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SELECTION INDICES IN TABLE PEAS (*PISUM SATIVUM* LINN.)

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ABSTRACT

Discriminant function analysis for yield revealed a progressive increase in the relative efficiency based on two, three, four or five character combinations over straight selection or single character selection indices. The maximum efficiency was observed with the selection indices based on five characters, viz., days to flower + pod length + number of seeds/pod + pod weight + test weight of 100 green grains. No. of seeds/pod, pod weight and test weight of 100 green grains were the important components with direct influence on yield on which maximum emphasis should be laid while making selection for yield.

Key words: Discriminant function, selection indices, relative efficiency, table pea.

The breeder is seldom faced with a situation in which modification of only a single attribute is desired. Normally modification are desired in several attributes. The theory of selection indices is proposed for manipulating several attributes simultaneously [1–3]. Ever since, a large number of selection indices were worked out in different crops. The use of this technique is important in selecting genotypes and also characters of specific importance. The present study, therefore, envisages to construct different functions for improvement of green pod yield in table peas (*Pisum sativum* L.).

MATERIALS AND METHODS

Twenty new selections and cultivars of table peas were grown in randomized block design with 3 replications at the Vegetable Research Station, Kalyanpur, Kanpur, of the C. S. Azad University of Agriculture and Technology. The sowing was done on 6.12.83 in 1 x 3.5 m plots with interrow spacing of 30 cm and interplant spacing of 10 cm. Observations were recorded on five randomly selected plants per plot in each replication for days to flower (X_1), pod length (X_2), number of seeds/pod (X_3), pod weight (X_4), test weight of 100 green grains (X_5), and yield per plot of green pods. Selection indices for yield were constructed

according to the procedure discussed of [3]. Along with different selection indices, their expected genetic advance from different selection indices at 5% selection intensity and relative efficiency indices of each function over straight selection were also calculated.

Table 1. Selection index, discriminant function, expected genetic advance in yield and relative efficiency from the use of different selection indices

Selection index	Discriminant function	Expected genetic advance	Relative efficiency
X1X2	W= 0.0007 X1 – 0.023 X2	0.590	31.0
X1X3	W= 0.016 X1 + 0.107 X3	0.302	15.9
X1X4	W= 0.011 X1 – 0.007 X4	0.160	8.4
X1X5	W= 0.016 X1 + 0.064 X5	0.752	39.6
X2X3	W= –0.289 X2 + 0.178 X3	0.722	38.0
X2X4	W= –0.346 X2 + 0.187 X4	0.703	37.0
X2X5	W= 0.203 X2 + 0.057 X5	0.880	46.3
X3X4	W= 0.143 X3 – 0.099 X4	0.291	15.3
X3X5	W= 0.012 X3 + 0.062 X5	0.718	37.8
X4X5	W= 0.172 X4 + 0.079 X5	0.819	43.1
X1X2X3	W= 0.007 X1 – 0.282 X2 + 0.185 X3	0.728	38.3
X1X2X4	W= 0.002 X1 – 0.344 X2 + 0.187 X4	0.704	37.0
X1X2X5	W= 0.007 X1 – 0.193 X2 + 0.058 X5	0.885	46.6
X1X3X4	W= 0.016 X1 + 0.164 X3 – 0.095 X4	0.360	18.9
X1X3X5	W= 0.018 X1 + 0.037 X3 + 0.062 X5	0.757	39.8
X1X4X5	W= 0.012 X1 – 0.161 X4 + 0.079 X5	0.836	44.0
X2X3X4	W= –0.340 X2 + 0.127 X3 + 0.111 X4	0.748	39.4
X2X3X5	W= –0.239 X2 + 0.103 X3 + 0.051 X5	0.909	47.8
X2X4X5	W= –0.187 X2 – 0.024 X4 + 0.060 X5	0.881	46.4
X3X4X5	W= 0.146 X3 – 0.255 X4 + 0.079 X5	0.970	45.8
X1X2X3X4	W= 0.006 X–0.333 X2+0.135 X3+ 0.108 X4	0.752	39.6
X1X2X3X5	W= 0.010 X1–0.227 X2+0.112 X3+ 0.052 X5	0.919	48.4
X1X2X4X5	W= 0.007 X1–0.174 X2-0.028 X4+ 0.061 X5	0.886	46.6
X1X3X4X5	W= 0.017 X1+0.168 X3-0.252 X4+ 0.079 X5	0.899	47.3
X2X3X4X5	W= –0.178 X2+0.137 X3-0.110 X4+ 0.061 X5	0.923	48.6
X1X2X3X4X5	W= 0.012 X1–0.155X2+0.154 X3–0.126 X4+ 0.064 X5	0.936	49.3

RESULTS AND DISCUSSION

The significant treatment variance for all the six characters indicated that the strains included in the present study were highly variable.

Different selection indices, their expected genetic advance and relative efficiency indices of each function over straight selection are presented in Table 1.

The present investigation shows that selection based on single characters was no more efficient than selection indices based on two, three, four and five character combinations.

It is also evident from Table 1 that when more than one character is employed in the construction of selection indices for yield, a progressive increase in the efficiency of selection was noticed. Robinson et al. [3] in corn also recorded a progressive increase in efficiency of selection with the inclusion of every additional character but in peas the selection based on three character combinations has been emphasized [4, 5]. When two characters at a time were considered for construction of selection indices, the relative efficiency ranged from 8.4 for two-character combination of days to flower and pod weight to 46.3 in the combination of pod length and test weight of 100 green grains. The combinations of three characters exhibiting greater relative efficiency than two-character combinations were pod length + seeds/pod + test weight (49.8), followed by the combinations days to flower + pod length + test weight (46.6), and pod length + pod weight + test weight (46.4). All the four character combinations except one, i.e. days to flower + pod length + seeds/pod + pod weight, gave higher efficiency than the three-character combinations (ranging from 46.6 to 48.6). Similarly, the five-character combination exhibited the maximum relative efficiency of 49.3. The main yield components in table peas are reported to be seeds/pod [4–6, 8, 9], green pod weight [5, 7] and 100-green seed weight, i.e. test weight [6, 7]. This suggests that increase in these traits will readily increase pod yield.

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