INTERNATIONAL JOURNAL OF AGRICULTURE & BIOLOGY
1560–8530/2003/05–4–630–631
http://www.ijab.org

Evaluation of Genetic Potential of Some Brassica Germplasm Collections

RAO SOHAIL AHMED KHAN AND FAROOQ A. KHAN
Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad–38040, Pakistan

ABSTRACT

Investigations were conducted to determine the genetic potential of Brassica accessions. Eight accessions were sown in Randomized complete block design in four replications. The analysis of variance revealed highly significant differences among all the accessions for various traits. Plant height, number of primary branches, number of secondary branches, number of pods per plant and seed index were found positively correlated with seed yield. So, the emphasis should be given during experimentation for improvement of plant height, number of primary branches, number of secondary branches, number of pods per plant and seed index for improvement in yield of seed in Brassica.

Key Words: Brassica germplasm; Coefficient of variability; Heritability; Correlation

INTRODUCTION

For the purpose of improvement and evolution of insect pest resistant, high yielding and better quality genotypes of Brassica, collection of germplasm from within the country and outside is a pre-requisite. Some national and international oilseed breeders (Reddy, 1991; Ramani *et al.* 1995; Saini & Sharma, 1995; Yadav & Singh, 1996) have signified the importance of genotypic and phenotypic variability, heritability and character association for further genetic improvement. The improvement through breeding could be made successfully by selecting the genetic material after determining the exact contribution of various components towards yield. The present study was thus undertaken to evaluate various yield components by correlation analysis in Brassica spp. The purpose was to evaluate the genetic potential of these accessions for yield and yield components and to develop a selection criterion. Information thus obtained can be used for the development of a comprehensive breeding programme to evolve high yielding Brassica oilseeds.

MATERIALS AND METHODS

Trial on eight *Brassica juncea* accessions viz 85612, 85615, 85633, 85635, 85643, 85649, 85670 inclusive one variety RL-18 (standard) was conducted in a quadruplicate RCBD at Post-graduate Agriculture Research Station, Faisalabad, during 2001-2002. The spacing was 0.25 m and 0.45 m between plants and rows, respectively. All the agronomic practices were kept uniform for all the treatments. Ten plants from each accession and each replication were randomly selected for recording pre and post harvest observation. Plant height was measured with the help of meter rod for 10 guarded plants, number of primary branches and number of secondary branches were counted from 10 guarded plants, number of pods of each 10 guarded plants were counted and their means were computed, 1000 seeds were counted from each entry in each replication and then their average was taken. Statistical analysis was made according to Fisher (1958), and Kown and Torrie (1964). Data on some quantitative characters were used to compute means, genetic variability, broad sense heritability and correlations.

RESULTS AND DISCUSSION

The number of secondary branches shows positive genotypic correlation with plant height, pods per plant, seed index and seed yield per plant while phenotypic correlation for plant height was non-significant (Table I). The positive genotypic correlation of plant height with pods per plant, seed yield per plant and negative with seed index was observed while phenotypic correlation was non-significant with all characters. Moreover, number of pods per plant and seed index shows significantly positive association with yield at genotypic level only. High yield would be obtained by more number of pods per plant because of highly positive genotypic and phenotypic correlation between number of pods per plant and seed yield per plant. A positive and highly significant genotypic and phenotypic correlation was present among seed index and seed yield per plant (Table II).

Table I. Mean squares (MS) genotypic (GCV%) and phenotypic (PVC%) coefficients of variability and Broadsense heritability (h^2%) estimates of five *B. juncea* plant traits

Characters	MS	GCV%	PVC%	h^2%
Number of secondary branches	64.36**	13.84	14.56	90
Plant height (cm)	2389.11**	14.66	14.83	98
Pods per plant	13956.14**	8.58	9.99	74
Seed index (g)	0.25**	7.52	8.13	83
Seed yield per plant (g)	35.14**	5.54	5.80	91

* and **= Significant at 5 and 1% levels, respectively

Table II. Genotypic (r_g) and phenotypic (r_p) correlation coefficients among five characters of Brassica species

Characters		Plant height	Pods per plant	Seed index	Seed yield per plant
Number of secondary branches	r_g	0.07*	0.60*	0.70*	1.00*
	r_p	-0.02^{NS}	0.59	0.62**	0.99**
Plant height	r_g		0.44*	-0.02*	0.05*
	r_p		0.34^{NS}	-0.20^{NS}	0.04^{NS}
Pods per plant	r_g			0.49*	0.64*
	r_p			0.30^{NS}	0.63**
Seed index	r_g				0.68*
	r_p				0.60**

* and **= Significant at 5 and 1% levels respectively; N.S.= Non-significant

High genetic variability accompanied by high heritability estimates for secondary branches, plant height, pods per plant, seed index and yield per plant (Table I) offer a hopeful situation in these directions. The mean performance of 85643 for number of secondary branches, number of pods per plant, seed index and seed yield per plant was observed high (Table III). The mean performance for plant height of 85633 was more than other genotypes.

