum direct and indirect effects on seed yield were selected for construction of suitable selection indices. Besides these characters, seed yield/plant was also included as an independent variable. It is apparent from the results that the index involving all the four characters exhibited the highest relative efficiency of 126.5% whereas, the minimum relative efficiency (21.2%) was indicated by the index having single trait, viz. 100-seed weight (Table 1).

Table 1. Selection index, discriminant function, expected genetic advance and relative selection efficiency in clusterbean

Selection index	Discriminant function	Genetic advance	Relative selection efficiency (%)
X_1	0.047	2.04	67.6
X_2	0.214	0.94	31.2
X_3	0.101	0.64	21.2
X_4	0.465	3.02	100.0
$X_1 X_2$	0.047 + 0.214	2.25	74.5
$X_1 X_3$	0.047 + 0.101	2.14	70.9
$X_1 X_4$	0.047 + 0.465	3.65	120.7
$X_2 X_3$	0.214 + 0.101	1.14	37.7
$X_2 X_4$	0.214 + 0.465	3.17	104.7
$X_3 X_4$	0.101 + 0.465	3.09	102.2
$X_1 X_2 X_3$	0.047 + 0.214 + 0.101	2.34	77.5
$X_1 X_2 X_4$	0.047 + 0.214 + 0.465	3.77	124.7
$X_1 X_3 X_4$	0.047 + 0.101 + 0.465	3.71	122.6
$X_2 X_3 X_4$	0.214 + 0.101 + 0.465	3.23	106.9
$X_1 X_2 X_3 X_4$	0.047 + 0.214 + 0.101 + 0.465	3.82	126.5

X_1—pods/plant; X_2—pods/cluster; X_3—1000-seed weight (g), and X_4—seed yield/plant (g).

All the single variable indices showed lower relative efficiency when compared with independent variable index, i.e. seed yield itself. Among two variable indices, function comprising pods/plant and seed yield recorded still higher genetic advance (3.65) and relative efficiency (120.7%). When three traits pods/plant, pods/cluster and seed yield/plant were taken together, the genetic advance and relative efficiency further increased to 3.77 and 124.7%, respectively. The function which included all the four characters gave the highest advance (3.82) with the maximum efficiency of 126.5%. This score had increased 26.5% higher efficiency over straight selection of seed yield only.

In the present study, selection indices based on multiple characters resulted in

increased efficiencies. This indicated the usefulness of multitrait selection for yield over selection based only on a single trait. The highest values of both genetic advance and relative efficiency were obtained when all the four characters were considered simultaneously. Thus, pods/plant, pods/cluster, 1000-seed weight and seed yield/plant are the traits needed for index construction and may be used for simultaneous improvement of these characters in clusterbean.

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