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UTILIZATION OF GERMPLASM FOR EARLINESS AND IMPROVEMENT OF *BRASSICA CAMPESTRIS* L. VAR. *YELLOW SARSON*

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A total of 132, two way crosses were made from diverse sources of self-compatible yellow sarson with four early accessions of self-incompatible brown seeded toria, for improvement and induction of earliness. The crosses were attempted and F1, were tested for nine yield attributing traits including earliness. The parents (33 + 4) and their crosses were analysed for genetic parameters (gca, sca, mean value) and further parents (33+ 4) and their crosses (132) were classified for High (H) and Low (L) of their individual attributes over the characters in respect of the significant gca value in positive or negative direction. The studies indicate that the residual variability existing in the germplasm can be exploited for crop improvement. Two way crosses are highly influenced by status of their parents.

Key words : *Brassica*, utilization, earliness, gca, sca, frequency of crosses

Oleiferous brassicae are mainly represented by turnip-rape (*B. campestris*) and mustard (*B. Juncea*). Both of these species together called as rapeseed-mustard, and occupy an important position in India. This group of oilseeds is having vast reservoir of genetic variability for various morpho- physiological traits. The slow rate of improvement in rapeseed-mustard in India, could be attributed to various reasons. Genetic uniformity attained by pure line leads to a serious consequences of genetic vulnerability to biotic and abiotic stresses. The scope of heterosis breeding is limited. To avoid the above cited problem, lines/population of short-duration with desirable traits may be evolved.

MATERIALS AND METHODS

The experimental material constituted of two improved strains *B. campestris* var. *yellow sarson viz.*, (YID-1 and YID 3) differing in morphological features

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as well as qualitative and quantitative traits including maturity (110-120 days), were used as a female parents. Four very early (65-95 days) of brown seeded toria (NC-6369; NC-63645; NC-63647 and T-9 renamed as T-1, T-2, T-3, T-4, respectively) were utilized as male parents. Fourteen variable plants from YID-1 (P-1, P-2, P-3, ... P-13, P- 14) were crossed with four male parents (T-1, T-2, T-3, T-4) and thus 56 F_0, of two way crossed seed were obtained and maintained. Thus, a total of 132 crosses were grown alongwith their parents in randomised block design during 1987-90 at IARI, New Delhi. The data recorded for nine variables such as Height (H); Primary branches (PB); Secondary branch (SB); Siliqua on primary branches (SP/B); Siliqua on sec. branches (S/SB); Seed per siliqua (S/S); Yield per plant (Y/PL); Initial flowering (IF); Complete flowering (CF) were analysed for mean performance, gca effects, sca effects, as per Line x tester analysis (Arunachalam, 1974).

RESULTS AND DISCUSSION

(1) Variability analysis : Significant variation was observed among the parents for all the nine traits. The partitioning of variation showed that the female parents also differed among themselves for all the traits. While male parents showed variation for six characters. The mean performance and range of variation for male and female parents showed that the maximum range of variation was observed among female parents for number of siliqua per secondary branch, number of secondary branch while for maximum variation was observed for seeds per plant, siliqua in secondary branch in male parents (Table 1).

Table 1. Mean and range of variability among parents in sarson

		HT	PB	SB	S/PB	S/SB	S/S	Y/PL	IF	CF
Parents	Max.	178.0	14.0	13.5	42.5	15.5	39.5	57.5	50.6	61.5
	Min.	59.0	4.4	1.5	17.0	1.0	13.2	13.5	29.0	42.0
Female	Max.	178.0	14.0	13.5	42.5	15.5	39.5	57.5	50.6	61.0
	Min.	95.0	5.4	1.5	19.1	1.0	18.2	13.8	34.5	42.0
	Mean	138.7	8.7	6.2	28.8	6.5	27.6	33.7	43.8	52.8
Male	Max.	101.0	6.8	19.5	27.7	14.5	16.5	23.5	38.5	52.0
	Min.	59.0	5.8	7.7	17.0	8.1	13.5	13.5	29.0	43.8
	Mean	78.9	6.2	13.5	21.5	11.2	14.7	12.1	34.8	41.8

(2) G.C.A. estimates : Adequate variation among the parents for most of the characters was observed. 21 out of 33 female parents and 3 male parents showed high (H) gca status in Fig. 1. The classification on high (H) and low

