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Gene Action Analysis for Yield and Its Component Traits in Indian Mustard (*Brassica juncea* (L) Czern and coss)

Dr. M K Srivastava
Head, Deptt of Plant Breeding and Genetics, Narain College, Shikohabad

Abstract: A 5X5 half Diallel set was planned to study the combing ability and gene action for yield and its component traits in Indian Mustard. Based upon findings of the experiment, two character like No. of seeds per siliqua and Plant height shows additive variance so Selection will be effective. All the characters study in the present experiment except the No. of Branches showed significant sca variance indicating the presence of non-additive gene action and due to this selection will not be effective to improve the traits. It further gives us an idea to go for exploitation of Heterosis in these traits .
Keywords: combining ability, diallel, additive variance, non additive variance, Brassica juncea.

I. INTRODUCTION

Improvement in yield is a prime target of most of the breeding programmes. Further yield is a poly genetically controlled complex phenomenon being influenced by several other components singly or jointy contributing to it. The study of combining ability will be useful in proper choice of parents as it determines the magnitude of general and specific combining ability effects of parents and the nature of gene action governing important traits. There for an attempt has been made to elucidate information on combining ability and nature of gene action using in present study 5 x 5 diallel set along with parent in Brassica juncea hence the present investigation was carried out to find out superior parents for crossing and their pottentiality to combine with others.

II. MATERIAL AND METHOD

Five diverse genotype comprising for each other of Brassica juncea were crossed in diallel fashion excluding reciprocal. The parent and F_2 progeny obtained from selfing of the 10 F_1's were sown in RBD of 3 replication each of the treatment comprised two rows of 4 m length at a spacing of 50 x 15 cm. The seeds were taken separately from each of the 10 plants selected randomly from each of the treatments and replication.

In each of the F_1 and F_2 experiments, ten plants were selected randomly from two row each of the treatment in each of replicates except days to flowering and maturity, these were taken on plots basis. The observation was recorded on days to first flowering. Days to maturity, no. of branches per plant, plant height at maturity number of siliqua per plants, 1000 seed weight and seed yield per plant. The analysis of variance (RBD) was done from the mean data of the character recorded on 5 parent and their 10 crosses in F_2 generation and for 5 parent, 10 F_2s separately also according to the method suggested by Panes and Uskhatme (1961)

III. RESULT AND DISCUSSION

The analysis of variance for combining ability (Table-1) showed that general combining ability (gca) were significant for two character i.e. No. of seed per siliqua and plant height at maturity. These two characters depicts the additive variance that infers true relationship so the selection will be effective.

The analysis of variance for combining ability showed that specific (sca) combing ability variance were significant for all the traits except the no. of branches showed a significant sca variance that infers non additive type of gene action is prevailing so heterosis breeding will be a good choice for better parent. How ever the magnitude of gca variance was much higher than that of sca variance in case of plant hight at maturity no of seed per siliqua etc. Exhibiting the predominance of additive variance. gene effect in the genetic control of these traits. Therefor in case of above traits simple selection may give rise desired improvement. Similar results have also been reported by Dhillon (1990), Bhadauria et al (1991), Godewadikar et al (1991) singh (1991), Yadav at al (1992), Singh at al (1995), Thakur and sagwal (1997), Sheikh at al (1998), Sheoran et al (2000).

The estimate of gca effect are presented in table – 2. The parent vaibhav exhibited high gca value for seed yield per plant. The parent CS-52 also recorded significant gca effect. It suggests that the above parent has high pottentiality to combine with other parent most effeciently. And at the same time it also reflects the negative & significant effect of plant height at maturity, no of siliqua per plant and number of branches per plant. The parent Laxmi also recorded significant negative gca effect in the direction for plant height at maturity and number of siliqua per plant. The parent PBR recorded significant and gca effect for plant height at maturity and no. of siliqua per plant and one remaining parent sanjucta Asech also recorded significant gca effect in the direction for plant height and day to flowering and negative gca effect in the direction for day to flowering.

