International Journal of Agricultural Sciences
Volume 12 | Issue 2 | June, 2016 | 241-244 ■ e ISSN-0976-5670
☞DOI:10.15740/HAS/IJAS/12.2/241-244
Visit us : *www.researchjournal.co.in*

RESEARCH PAPER

Studies on seed quality parameters in Indian mustard [*Brassica juncea* (L.) Czern and Coss]

K.K. SRIVASTAVA, S.C. VIMAL*, S.P. GIRI AND ANUJ KUMAR VERMA
Narendra Dev University of Agriculture and Technology, Kumarganj, FAIZABAD (U.P.) INDIA
(Email : scvimalndgpb@gmail.com)

Abstract : An evaluation of thirty two accessions of Indian mustard [*Brassica juncea* (L.) Czern and Coss] was carried out during 2014-2015 in Completely Randomized Design (CRD) with three replications in Laboratory revealed highly significant differences among the accessions for all seed vigour traits. Observations were recorded on ten seed vigour traits *viz.*,1000-seed weight (g), field emergence (%), speed of germination (at field), germination, speed of germination, root length (cm), shoot length (cm), seedling length (cm), seedling dry weight (mg) and vigour index. Highly significant differences were observed among the genotypes for all the seed vigour traits. The phenotypic co-efficient of variability (PCV) ware close to genotypic co-efficient of variability (GCV) for more of the traits which indicate that environmental effect has no considerable effect on the total phenotypic variation. Heritability and genetic advance indicated that the nature action and reliability or those characters for selection and emerged as ideal traits for improvement through selection.

Key Words : Indian mustard, Co-efficient of variations, Genetic advance, Heritability, Seed vigour

View Point Article : Srivastava, K.K., Vimal, S.C., Giri, S.P. and Verma, Anuj Kumar (2016). Studies on seed quality parameters in Indian mustard [*Brassica juncea* (L.) Czern and Coss]. *Internat. J. agric. Sci.*, **12** (2) : 241-244, **DOI:10.15740/HAS/IJAS/12.2/241-244.**

Article History : Received : 28.01.2016**; Revised :** 02.03.2016**; Accepted :** 23.04.2016

INTRODUCTION

Indian mustard (*Brassica juncea* L.) is one of the most important oilseed crops of India. In order to incorporate desirable quality characters to maximize the economic yield, the information on nature and extent of genetic variability present in populations for desirable traits, their association and relative contribution to yield constitutes the basic requirement. The present study was under taken to find out the genetic variability available, heritability and genetic advance, the association of different quality characters and their contribution to define seed vigour index. Sustained increase in agriculture production and productivity necessarily requires continuous development of new and improved varieties of crop and efficient system of production and supply of seed to farmers. Seed quality is the sum of all these attributes which differentiate the seed from the grain. In addition to important seed quality attributes, seed should be of uniform size and should possess good germination capacity of quality seed lot. Using seed of low germination will reduce the field establishment or stand and thus, the yields will be lowered.

Selection programme depends primarily upon the magnitude of heritable portion of variability. Heritability

*** Author for correspondence**

estimate provides information on transmission of character from the parent to the progeny. Such estimates facilitate evaluation of hereditary and environmental effects in phenotypic variation and thus, aid in selection. Heritability estimates are used to predict genetic advance under selection so that breeders used to predict genetic gain and able to anticipate improvement for different types and intensities of selection.

MATERIAL AND METHODS

The material of the present study consisted of 32 genotypes of Indian mustard were analyzed in Completely Randomized Design with three replications during 2014-2015 in the Seed Testing Laboratory (STL) of Seed Technology Section, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) India. The observations were recorded on ten seed quality parameters *viz.*,1000-seed weight (g), field emergence (%), speed of germination (at field), germination (%), speed of germination, root length (cm), shoot length (cm), seedling length (cm), seedling dry weight (mg) and vigour index.

Seed germination percentage under lab condition was estimated on the basis of germinated seed from 100 randomly selected seed kept for germination in seed germinator at 28 ± 1^0C for 8 days. At the end of germination test period randomly ten normal seedlings were carefully removed from each replication. The distance between the collar and tip of the primary shoot as shoot length and between the collar and tip of primary root as the root length was measured in centimetre and the mean value were calculated. 10 seeds were plated on seed germination paper after a specific period of time 5 seedlings were selected and removed and dried in a hot air oven at 100^0C temperature for 24 hours. The seedling was weighted on electronic balance and taken seedling dry weight in mg.