Table III. Mean performance of different accessions of *B. juncea*

Brassica Accessions	Number of secondary branches	Plant height (cm)	Number of pods per plant	Seed index	Yield per plant
85643	35.03	172.81	648.7	3.47	31.33
RL-18	29.60	186.40	601.0	3.17	27.03
85649	29.22	119.63	535.9	2.99	26.57
85612	28.33	147.0	645.5	3.30	25.82
85670	26.90	173.63	648.0	3.03	25.55
85633	25.27	188.30	615.2	2.62	24.00
85635	24.10	181.92	515.5	2.97	22.68
85615	21.92	146.52	517.1	3.11	21.35

Plant breeder is facing problem for the development of improved varieties of rapeseed and mustard that can offer advantages as improved yield, resistance to insect, pest, and disease. Variation provides useful information to the plant breeder to determine the genetic potential of the populations for evolving new varieties with desirable characters in any crop species. In the literature, breeders (Yadav & Singh 1996; Thakral *et al.* 1999; Kumar *et al.* 1999; Patel *et al.* 1999; Sheikh *et al*. 1999; Shah *et al.* 2000; Verma & Sachin, 2000) also reported high genetic variability and high heritability for secondary branches, plant height, pods per plant, seed index and yield per plant (Table I) for these traits in Brassica species.

A glance over the Table II reveals a positive and significant correlation at genotypic (r_g) and phenotypic (r_p) level between number of secondary branches and pods per plant indicating that greater the secondary branches per plant, higher will be the number of pods borne and thus ultimately contributing positively towards yield. Khan *et al.* (1999) reported the similar results in Brassica accession.

Moreover, number of pods per plant and seed index shared significantly positively association with yield at genotypic level only. These results are supported by the findings of Ikram-ul-Haq *et al.* (1998) in different Brassica accession, Singh and Singh (1995) in *B. compestris* var. toria, and Chowdhury and Goswani (1991) who reported similar results in *B. juncea*. Based on the results, it is inferred that the present germplasm collections can be helpful for the oilseed breeder in future breeding programmes. Particularly the accession 85643 is worth mentioning as it showed outstanding performance with respect to yield and its components (Table III). This line proved to be superior for heritability and means for the number of primary branches, number of secondary branches, seed index and seed yield per plant. So, accession 85643 is the best suitable to be used in further crosses and also for screening of the germplasm.

REFERENCES

Chowdhury, P.R. and G.D. Goswani, 1991. Genetic variability studies in Indian mustard (B. juncea L.) *Envir. and Ecol*., 9: 1003–06

Fisher, R. 1958. *Statistical Method For Research Workers,* 13th ed. Olive and Boyd, London, Edinburgh

Ikram-ul-Haq, M.M. Gillani and F.A. Khan, 1998. Correlation and regression analysis of some quantitative characters among Brassica accessions. *Pakistan J. Biol. Sci*., 1: 124–6

Khan, F.A. and M. Rashid, 1999. Association of some quantitative traits in germplasm of *B. compestris*. *J. Pure. Appl. Sci.,* 18: 49–52

Kumar, S., R.S. Sangwan and I.S. Yadav, 1999. Correlation studies in Brassiaca species under dryland conditions. *Cruci. Newsletter,* 21: 151–2

Kown, S.H. and J.H. Torrie, 1964. Heritability and interrelation among traits of two soybean population. *Crop Sci*., 4: 196–8

Patel, R., R.B. Bhajah and O.P. Verma, 1999. Seed yield determinants. Indian mustard (*B. juncea* L. czern and coss) *Cruci. Newsletter,* 21: 154

Ramani, V.B., M.P. Patel, H.S. Patel and P.L. Naik, 1995. Path analysis in mustard (*B. juncea* L.) *Gujrat Univ. Res. J.*, 20: 157–9

Reddy, B.N., 1991. Correlation studies in Indian mustard *(Brassica juncea* L.*). J. Oilseed Res.,* 8: 148–50

Saini, H.P. and Sharma, 1995. Model plant architecture through association and path coefficient analysis in Indian Colza. *Ind. J. Agri. Res*., 29: 109–15

Shah, A.H., M.M. Gillani and F.A. Khan, 2000. Comprehensive selection of yield and yield influencing character in Brassica species. *Int. J. Agri. Biol.* 2: 245–7

Sheikh, F.A., A.G. Rather and S.A. Wani, 1999. Genetic variability and inter-relationship in toria (*B. compestris* L. var. toria). *Adv. in Pl. Sci.* 12: 139–43

Singh, M. and G. Singh, 1995. Correlation and path analysis in toria under mild hills of Silkkim. *Crop Impr*., 22: 95–7

Thakral, N.K., T.P. Yadav, P. Kumar, A. Singh and N. Chadra, 1999. Association analysis for some quantitative traits in Indian mustard. *Cruci. Newsletter,* 21: 105–06

Verma, S.K. and J.N. Sachan, 2000. Genetic divergence in Indian mustard (*B. juncea* L. czern and coss) *Crop Res. (Hisar),* 19: 271–6

Yadav, Y.P. and H. Singh, 1996. Morpho-physiologicaldeterminants of yield under water stress condition in Indian mustard. (*B. juncea* L. czern and coss). *Acta Hort*., 407: 155–60

(Received 24 June 2003; Accepted 20 August 2003)