Significant sca effect were obtained for different character and are present in table – 3. The cross PBR 97 x CS 52 followed by Laxmi x CS 52 had highest positive sca effect for seed yield per plant & no. of siliqua per plant. The cross vaibhav x Laxmi highest positive sca effect for plant height at maturity and 1000 seed weight per plant. The cross vaibhav x PBR 97, Sanjucta Asech x Laxmi and Sanjucta Asech x PBR 97 had highest positive sca effect for both no of siliqua per plant and no. of seed per siliqua, after that sanjucta Asech x Laxmi also positive sca effect for no of branch per plant and plant height at maturity. The crosses Laxmi x CS 52 showed highest overall sca status except no. of seed per siliqua and 1000 seed weight per plant. Bhadauria et al (1991) and singh (1991) and patel at al (1993). In the present investigation the cross combination PBR 97 x CS 52 has emerged as the best parent giving the highest sca effect for seed yield per plant.

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Table – 1- Analysis of variance (ANOVA) for combining ability for eight characters in 5 x 5 F2 half diallel set of *Brassica juncea (L)*

Source of variation	D.F.	CHARACTER							
		Days to flowering	Number of branches/ plant	Number of siliqua/ plant	Number of seed per siliqua	Plant height at maturity	Days to maturity	Seed yield / per plant	1000 seed weight per plant
G.C.A	4	1.1711	0.3538	25.5973	5.2049*	173.6994**	1.4490	0.6439	0.09563
S.C.A	10	1.27004*	0.6278	35.7390**	1.3608	35.9058*	3.4201*	1.3910*	0.5056*
Error	28	1.2168	0.2114	11.5259	3.9364	16.2316	3.0377	0.4984	0.1484

* Significant at 5% level of significance

** Significant at 1% level of significance

Table – 2, Estimate of General combining ability effects for eight character in a 5 x 5 half diallel set of *Brassica juncea (L)*

Source of variation		CHARACTER							
		Days to flowering	Number of branches/ plant	Number of siliquae/ plant	Number of seed per siliqua	Plant height at maturity	Days to maturity	Seed yield / per plant	1000 seed weight per plant
Sanjucta Asech	P1	-0.70*	-0.15	0.79	1.40*	6.31**	-0.28	-0.08	0.15
PBR – 97	P2	0.06	-0.05	2.20*	-0.77	3.99**	-0.47	0.11	0.08
Vaibhav	P3	0.10	-0.17	1.00	-0.43	-1.11	0.44	0.35*	0.14
Laxmi	P4	0.20	-0.02	-2.31*	-0.43	-4.86*	-0.23	-0.47	-0.07
CS – 52	P5	0.34	0.38*	-1.68*	0.23	-4.32*	0.53*	0.09	0.00

