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Research Paper

Heritability and genetic advance for yield and quality traits in Indian mustard [*Brassica juncea* (L.) Czern and Coss]

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ABSTRACT

Heritability and genetic advance were studied under generation mean analysis, using three high yielding varieties *viz.*, GM 1, GM 2 and GM 3 and two '0' and/or '00' quality genotypes NUDH YJ 3 and EC 278811 over two environments created by two date of sowing. High heritability (broad sense) associated with moderate to high genetic advance recorded for 1000-seed weight, seed yield per plant, harvest index, palmitic acid, stearic acid, oleic acid, linoleic acid, linolenic and erucic acid contents, suggested that these traits can be further improved through selection in segregating generations. Moderate to high heritability alongwith low genetic advance were observed for days to maturity, days to flowering and oil content suggested that very remote possibilities of improving these traits through straight selection, hence *inter se* crossing of desirable recombinants keeping adequate population size would be beneficial.

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KEY WORDS : *Brassica,* Heritability, Genetic advance and Indian mustard

Indian mustard [*Brassica juncea* (L) Czern and Coss] is the most important oilseeds crop occupying a prominent position in Indian oilseeds scenario with a vital role in oilseed economy of the country. Extensive breeding work for evolving new and better varieties in Indian mustard is in progress for decades and consequently a number of high yielding varieties are in cultivation. Most of the quantitative characters are controlled by polygene, which are influenced by the environment. Hence, it is essential to partition the overall variability into heritable and non-heritable components with the help of heritability and genetic advance.

RESEARCH PROCEDURE

Under generation mean analysis, three high yielding varieties *viz.,* GM 1, GM 2 and GM 3 and two '0' and / or '00' quality genotypes *viz.,* NUDH YJ 3 and EC 287711 were crossed and four hybrids *viz.,* GM 1 x NUDH YJ 3, GM 2 x EC 287711,GM 3 x NUDH YJ 3 and GM 3 x EC 287711 developed at Main Castor and Mustard Research Station, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar by hand crossing using standard technique during *Rabi* 2004-2005, these hybrids were sown in 2005-06 selfed and backcrossed to obtain their F_2, BC_1 and BC_2 generations. The entire experimental material comprised of six generations *viz.,* P_1, P_2, F_1, F_2, BC_1 and BC_2 for each of the four crosses. All the crosses along with their parents *i.e.,* all six generations were grown in the Compact Family Block Design with three replications in two different environments created by two date of sowing (timely and late sown) during *Rabi* 2006-07. Each net plot had one row for parents and F_1, two rows for each of the BC_1 and BC_2 generations and four rows for F_2 generation. Each row consisted of 15 plants with row to row and plant to plant spacing being 45 and 15 cm, respectively. The recommended agronomic practices were followed to raise the crop. Data for various quantitative characters were recorded on five randomly selected competitive plants for each generation in every replication pertaining to yield and yield components. The oil content was estimated (per cent) through nuclear magnetic resonance technique (NMRT) from the samples. Fatty acid profiles of the oil were determined in percentage by GAS liquid chromatography. The broad sense heritability and genetic advance was calculated by the formulae suggested by Allard (1960).

RESEARCH ANALYSIS AND REASONING

High heritability (broad sense) coupled with high

genetic advance were observed for 1000-seed weight in cross III and seed yield per plant in crosses I, II, III in environment I, harvest index in cross III in environment II, palmitic acid content in cross II and IV in environment I, stearic acid, oleic acid, linoleic acid, linolenic acid and erucic acid contents in all the crosses in both the environments, suggestive of considerable improvement in these traits through any simple selection scheme (Table 1). This results are in close agreement with the finding of Chaudhry *et al.* (2004), Kumar and Mishra (2007) and Sheetal *et al.* (2007).

High broad sense heritability with moderate to low genetic advance were observed for days to 50 per cent flowering in crosses I and IV, number of siliquae per plant in cross II in environment I, for oil content in all the crosses and palmitic content in crosses I, II and IV in environment II. It was indicated that, moderate improvement for these characters can be achieved through selection. For getting desired improvement, efforts should be directed towards selection of desired homozygotes in segregating generations (Table 1). This finding is in conformity with the results of Patel *et al.* (2006), Kumar and Mishra (2007) and Singh *et al.* (2009).

Moderate heritability with high to moderate genetic advance were observed for number of branches per plant in cross I, siliquae per plant in all the crosses, seed yield per plant in all the crosses and harvest index in crosses I, II and IV in environment II, suggesting little improvement in these traits through selection. Moderate to low heritability alongwith low to moderate genetic advance were observed for plant height in cross II in environment I, cross I and 1000-Seed weight in crosses I and III in environment II. It emphasized very remote possibilities of improving these traits through straight selection. Hence *inter se* crossing

Table 1 : Heritability (per cent) and genetic advance (per cent) of mean of four crosses under two environments