Table 1: Analysis of variance for ten characters in Indian mustard genotypes

Character	Source of variation	
	Treatment	Error
	31 (d. f.)	64 (d. f.)
1000-seed weight (g)	2.73**	0.01
Field emergence (%)	101.50**	1.70
Speed of germination (at field)	5.80**	0.04
Germination (%)	98.12**	3.14
Speed of germination	11.41**	0.05
Root length (cm)	18.06**	1.29
Shoot length (cm)	3.22**	0.12
Seedling length (cm)	29.00**	1.56
Seedling dry weight (mg)	2.35**	0.02
Vigour index	19172.30**	245.68

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 2: Estimates of range, grand mean, phenotypic (PCV) and genotypic (GCV) co-efficient of variation, heritability in broad sense [$h^2_{(bs)}$%] and genetic advance in per cent of mean ($\overline{Ga}$ %) for ten characters in Indian mustard genotypes

Characters	Range (Lowest-highest)	Grand mean ($\overline{X}$)	PCV (%)	GCV (%)	Heritability [$h^2_{(bs)}$%]	Genetic advance in per cent of mean ($\overline{Ga}$ %)
1000-seed weight (g)	2.17-5.60	3.63	26.33	26.28	99.56	54.02
Field emergence (%)	74.67-94.67	83.25	7.10	6.92	95.11	13.91
Speed of germination (at field)	7.55-12.82	9.39	14.94	14.76	97.55	30.03
Germination (%)	80.33-97.67	87.98	6.71	6.40	90.96	12.58
Speed of germination	8.75-15.06	11.87	16.51	16.39	98.57	33.53
Root length (cm)	6.27-12.75	9.03	29.06	26.19	81.17	48.61
Shoot length (cm)	3.86-7.25	5.38	19.99	18.89	89.31	36.78
Seedling length (cm)	10.26-19.81	14.40	22.71	20.99	85.41	39.97
Seedling dry weight (mg)	3.08-5.77	4.30	20.77	20.51	97.44	41.71
Vigour index	247.16-496.46	378.05	21.41	21.00	96.25	42.46

RESULTS AND DISCUSSION

The analysis of variance of the experiment showed highly significant differences among the thirty two genotypes of Indian mustard for all the characters indicating the presence of adequate variability (Table 1). The estimates of phenotypic co-efficient of variation (PCV) and genotypic co-efficient of variation (GCV) for ten seed quality characters of Indian mustard genotypes are presented in Table 2. The magnitude of phenotypic co-efficient of variation (PCV) was higher than the corresponding genotypic co-efficient of variation (GCV) due to environmental influence.

The genotypic and phenotypic co-efficients of variability were computed to assess the nature and magnitude of existing variability in the germplasm. The high magnitude of genotypic co-efficient of variation (GCV) along with phenotypic co-efficients of variation (PCV) was recorded for root length (PCV=29.06%, GCV=26.19%),followed by 1000-seed weight (PCV =26.33%, GCV=26.28%), seedling length (PCV= 22.71%,GCV=20.99%), vigour index (PCV=21.41%, GCV=21.00%), seedling dry weight (PCV=20.77%, GCV=20.51%). This type of indication showed greater scope of obtaining high selection response for these five traits owing to presence of high genetic variability. The existence of high variability for root length and 1000 seed weight in Indian mustard is in conformity with the finding of earlier workers *viz.*, Tomar and Chaudhary (1987); Singh *et al*. (1982); Lafond and Baker (1986); Verma *et al.* (1988); Reddy *et al.* (1994); Singh *et al.* (2009); Baloch *et al.* (2013) and Wani *et al.* (2013).

The fundamental principle involved in plant breeding is the application of selection on the genetic variability available in germplasm for various characters to change the genetic architecture of the plant character and consequently of plant in order to develop improved genotypes possessing higher economic yield and value than existing ones. Obviously, genetic variability is the raw material on which selection acts to bring improvements in genetic architecture of pants. Heritability in broad sense [$h^2_{(bs)}$%] and genetic advanced in per cent of mean $\frac{Ga}{\overline{}}$ % as direct selection parameters provide index of transmissibility of attributes which gives indication about the effectiveness of selection in improving the characters.