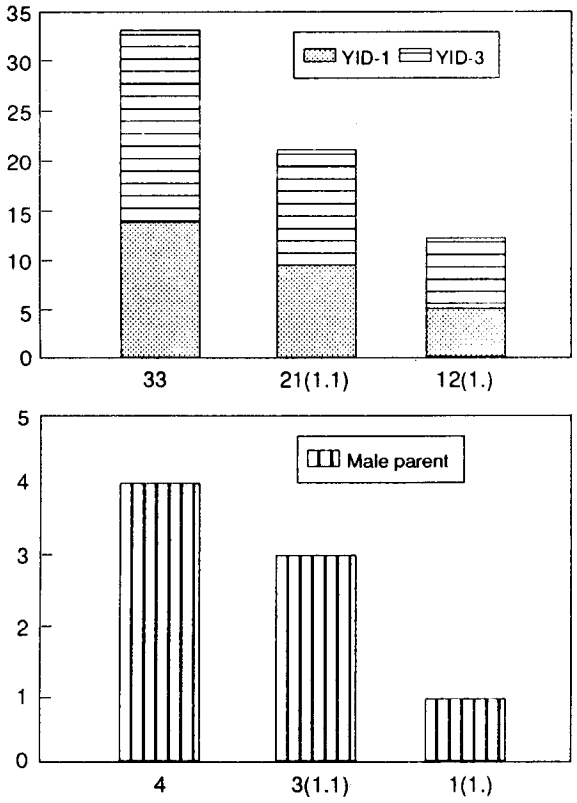

Fig. 1. Frequency of parents, showing their gca status

(L) parental status on the basis of gca effects measures across the characters are useful for relative assessment of potential of parents (Longham, 1961; Bandyopadhyay, 1976; Katiyar, 1978; Das, 1979; Katiyar, 1984 and Bhatnagar and Sharma, 1991). Such a close interrelationship between gca status and average performance of parents did not occur, when all the parents use in producing F_1 were examine individually mean performance over gca status. The presence of residual heterozygosity at certain loci in female parents and in male self-incomparibility could be a valid reason. The finding reported in the present study regarding gca effect and residual heterozygosity in relation to self incompatibility of male parents resembles with earlier workers.

(3) S.C.A. estimates : In general additive and non additive gene effects were found to control all the characters while non-additive pre-dominent for most of the characters. Estimated sca revealed that the presence of non-additive variance for plant height, primary branches, days to flower, yield per plant. Three crosses were identified as a potential hybrid having significant sca effects for five characters. Thus, the higher frequency crosses were given by female

parent YID-3 as compared to YID-1. Out of eight, six crosses belong to same parent (YID-3) showed significant for four characters. So, most of the crosses had shown significant sca effects in desirable direction. Thus, it is clear that female parents (YID-3) was most successful in producing higher number of superior crosses for yield and earliness (Table 2). Similarly, the male parents (T-3 and T-4) were comparatively better for producing the superior crosses. Similar results have been observed by other workers.

Table 2. Frequency of crosses with high(H) and low (L) sca status in different gca classes

gca of parents		sca status of crosses								
		Overall			In YID-1			In YID-3		
Female × Male	Feq.	T	H	L	T	H	L	T	H	L
H × H	F	63	37	26	24	15	9	39	27	12
H × L	F	57	29	28	26	14	12	31	15	16
L × L	F	12	4	8	6	2	4	6	2	4

(4) Relationship between parental gca status and sca effects : The frequency of crosses with high (H) low (L) sca effects were considered for nine characters.

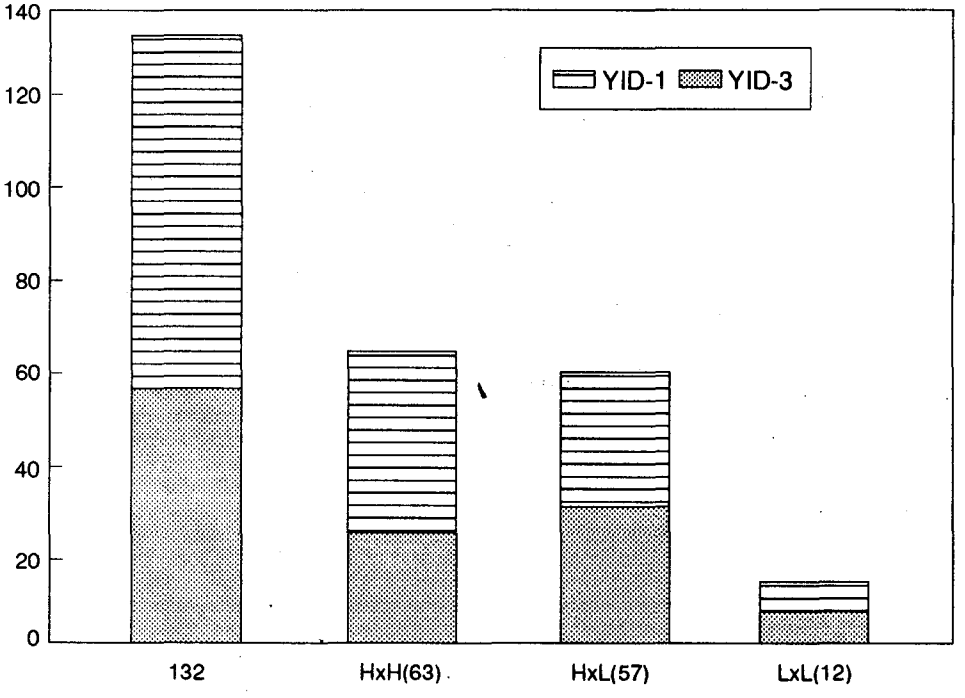

Fig. 2. Frequency of crosses showing their sca status in HxH, HxL, LxL parental categories

These crosses were looked upon their parental gca. Out of 132 crosses, 63 belong to High × High (H × H); 57 crosses of High × Low (H × L) and 12 crosses of Low × Low (L × L) parental status (Fig. 2).

The maximum crosses with high (H) sca status were found in High × High (H × H) while Low × Low (L × L) and High × Low (H × L) crosses were lowest and intermediate. Superior crosses with higher frequency would be located into H × H and H × L categories. The result are quite similar to the findings of earlier reports.

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