* Significant at 5% level of significance

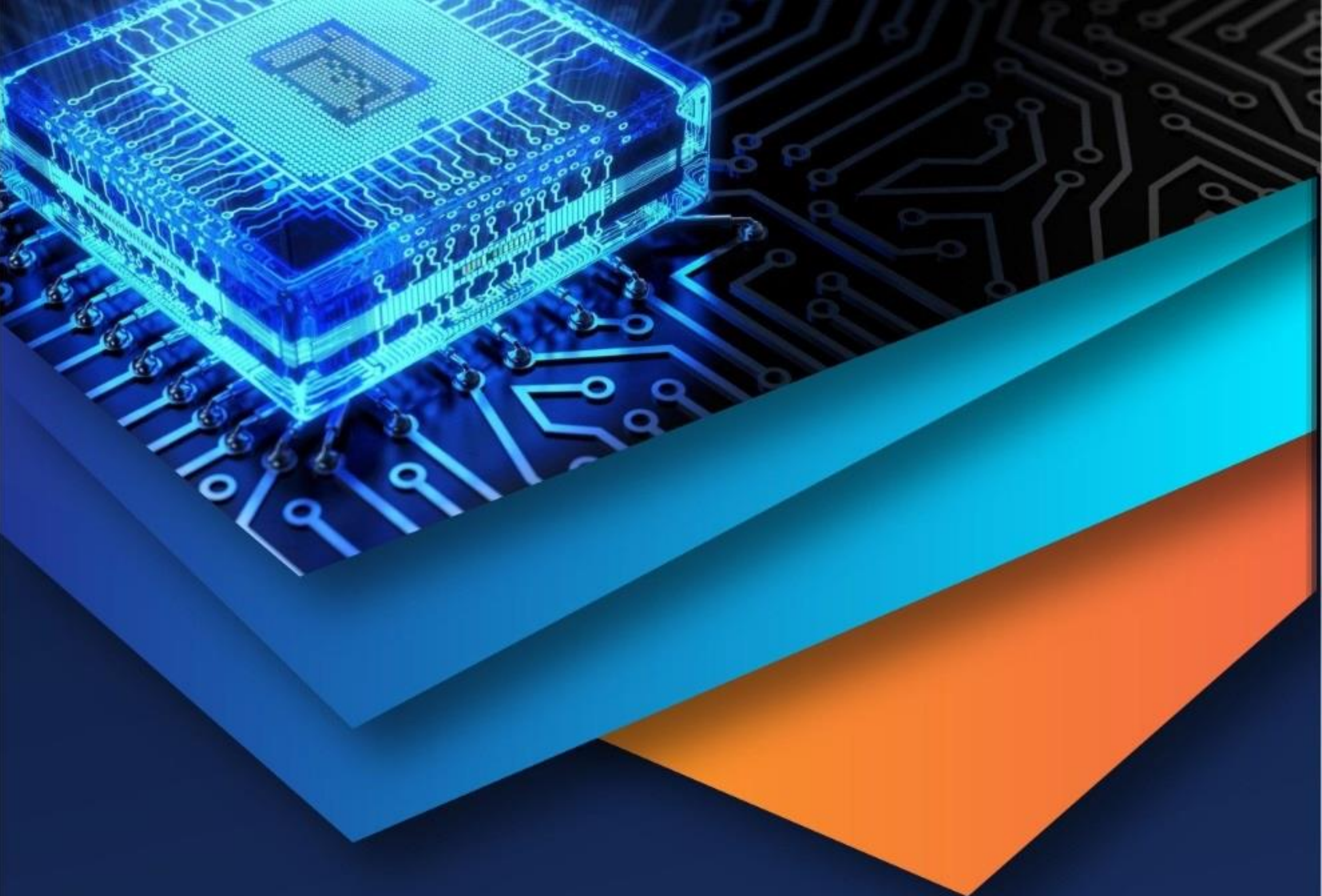
** Significant at 1% level of significance

Table – 3 Estimate of specific combining ability effect for eight characters in a 5 x 5 F_2 half diallel set of *Brassica juncea (L)*

Sr. No.	Crosses	Day to Flowering	Number of branch / plant	Number of siliquae/ per plant	No. of seed per siliqua	Plant height at maturity	Day to maturity	Seed yield/ plant	1000 seed weight per plant
1	Sanjucta Asech x Vaibhav	0.38	0.07	2.57*	-1.16*	2.53*	3.70**	-0.64	-0.17
2	Sanjucta As x PBR 97	-1.00	0.19	2.84*	1.46*	-0.57	0.46	0.92*	0.73*
3	Sanjucta As x Laxmi	0.24	0.50*	3.04**	0.97*	5.70**	0.79	0.86	0.61
4	Sanjucta As. X CS52	0.76*	-0.13	-4.37	0.38	1.32	-3.30**	0.50	0.18
5	Vaibhav x PBR 97	0.57*	-0.11	2.10*	2.08**	-3.14	-0.68	0.13	0.00
6	Vaibhav x Laxmi	0.14	-0.27	0.48	-0.83	3.33**	-0.02	0.60	1.01**
7	Vaibhav x CS52	-2.33*	-0.01	-6.61	-0.53	-6.94	-0.78	-0.53	-0.29
8	PBR97 x Laxmi	-1.57	1.64*	-0.08	-0.44	-7.88	0.08	-0.09	-0.79
9	PBR97 x CS52	0.29	0.45	11.55**	-0.02	-1.14	-0.02	1.74**	0.72*
10	Laxmi x CS52	1.19*	-1.18*	5.57**	0.61	-7.62*	1.65*	1.24*	0.59

* Significant at 5% level of significance

** Significant at 1% level of significance



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