Journal of Crop and Weed 7(1): 49-51(2011)

Changes in character association in recombinant lines of *Brassica campestris*

M. SEN AND K. S. KARMAKAR

Department of Plant Breeding, ,
Bidhan Chandra Krishi Viswavidyalaya,
Mohanpur-741252,Nadia, West Bengal

Received: 15.01.2011, Revised: 12.05.2011, Accepted: 30.05.2011

ABSTRACT

The investigation was carried out with six parents (3 bilocular and 3 tetralocular) and 18 recombinant lines (F_4) which were grown in three replications following Randomized Block Design at Instructional Farm, Bidhan Chandra Krishi Viswavidyalaya, Jaguli, West Bengal during the year 2007-2008. Same parents and 18 recombinant lines (F_5) were grown in the following year in the same procedure. The prime objective of the study was to study the relationship of yield with yield components among parents and recombinant lines in Brassica campestris L. Var. Yellow Sarson to carry out future research programme. Eleven characters were studied during both the years. Seed yield per plant recorded significant positive correlation only with two characters siliqua on branches and total siliqua per plant among the parents in the second year while no significant relationship was recorded between seed yield per plant and other yield attributing characters among the parents in the first year. Seed yield per plant showed no significant correlation with any of the characters among F_4 recombinant lines. In F_5 seed yield per plant showed significant positive correlation with four characters plant height, siliqua on main raceme, siliqua on branches and total siliqua per plant. F_5 recombinant lines have opened up new opportunities by creating new association not available in parents.

Key Words: Brassica, siliqua, phenotypic coefficient of correlation, ,seed yield.

Rapeseed and mustard occupy a prominent place in edible oil seed production. China ranked first in rapeseed production and occupied 7.2 million hectare land and produced 11.9 million tons about 30.4% of the world production. India ranked second with 5.18 million tons and 21.9% share in world production. World wide production of rapeseed (including canola) rose to 46.4 million metric tons in 2005, the highest recorded total (source: FAO). In India, rapeseed mustard cultivation is mainly confined to Rajasthan, Uttar Pradesh, Madhya Pradesh, Haryana, Punjab, Assam, Bihar, Gujarat and West Bengal. Among the different states, Rajasthan alone produces more than 50 per cent of total rapeseed and mustard produced in India. During 2006 - 2007 rapeseed and mustard in India occupied 6.33 million hectares with production of 6.69 million tons. Productivity of rapeseed mustard in India is slightly more than one ton compared to 1.5 t/ha productivity of the world. Productivity of rapeseed mustard in India for the last one decade has stagnated at around one ton per hectare. For a rational approach to the improvement of yield, therefore, it is essential to have some information on the association between the different yield components and their relative contributions to yield. The most important components are the number of branches, siliqua per plant and 1000 seed weight. Kumar *et al.* (1984) suggested that selection of component characters rather than yield itself can help substantially to increase seed yield in Brassicas. Singh and Chaudhury (1979) suggested for a compromise in selection programme for siliqua number per plant, length of siliqua bearing branches etc. Approaches to improving through early generation selection for yield have centered on the use of alternative selection criteria (Bhatt, 1980). The most widely used alternative selection criteria in *B. rapa* L. have been primary morphological components of seed yield such as the number of siliqua per plant, number of seeds per siliqua and seed size expressed as test weight (Sikari *et al.*, 2004) The value of morphological trait as a selection criteria depends on the genetic characterization of a character, its agronomic benefit and finally the ease with which it can be measured in large scale trials.

In the present context, a comparative study of yield and yield components of parents and their advance generation recombinants has been carried out. The prime objective behind these is to study the relationship of seed yield and yield attributes among parents and recombinants.

MATERIALS AND METHODS

The field experiments were conducted at Instructional Farm of BCKV, Jaguli, West Bengal during *rabi* seasons of two consecutive years (2007-08 and 2008-09). The seeds of 6 parents and their 18 F_4 recombinants advanced from bulk F_2 progenies of each of the 15 crosses (half-diallel) along with the tetralocular progenies of three crosses were grown in 3 replications following Randomized Block Design in 2007-2008 in the third week of November as single row plot of 2m long with a 30 cm row spacing. Fertilizers i.e N, P and K @ 40:30:30 kg/ha were used in the form of urea , single super phosphate and

