Asian Journal of Plant Sciences

ISSN 1682-3974

Asian Journal of Plant Sciences 2 (1): 77-79, 2003
ISSN 1682-3974

Genetic Variability and Heritability Estimates in Summer Mustard *(Brassica juncea)*

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Abstract: In mustard *(Brassica juncea)* broad-sense heritabilities, coefficients of variability and genetics advance values were computed for primary branches, plant height, siliquas per plant and seed yield per plant in four single crosses. Number of siliquas per plant were highly heritable coupled with high genetic advance and coefficient of variability. It reflected a great scope for selection. Cross combinations 86-4-3 x Poorbi Raya and 86-16-1 x Poorbi Raya were particularly valuable for various characters. They gave high heritability and genetics advance for most characters. Indicating that selection should lead to a fast genetic improvement of the material.

Key words: *Brassica juncea*, cross breeding, heritability, crop yield, yield components and heritability estimates in *Brassica juncea*

Introduction

The success of a breeding programme depends on the presence of genetic variation in the material at hand. Greater the genetic variation, greater the chances for bringing about sustainable improvement through selection. Heritability estimates provide information about the extent to which a particular genetic character can be transmitted to the successive populations. Knowledge of heritability of a trait thus guides a plant breeder to predict the behaviour of succeeding generations and helps in making desirable selections.

Considerable work has been done in *Brassica* spp. to estimate heritability of morphological traits. Characters like plant height and yield per plant were highly heritable and gave high estimates of genetic advance in the crosses of toria (Joarder *et al*., 1977) In rapeseed estimated heritability was the highest for seed yield, followed by number of siliquas per plant and number of primary branches (Kun *et al*., 1977). High heritability and genetic advance were also reported for plant height and seed yield (Labana *et al*., 1980). Average heritability values for branching position and plant height were recorded. Co-efficient of genetic variation for number of siliquas per plant and number of branches were comparatively high (Li and Guan, 1981)). In a cross of Indian mustard high estimates of heritability were reported for primary branches (Chaudhry and Sharma, 1982). In *Brassica napus* the highest heritability values were seen for position of effective branches and plant height. The greatest expected genetic advance was in position of effective branches (Wan and Hu, 1983; Liu and Liu, 1987). In brown sarson medium to high estimates of heritability were reported for plant height, number of siliquas per plant, number of branches per plant and seed yield (Yadava *et al*., 1985). High heritability estimates were recorded for 1000 seeds weight and yield/plant.

Genetic advance as a percentage of the mean was greatest for yield/plant followed by plant height and number of branches (Beena *et al*., 1998; Gupta and Singh, 1998; Jiban and Saini, 1998; Singh *et al*., 1999; Mondal and Khajuria, 2000). The present studies were planned to estimate heritability of yield and yield components in some *Brassica* crosses.

Materials and Methods

Treatments were four brassica crosses viz; 86-4-3 x Raya Anmol, 86-16-1 x Raya Anmol, 86-4-3 x Poorbi Raya and 86-16-1 x Poorbi Raya. The objective of these crosses is to produce short stature varieties with more branches, siliquas per plant and higher seed yield per plant, as it is expected to increase per hectare yield. Seeds obtained from F_1 hybrids of the above crosses were space planted along with their parents in the experimental area of Oilseeds Research Institute, Faisalabad on September, 2000 to raise F_2 generation under irrigated conditions. The experiment was sown in a randomized complete block design with three replications(Steel and Torrie, 1960).

The seeds were dibbled at a plant to plant distance of 15 cm and row to row distance of 45 cm. At maturity 150 plants from each cross (50 plants/replication) were selected at random. Data on primary branches/plant, plant height (cm) siliquas per plant and seed yield per plant (g) were recorded for each selected plant.

Heritability estimates in broad sense were computed by using formula of Mahmud and Kramer (1951).

Table 1: Coefficients of variability (CV), heritabilities (h^2) and genetic advance values (GA) in four brassica crosses

Crosses		Primary branches/ plant (cm)	plant height	Siliquas/ plant	Seed yield/ plant (g)
86-4-3 x Raya Anmol	h^2	51.6	2.7	50.9	75.6
	CV	26.2	10.5	30.9	33.9
	GA	2.0	1.3	22.3	4.8
86-16-1 x Raya Anmol	h^2	10.0	50.2	62.2	49.6
	CV	19.6	16.4	35.4	36.9
	GA	0.7	6.3	20.9	3.4
86-4-3 x Poorbi Raya	h^2	40.1	58.2	96.1	97.3
	CV	19.1	11.3	38.1	39.6
	GA	1.4	6.0	31.2	5.7
86-16-1 x Poorbi	h^2	48.9	74.5	96.9	93.7
Raya	CV	18.7	14.6	30.5	28.0
	GA	1.4	77.6	26.4	4.8

Genetic advance was computed by using the formula of (Burton and Devane, 1953) at 10 percent selection intensity.

Coefficient of variation were also worked out for various characters.

Results and Discussion

It is evident from data that coefficients of variability were higher for seed yield per plant and siliquas per plant (Table 1). Moderate coefficients of variability were estimated for primary branches per plant whereas lower for plant height.

Low estimates of heritability for number of primary branches per plant indicated the need for careful selection of appropriate parents.

High heritability and corresponding genetic advance values exhibited for siliquas per plant in some crosses revealed that selection can be made with considerable success, while low to moderate heritabilities for this character pointed out that selection should be made with greater care for better parents. Higher seed yield per plant, is considerably important, as it is expected to lead to higher per hectare yield. High heritabilities for seed yield per plant in some crosses indicated that a considerable genetic variation was present in F2 generation and improvement for the desired level is easily possible due to additive type of gene action. Whereas lower estimates of heritability computed for the same character indicate that a great competency is needed in selecting parents for hybridization. Several other workers have reported similar findings (Joarder *et al*., 1977; Kuun *et al*., 1977; Labana *et al.,* 1980; Yadava *et al*., 1985; Gupta and Singh, 1998; Beena *et al*., 1998; Singh *et al*., 1999; Mondal and Khajuria, 2000).

Cross combinations 86-4-3 x Poorbi Raya and 86-16-1 x Poorbi Raya were particularly valuable for various characters. They showed high heritability and genetic advance for most characters. Keeping in view this criteria, selection should lead to a fast genetic improvement of the progenies of these crosses.

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