The higher estimates of heritability coupled with higher genetic advance for 1000 seed weight, indicated that heritability of traits is mainly due to additive effects and selection is effective for such traits. High heritability accompanied with high to low genetic advance for vigour index, 1000-seed weight, speed of germination, speed of germination (at field), seedling dry weight, vigour index, field emergence (%), germination (%), shoot length, seedling length and root length is indicative of non additive gene action and the high heritability is being exhibited due to favourable influence of the environment rather than genotypes. Similar report was suggested by Singh *et al.* (2006); Singh *et al.* (2009) ; Dholu *et al.* (2014); Gami and Chauhan (2014); Verma *et al.* (2014); Akabari and Niranjana (2015) and Kansotia *et al.* (2013).

REFERENCES

Akabari, V.R. and Niranjana, M. (2015). Genetic variability and trait association studies in Indian mustard (*Brassica juncea*). *Internat. J. agric. Sci.*, **11** (1): 35-39.

Baloch, M.J., Baloch, E., Jatoi, W.A. and Veesar, N.F. (2013). Correlation and heritability estimates of yield and yield contributing traits in wheat (*Triticum aestivum* L.). *Pak. J. Agril. Sci.*, **29**(2) : 96-105.

Dholu, V.K., Sasidharan, N., Suthar, K., Bhusan, B. and Patel, J.N. (2014). Heterosis and combining ability analysis in Indian mustard, *Brassica juncea* (L.) Czern & Coss. *Internat. J. agric. Sci.*, **10** (1): 102-107.

Gami, R.A. and Chauhan, R.M. (2014). Genetic analysis for oil content and oil quality traits in Indian mustard [*Brassica juncea* (L.) Czern & Coss.]. *Internat. J. agric. Sci.*, **10** (1): 146-150.

Kansotia, Bhagchand, Meena, Ram Swaroop and Meena Vijay Singh (2013). Effect of vermicompost and inorganic fertilizers on Indian mustard (*Brassica juncea* L.) . *Asian J. Soil Sci.*, **8**(1): 136-139.

Lafond, G.P. and Baker, R.J. (1986). Effect of genotype and seed size on speed of emergence and seedling vigour in nine spring wheat cultivars. *Crop Sci.*, **26**(2) : 341-346.

Reddy, S.K.N., Reddy, B.M. and Ankaiah, R. (1994). Effect of initial germination levels on vigour, growth and yield in rice. *Seed Res.*, **22**(1) : 22-25.

Singh, A.R., Bhale, N.L. and Borikar, S.T. (1982). Effect of seed size and weight on germination and seedling growth in bold seeded genotypes of sorghum. *Res. Bull. Marathwada Agril. Univ.*, **611**(2) : 23-25.

Singh, H.L., Singh, S.K., Singh, P. and Singh, B.C. (2006). Genetic variability and character association in barley. *Internat. J. Pl. Sci.*, **1**(2) : 256-258.

Singh, V.V., Singh, Sudheer, Verma, Vandana, Meena, S.S.

and Kumar, Arvind (2009). Genetic variability for seedling traits in Indian mustard under moisture stress conditions. *Indian J. Plant Genet. Reso.,* **22**(1) : 48-49.

Tomar, S.R.S. and Chaudhary, H.B. (1987). Analysis of seed and seedling characters in short duration wheat genotype. *Seed Sci. & Tech*., **15**(2) : 128-132.

Verma, Hari Kishor, Singh, M.M., Singh, M.K. and Kumar, Santosh (2014). Response of Indian mustard (*Brassica juncea* L.) varieties to irrigation for better growth, yield and quality of mustard crop. *Internat. J. agric. Sci.,* **10** (1): 426-429.

Verma, S.S., Chandagi, Ram and Yadav, T.P. (1988). Effect of seed size on laboratory and field parameters in soybean. Proceeding of National Seminar on Seed Sci. and Tech., pp. 49-53.

Wani, B.A., Ram, M., Yasin, B.A., Majid, Ali, Ashiq, P. and Mir, R.A. (2013). Seedling vigour in wheat (*Triticum aestivum* L.) as asourse of genetic variation and study of its correlation with yield characters. *African J. Agril. Res.,* **8**(4) : 370-372.