Email : sen.madhuparni@gmail.com

Table 1(a): Phenotypic co-efficients of correlation among different characters of parents during 2007 – 08

	PH	BH	MRL	BN	SM	SB	SL	SP	SS	SW	SY
PH	1.000	0.737	0.615	0.564	0.728	0.096	– 0.199	0.203	0.335	0.605	0.372
BH		1.000	0.258	0.110	0.379	– 0.510	– 0.187	0.443	0.727	0.254	– 0.095
MRL			1.000	0.257	0.765*	0.079	– 0.310	0.309	– 0.014	0.543	0.542
BN				1.000	0.387	0.677	0.188	0.616	– 0.004	0.459	0.573
SM					1.000	0.168	– 0.101	0.446	– 0.080	0.408	0.449
SB						1.000	0.258	0.939**	– 0.445	0.130	0.621
SL							1.000	0.160	– 0.047	– 0.336	– 0.125
SP								1.000	– 0.484	0.159	0.703
SS									1.000	– 0.081	0.007
SW										1.000	0.378
SY											1.000

Table 1(b): Phenotypic co-efficients of correlation among different characters of parents during 2008 – 09

	PH	BH	MRL	BN	SM	SB	SL	SP	SS	SW	SY
PH	1.000	0.617	0.766*	0.238	0.399	0.273	– 0.589	0.407	0.599	0.367	0.512
BH		1.000	0.570	– 0.238	0.300	– 0.008	– 0.630	0.152	0.773*	0.559	0.096
MRL			1.000	0.211	0.418	0.288	– 0.235	0.427	0.577	0.527	0.562
BN				1.000	– 0.029	0.385	– 0.005	0.263	– 0.235	– 0.013	0.337
SM					1.000	0.274	0.086	0.721	0.178	0.453	0.583
SB						1.000	0.195	0.864*	0.073	0.213	0.845*
SL							1.000	0.184	– 0.638	– 0.053	0.118
SP								1.000	0.146	0.390	0.914**
SS									1.000	0.429	0.243
SW										1.000	0.307
SY											1.000

Table 2(a): Phenotypic co-efficients of correlation among different characters of F_4 recombinants during 2007-08

	PH	BH	MRL	BN	SM	SB	SL	SP	SS	SW	SY
PH	1.000	0.580**	0.633**	0.025	0.301	0.056	0.120	0.149	0.193	0.245	0.013
BH		1.000	0.432	– 0.450	0.054	– 0.408	0.152	– 0.361	0.447	0.232	0.029
MRL			1.000	0.033	0.258	0.069	0.235	0.147	– 0.059	0.342	0.073
BN				1.000	0.183	0.821**	0.052	0.820**	– 0.437	– 0.005	0.059
SM					1.000	0.061	0.361	0.379	– 0.088	0.074	0.072
SB						1.000	0.025	0.947**	– 0.441	– 0.158	0.218
SL							1.000	0.140	0.131	– 0.014	0.118
SP								1.000	– 0.437	– 0.122	0.226
SS									1.000	– 0.063	0.149
SW										1.000	– 0.175
SY											1.000

Table 2(b): Phenotypic co-efficients of correlation among different characters of F_5 recombinants during 2008 – 09

	PH	BH	MRL	BN	SM	SB	SL	SP	SS	SW	SY
PH	1.000	0.740**	0.418	0.176	0.358	0.582**	0.160	0.472*	0.383	0.231	0.640**
BH		1.000	0.250	– 0.091	0.201	0.273	– 0.053	0.219	0.408	0.235	0.321
MRL			1.000	0.133	0.319	0.073	– 0.177	0.065	0.455	0.105	0.328
BN				1.000	0.184	0.424	0.198	0.355	0.027	0.038	0.434
SM					1.000	0.602**	0.226	0.800**	0.156	0.098	0.586**
SB						1.000	0.411	0.909**	0.052	0.142	0.820**
SL							1.000	0.463*	– 0.148	0.293	0.411
SP								1.000	– 0.006	0.180	0.803**
SS									1.000	– 0.175	0.258
SW										1.000	0.245
SY											1.000