Characters	Environment	GM 1 X NUDHYJ 3 (Cross I)		GM 2 X EC 278811 (Cross II)		GM 3 X NUDHYJ 3 (Cross III)		GM 3 X EC278811 (Cross IV)	
		Heritability broad sense (%)	Genetic advance (% of mean)	Heritability broad sense (%)	Genetic advance (% of mean)	Heritability broad sense (%)	Genetic advance (% of mean)	Heritability broad sense (%)	Genetic advance (% of mean)
Days to	E_1	93.07	14.98	63.70	10.06	69.58	9.70	87.52	13.76
flowering	E_2	NS	NS	64.06	8.92	84.20	13.04	95.73	17.16
Branches per	E_1	90.68	25.43	NS	NS	53.41	8.66	NS	NS
plant	E_2	72.04	14.70	NS	NS	48.36	4.15	NS	NS
Siliquae	E_1	66.09	9.20	80.51	12.45	46.64	5.52	57.47	8.61
per plant	E_2	NS	NS	64.16	26.42	70.31	41.87	63.34	48.49
1000-seed	E_1	62.14	16.40	64.01	16.28	79.72	29.17	51.90	10.46
Weight	E_2	51.54	11.81	NS	NS	56.71	17.45	NS	NS
Seed yield	E_1	84.96	76.78	78.87	46.73	88.32	121.55	NS	NS
per plant	E_2	59.78	84.03	74.29	95.14	78.19	130.34	NS	NS
Harvest Index	E_1	87.71	26.21	75.46	23.28	NS	NS	69.33	21.34
	E_2	60.74	28.26	70.41	48.25	87.69	30.98	45.53	22.56
Oil content	E_1	91.39	9.56	93.47	9.40	86.77	7.67	94.34	12.62
	E_2	93.06	13.36	94.34	13.48	91.80	10.89	94.90	13.13
Palmitic	E_1	69.64	22.86	86.84	25.42	50.16	22.41	85.60	73.14
content	E_2	85.48	32.95	83.98	28.74	70.71	16.65	81.84	23.85
Stearic	E_1	90.23	38.28	90.84	44.15	98.39	53.60	96.70	58.21
content	E_2	98.31	81.89	94.26	48.98	98.86	52.76	98.12	58.09
Oleic content	E_1	98.47	36.08	99.46	54.16	84.78	42.07	99.65	53.45
	E_2	96.36	29.23	61.76	19.04	95.03	23.97	98.55	26.67
Linoleic	E_1	83.82	19.34	92.02	45.98	97.56	58.28	93.17	42.24
content	E_2	96.15	24.90	84.04	23.67	89.55	32.80	89.72	23.67
Linolenic	E_1	88.38	27.19	77.70	17.15	90.18	42.61	97.30	39.53
content	E_2	91.15	40.01	73.06	28.06	85.82	27.28	71.13	17.51
Erucic	E_1	98.98	158.23	98.61	157.71	95.06	149.15	99.25	143.92
content	E_2	85.70	115.58	96.68	126.25	97.90	162.55	95.25	106.34

Note: E_1 = Timely sown (Date:18.10.2006), E_2 = Late sown (Date:03.11.2006) NS=Non-significant

of desirable recombinants keeping adequate population size would be beneficial.

High heritability coupled with low genetic advance were observed for days to maturity in cross III in environment I and crosses I and IV in environment II and oil content in all the crosses in environment I. This is in the conformity with the finding of Sing *et al.* (2002), Swarnkar *et al.* (2002) and Singh *et al.* (2009).

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LITERATURE CITED

Allard, R.W. (1960). *Principles of plant breeding*. John Wiley and Sons. Inc. New York.

Chaudhary, A.K., Singh, S.P. and Pant, D.P. (2004). Variability in quality parameters in Indian mustard. *Cruciferae – Newsl.* **25** : 67-68.

Kumar, S. and Mishra, M.N. (2007). Study on genetic variability, heritability and genetic advance in populations in Indian mustard. *Internat. J. Pl. Sci.,* **2** (1) : 188-190.

Patel, J.M., Patel, K.M., Patel, C.J. and Prajapati, K.P. (2006). Genetics parameters and interrelationship analysis in Indian mustard [*Brassica juncea* (L.) Czern and Coss]. *J. Oilseeds Res.,* **23** (2) : 159-160.

Sheetal, B., Beena, N., Shanti, P., Vandana, K. and Bidhanwar, P.D. (2007). Genetic study of generation in mustard (*Brassica juncea*). *Res. Crops,* **8** (3) : 638-640.

Singh, M., Mahesh, R., Raj Shekhar and Dixit, R.K. (2009). Genetic variability and character association in Indian mustard. [*Brassica juncea* (L.) Czern and Coss]. *J. Oilseeds Res.,* **26** (Special Issue) : 56-57.

Singh, M., Swarnkar, G.B., Prasad, Lalta and Rai, G. (2002). Genetic variability, heritability and genetic advance for quality traits in Indian mustard. *Pl. Archives,* **2** (1) : 27-31.

Swarnkar, G.B., Singh, M., Prasad, Lalta, Lallu, Singh, M. and Prasad, L. (2002). Analysis of heritability and genetic advance in relation to yield and its contributing traits in Indian mustard. *Pl. Archives,* **2** (2) : 305-308; 7 ref.

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