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A Study of Genetic Analysis Through Diallel Mating In Indian Mustard (*Brassica juncea*) (L) Czern&Coss

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Abstract:- *Combining ability analysis was obtained from diallel mating design (excluding reciprocals) by using 45F_1 hybrid and their parents.The parents used namely Kranti, Rohini, Pusa bold, Vardan, Pusabahar, RH-30, RLM 198, Jawahra-1 JD-6 and NDRE-4. The observations were recorded for twelve characters.*
The analysis of variance for experimental design was performed for 12 characters. The mean squares due to genotypes was highly significant for all characters. The results indicates both gca and sca variances in present study were highly significant in F_1 generation for all the 12 characters indicating that both additive as well as non-additives genetic effects are involved in determining these attributes.
The present observations revealed a reasonable degree of agreement for line X testers mating technique of gca effects based on F_1 data in respect of most of character. 18 cross combinations in F_1 hybrid generation revealed highly significant positive and desirable sca effects for seed yield/plants^{-1}. Highly significant and positive sca effect were recorded in 11 hybrids for oil contents.
Keywords:- *Brassica juncea, general combining ability, specific combing ability, diallel, Genetic analysis.*

I. INTRODUCTION :-

Rape seed species from Brassica genus is a high value crop for oil production After attaining self sufficiency in food production there is an immediate need to increase production of edible vegetable oil in the country, because there is big gap in demand and supply of edible oil, which force our foundry to import vegetable oils of millions of rupees causing a heavy drain of foreign exchange in past years, In India rape seed mustard production was 1.6 million tones in an area of 3.54 million hectares during 1978 which is increased in 2010-11 by 7.41 million tones in an area of 6.49 million hectares with productivity of about 11.97Kg.

II. MATERIALS AND METHOD :

Ten varieties/strain of Indian mustard (Brassica Juncea) or Rai namely Kranti, Rohini, pusabahar, Rh-3-, RLM, Jawahar-1 JD-6 and NDE-4 were cross in a diallel fashion (excluding reciprocal) to obtain 45 F_1 hybrids along with their parents were grown in randomized complete block design with three replication at department of Agricultural Botany, B.R.D.P.G. College, Deoria (U.P.) Each parent and F_1 was grown in single row of 5m length with spacing of 45x15 cm^2. Recommended cultural practices were adopted in order to raise crop. A sample of five randomly taken plants of parents and F_1 for each treatment were taken from each replication. Data was recorded on 12 traits namely days to flowering, days to maturity, plant highly (cm.) leaf area index, number of primary branches, number of secondary branches, number of silique per plant, number of seed persilique, 1000 seeds weight (g) harvest index (%). Oil content (%) seed yield per plant(g).

The data were subjected to analysis of variance (Fisher 1938) and General combining ability (gca) and specific combining ability (sca) was estimated as suggested by Griffing 1956 b.

III. RESULT AND DESEUSSION:

The analysis of variance for experimental design was performed for twelve characters and presented in table 1 The mean squares due to genotypes was highly significant for all the character namely days to flowering days to maturity, plant height (cm.) leaf area index, number of primary branches, no of secondary branches, no of siliquae per plant, no of seeds per siliquae, 100 seed weight (g), harvest index (%), oil content (%), seed yield per plant (g) The analysis of variance was analyzed for parents and F_1 generation for different characters (table 1) exhibited significant difference for all the 12 characters indicated much variability in mustard were also observed by Aghao et al (2010), Singh et al, (2010), Ranesh (2010), Nasrin et al (2011), Turi et al, (2011) and Vaghela et al (2011).

Table-1 : Analysis of Variance for experimental design

Source of variation	d.f.	Days to flowering	Days to maturity	Plant height (cm)	Leaf area index	No. of Primary branches	No. of secondary branches	No. of siliquae per plant	No. of seeds per siliqua	1000 seeds weight (g)	Harvest index(%)	Oil content (%)	Seed yield per plant (g)
Replication	2	1.57	9.55	20.49	0.003	0.81	3.35	70.76	2.26	0.01	0.67	0.15	0.26
Treatments	54	176.71**	168.95**	957.85**	0.98**	6.75**	12.49**	6301.88**	10.86**	10.86**	6.13**	2.62**	23.79**
Parents	9	286.48**	339.96**	1852.40**	1.28**	4.99**	13.09**q	3195.81**	7.20**	2.78**	0.99**	6.00**	30.97**
F_1s	44	154.17**	132.55**	770.96**	0.90**	5.95**	9.125**	6427.39**	11.42**	1.89**	7.22**	1.67**	20.67**
Ps. Vs F_1s	1	180.91**	69.08**	1130.04**	1.74**	56.32**	155.69**	28748.41**	19.39**	3.96**	4.67**	14.31**	31.16**
Error	108	1.44	1.21	4.14	0.004	0.66	1.62	143.17	0.67	0.02	0.05	0.19	0.13

*Significant at p = 0.05, **Significant at p = 0.01

The analysis of variance for combining ability is presented in table 2. The concept of combing ability is land mark in the history of practical plant breeding. The combining ability helps the breeder in identifying the best combiners and deciding the best use of these combiners in hybridization programmed with regard to exploitation of various kind of genetic effects. Both the gca and sca variances in the present study were highly significant in F_1 generations for the 12 characters indicating that both addictive as well as non addictive genetic effects are involved in determining these attributes and the parents and crosses diffeed significantly in their combining ability effect (Singh et al. (2010), Aghao et al, (2010)

Table 2 : Analysis of variance for combining ability

Source of variation	Generation	d.f.	Days to flowering	Days to maturity	Plant height (cm)	Leaf area index	No. of Primary branches	No. of secondary branches	No. of siliquae per plant	No. of seeds per siliqua	1000 seeds weight (g)	Harvest index(%)	Oil content (%)	Seed yield per plant (g)
GCA	F_1	09	302.61**	274.00**	1656.07**	1.35**	3.80**	5.85**	4636.12**	11.70**	3.31**	2.13**	1.42**	34.68**
SCA	F_1	45	10.17**	11.58**	51.93**	0.12**	1.94**	3.83**	1593.58**	2.00**	0.17**	2.03**	0.76**	2.58**
Error	F_1	108	0.48	0.40	1.38	0.001	0.22	0.54	47.71	0.23	0.01	0.02	0.07	0.04

The present observations revealed a reasonable degree of agreement for line X tester mating technique of gca effects based on F_1 data in respect of most of characters. Parent Kranti and Rohini possessing desirable gca estimates for a number of economic character oil content.

Eighteen cross combinations in F_1 hybrid generation revealed highly significant positive and desirable sca effects for seed yield per plant. Among these, 6 ..... specific combiners namely, Kranti X Rohini (4.99), Kranti X Vardan (3.0), RH-3- X Jawaher – 1 (2.1), Vardan X JD-6 (2.07), Rohini X Pusabahar (1.88) and Rohini X Pusa bold (1.59) when per se performance and sca effects were taken into consideration simultaneously. Highly significant and positive sca effect were recorded in 11 hybrids for oil content. The best specifies combiners in F_1 generations were RH-30 X JD-6, RLM-198 X NDRE-4, RLM- 198

X NDRE-4, PusaBahar X, NDRE-4 Rohini X Vardan, Pusabahar X NDRE-4 and PusaBahar X JD.6.

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