** : Significant at 5%; ** : Significant at 1% level of significance* muriate of potash. Entire amount of P, K and 50% N was used as basal dose before sowing and the remaining 50% N was used as top dressing 30 days after sowing just after completion of weeding and thinning with a follow up of irrigation. Spacing between plants within rows was kept 8-10cm. Spraying of dimethoate 30EC @ 750g a.i./ha was done at regular intervals to avoid aphid infestation. In the second year (2008-2009) also, the crop was sown in the third week of November and the experiment was carried out in the same way with 6 parents and 18 F_5 recombinants as was followed in the first year. Five competitive plants were selected at random from each treatment per replication and mean phenotypic value from each of the total 11 characters like plant height, height upto first fruiting branch, main raceme length, number of primary branches per plant, number of siliqua on main raceme, number of siliqua on branches, length of siliqua, total number of siliqua per plant, number of seeds per siliqua, 100 seed weight, seed yield per plant were considered. Phenotypic correlations were computed according to Gomez and Gomez (1983).

RESULTS AND DISCUSSION

Phenotypic correlation of seed yield per plant with different quantitative characters among parents, F_4 and F_5 recombinants

Difference in relationship of seed yield per plant with other characters and interrelationship between yield attributes were observed in parents (Table 1a and 1b), F_4 (Table 2a), and F_5 (Table 2b) recombinants.

Seed yield per plant recorded significant positive correlation only with two characters siliqua on branches and total siliqua per plant among the parents in the second year (Table 1b) while no significant relationship was recorded between seed yield and other yield attributing characters among the parents in the first year (Table 1a).

Among F_4 recombinants, significant positive correlations of plant height with height upto first fruiting branch and main raceme length; branch number with siliqua on branches and total siliqua per plant; siliqua on branches with total siliqua per plant were recorded.

In the second year (Table 2b) seed yield per plant showed significant positive correlations with four characters namely plant height, siliqua on main raceme, siliqua on branches and total siliqua per plant in F_5 recombinant lines in contrast to the parents in which seed yield per plant (Table 1b) showed significant positive correlations with two characters only namely siliqua on branches and total siliqua per plant.

Plant height in the F_5 recombinants recorded significant positive correlation with three yield attributes height up to first fruiting branch (0.740), siliqua on branches (0.582) and total siliqua per plant (0.472). Siliqua on main raceme showed significant positive correlation with siliqua on branches and total siliqua per plant. Siliqua on branches on the other hand showed significant positive correlation with total siliqua per plant in F_5 recombinants (Table 2b). Significant positive correlations between plant height and main raceme length, between height upto first fruiting branch and seeds per siliqua and siliqua on branches with total siliqua per plant were recorded in the second year (Table 1b) whereas significant positive correlations of main raceme length with siliqua on main raceme and siliqua on branches with total siliqua per plant were recorded in the first year (Table1a) among parents.

F_5 progenies, therefore, appear to present new association which could be utilized for selection of desirable combinations. In the segregating generation, new association may arise due to breakage in linkages. Accordingly, magnitude of character association would differ in the segregating population from the normal progenies. In the present experiment, seed yield per plant in F_5 recombinants showed significant positive correlation with plant height and siliqua on main raceme (new association) which showed significant positive association with siliqua on branches and total siliqua per plant. These two characters siliqua on branches and total siliqua per plant in turn showed significant positive correlation with seed yield per plant. Selection of these characters showing significant positive correlation with seed yield per plant, therefore, might improve seed yield per plant. The present experiment thus revealed that F_5 generation has opened up new opportunities by creating new associations not available in parents.

REFERENCES

Bhatt, G.M. 1980. Early generation selection criteria for yield in wheat. *J.Aust. Inst. Agric.Sci.* **46**:14-22.

Gomez, K.A. and Gomez, A.A. 1983. Statistical procedures for Agricultural Research ed. 2nd John wiley and Sons-New York. pp. 357-387.

Kumar, P., Yadav, T.P. and Yadav, A.K. 1984. Association of seed yield and its component traits in the F_2 generation of Indian mustard. *Indian J. Agric. Sci.*, **54**: 604-07.

Sikari, A.B. and Sinhamahapatra, S.P. (2004). Character association and path co-efficient analysis of the yield formation process over three morphological groups in *Brassica campestris* (L.) var. yellow sarson. *Crop Res.*, **28**:98-102.

Singh, D. 1958. *Rape and Mustard*. The Indian Central Oilseeds Committee, Bombay, pp. 105.

Singh, R.K. and Chaudhary, B.D. 1979. *Biometrical Methods in Quantitative Genetic Analysis*. Rev. Ed. Kalyani Publishers, New Delhi. pp. 39 – 79.