MULTI-TRAIT SELECTION DURING LATER GENERATION IN INDIAN MUSTARD (*B. JUNCEA* (L.) CZERN & COSS.)

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ABSTRACT

A selection experiment in two crosses of Indian mustard was performed to determine whether worthwhile increase in yield would be obtained by selecting among F5 families for yield and its components. About 15 combinations between yield and its components were made to measure the response of selection in F6 over F5 generation. Approximately 10% of the F5 plants were selected for high & low character expression in each combination. From the estimates of relative performance of high and low, selection differential, selection responses and realized heritability three character combination involving secondary branches + 1000 seed weight + yield/plant appeared the most effective combination in enhancement of yield. However, the effect of secondary branches alone or in combination with other traits was also remarkable.

INTRODUCTION

Improvement in yield is the main objective of plant breeding programme and breeder involved in them must take choices as to when and how to impose selection. Because of low heritability and complex quantitative nature of yield, it has been suggested that indirect selection based on one or more of its components might be more effective than direct selection for yield itself. (Paroda and Joshi, 1970 and Smith, 1976). In view of lack of such an information on mustard, an experiment was conducted to study the effectiveness of different selection criteria using various combinations of yield and related components in 2 crosses in F_5 generation.

EXPERIMENTAL

A selection experiment was carried out in two populations of Indian mustard developed by crossing three varieties RH7818 with NDR8501 and Varuna with NDR8501. About 15 combinations between yield and its components, on the basis

of single, double, triple and all the four characters involving secondary branches (X_1), seeds per siliqua (X_2), 1000-seed weight (X_3) and seed yield/plant (X_4) were made. Approximately 10% of the F_5 plants for each combination in both crosses were selected for high and low levels by rank score method. The selection differential, realized selection response and realized heritability were calculated (Falconer, 1960) to measure the response and effectiveness of selection criteria in F_6 generation.

The progenies selected for high and low performance was positive and significant for secondary branches, 1000 seed weight and seed yield/plant, but not for seeds/siliqua in all the 15 groups of both crosses. The relative performance of high and low (H-L) x 100/H for seed yield (Table 1) was high in G_1, G_6 and G_{13} in both the populations, when selection was resorted on the basis of single, double and triple character combinations, separately. The presence of this differences in all groups indicated the effectiveness of the high and low selections.

Selection differential(s), realized selection response(s), realized heritability (RH) yield in different combinations (groups) of two crosses in Indian mustard.

Groups	RH7818 x NDR8501				VARUNA x NDR8501			
	(H-L)x100 / H	S	R	RH (%)	(H-L)x100 / H	S	R	RH (%)
G_1 (X_1)	11.63	2.93	1.38	47.09	18.55	3.27	2.50	76.45
G_2 (X_2)	3.35	0.40	0.37	92.50	7.06	0.90	0.78	86.67
G_3 (X_3)	7.27	0.91	0.84	92.32	17.84	2.79	2.68	96.05
G_4 (X_4)	8.79	2.89	1.18	40.83	20.07	4.32	2.58	59.72
G_5 (X_1X_2)	14.59	2.16	1.90	87.96	17.95	2.37	2.21	93.25
G_6 (X_1X_3)	17.07	3.40	2.44	71.76	19.73	3.93	3.00	76.33
G_7 (X_1X_4)	19.47	3.90	2.64	67.69	9.65	2.15	1.20	55.81
G_8 (X_2X_3)	18.86	1.20	1.05	87.50	9.20	1.34	1.05	78.06
G_9 (X_2X_4)	18.45	3.01	2.55	84.71	17.97	3.89	2.49	64.01
G_{10} (X_3X_4)	15.38	2.35	1.84	78.29	16.77	2.18	2.08	95.41
G_{11} ($X_1X_2X_3$)	13.36	2.20	1.66	75.45	19.79	3.78	2.48	65.61
G_{12} ($X_1X_2X_4$)	18.22	2.46	2.30	93.49	14.91	3.69	1.66	44.98
G_{13} ($X_1X_3X_4$)	23.96	4.68	3.26	69.72	20.15	4.74	3.28	69.10
G_{14} ($X_2X_3X_4$)	12.46	2.23	1.55	69.50	14.57	1.76	1.66	94.32
G_{15} ($X_1X_2X_3X_4$)	22.09	3.56	2.98	83.70	11.66	3.18	1.46	45.91

The selection differential and realized selection response was minimum in G_3 and maximum in G_{13} of both crosses. From the Table 1, it is obvious that where the selection differential was high the realized selection response was also more or less

high in the same order suggested that more the selection differential greater the response to selection. The remarkable effect of secondary branches alone or in combination with other traits on the high selection differential and selection response was also registered, which showed the role of secondary branches in enhancement of seed yield during selection. The selection resorted on the basis of secondary branches + 1000 seed weight seed yield per plant showed maximum estimates of these parameters in both crosses appeared to be the most effective selection criteria for enchancement of seed yield in Indian mustard.

The realized heritability (RH) estimates was high in G_2 and G_3 when selection for single character was practiced in both the crosses. The heritability estimates was high in G_5 and G_8 in two character combinations while in three character combinations it was high in G_{13} of both the crosses. From the table it is clear that RH based on yield alone was not much high as compared to the groups constellated by yield with other traits, due to the complex nature of yield. Overall the study suggested that multiple selection criteria on yield components can successfully be utilized in pedigree breeding programmes.

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