Pak. j. sci. ind. res. Ser. B: biol. sci. 2015 **58** (3) 165-167

Short Communication

Estimation of Genetic Variability and Heritability (Broad sense) for Yield and Yield Components in Some *Brassica juncea* Genotypes

Amanullah and Muhammad Mansoor*
Arid Zone Research Institute (PARC), Dera Ismail Khan, KPK, Pakistan

(received October 24, 2014; revised June 12, 2015; accepted June 16, 2015)

Abstract. Broad sense heritability and genetic advance were estimated among ten mustard (*Brassica juncea* L.) genotypes for yield and yield contributing parameters in RCB design with three replications. Broad sense (BS) heritability estimates were higher (above 60%) for days to flowering, plant height, days to maturity, branches/plant and number of pods/plant. Moderate heritability values were observed for grain yield. The expected response to selection was higher (≥ 20%) for number of pods/plant and grain yield kg/ha and moderate values ranging from 10-20% for selection response was recorded for plant height. Days to flowering, days to maturity and number of branches/plant showed lower values (≤ 10%) for expected response to selection. The genotypes 022860, J-38 and 022862 have shown better results for most of the traits and could be used in focused future breeding programmes.

Keywords: *Brassica juncea*, heritability, genetic advance, phenotypic variance

Rapeseed/mustard (*Brassica*) is the conventional oilseed crop in Pakistan. The cultivated area of rapeseed/mustard is declining mainly due to low yields and the main reason for low yield seems cultivation of varieties with low yield potential.

Genetic improvement is surly the main source for increasing the grain yield of *Brassica*. Broad sense (BS) heritability estimates and considerable genetic advance could be a valuable tool for breeders to select improved genotypes of *Brassica* for higher grain yield (Pant and Singh, 2001). Idahosa *et al*. (2010) investigated that the magnitude of genetic variability present in base population of the crop species is also pivotal to crop improvement which must be exploited by plant breeders for yield improvement. Information on heritability estimates along with genetic advance is normally more helpful in predicting the gain under selection then heritability estimates alone hence, studies have been taken by many researchers (Ejaz-ul-Hasan *et al*., 2014; Junaid *et al*., 2014; Ahmad *et al*., 2013; Ali *et al*., 2013; Rameeh, 2011; Aytac and Kinaci, 2009; Iqbal and Khan, 2003; Ali *et al*., 2002; Larik and Rajput, 2000).

Keeping in view the importance of genetic potential studies, broad sense heritability, genetic variability and genetic potential among *B. junceae* genotypes were explored for various characters which were ultimately important for selection of best lines for successful breeding programme.

*Author for correspondence; E-mail: joyadkpk@googlemail.com

The experiment was conducted at Arid Zone Research Institute, Dera Ismail Khan (KPK) during the Rabi period year, 2013-14. Ten genotypes *viz*. 019493, 019509, 019510, 019511, 019518, 019528, 022852, 022860, 022862 and 023980 were tested in the trial using RCB design. Each entry was planted in 4 rows, 5 m long and 30 cm apart. Sowing was done with the help of hand drill. Plants were thinned leaving 3-4 cm space between plant to plant. Fertilizer was applied @ 75-60 NP kg/ha. Half dose of urea was applied with 2nd irrigation. All the cultural practices were kept constant from sowing till harvesting. Data were recorded on days to flowering, days to maturity, plant height, branches/plant, pods/plant and grain yield kg/ha. Data were recorded on the two central rows for grain yield and the data collected were subjected to analysis of variance (ANOVA) using Genstat discovery statistic software. Least significant differences (LSD) test was applied to find out the mean differences. The genotypic, phenotypic and environmental variances, broad sense heritability, genetic advance and its percentage were calculated. Calculation of broadsense heritability (h^2b) estimate on mean basis was done as suggested by Eckebil *et al*. (1977).

Estimates of heritability, genetic advance and genetic advance as percentage of the population mean are shown in Table 1. The magnitude of heritability was generally high in all characters. According to Ansari *et al*. (2004) high heritability percentage reflects the large heritable variance which may offer the possibility of improvement

Table 1. Means, range, GCV, PCV, heritability (h^2) and genetic advance estimates for various traits of *Brassica juncea* genotypes

Characters	Means	Range	Variance		Co-efficient of variability		Heritability (bs) (%)	Genetic advance	Genetic advance as percent of mean
			Genotypic	Phenotypic	Genotypic	Phenotypic			
Days to flowering	60.37	53.00-63.67	15.19	16.11	6.46	6.65	94.2	7.79	12.91
Plant height (cm)	217.53	207.0-231.3	65.52	79.64	3.72	4.10	82.3	15.13	6.95
Days to maturity	142.23	140.7-143.7	0.80	1.14	0.63	0.75	69.9	1.54	1.08
Branches/plan	5.70	4.67-7.00	0.39	0.88	10.99	16.43	69.9	0.86	15.14
Pods/plant	269	228.7-335.3	1158.16	1515.43	1.26	1.45	76.4	61.29	2.27
Grain yield (kg/ha)	39648	3314-4677	167284.9	331231.9	1.03	1.45	50.5	598.77	1.51

* = At 1% standardized selection deferential.

through selection. However, Johnson *et al*. (1955) reported that heritability estimates together with genetic advance are more important than heritability alone to predict the resulting effect of selecting the best individuals. Heritability values were categorized as low (≤ 30%), moderate (30-60%) and high (> 60%). While, genetic advance as percent mean were considered as low (≤ 10%), moderate (10-20%) and high (≥ 20%).

The heritability (BS) estimates for all the characters were higher (69.9-94.2%) except grain kg/ha where, moderate heritability (50.5%) was observed. Low genetic advance (7.794) and high heritability (94.2%) in flowering, high heritability (69.9%) and low genetic advance (1.542) for days to maturity and branches/plant, high heritability (69.9%) and low genetic advance (0.863) were observed in branches/plant. High heritability and moderate genetic advance (15.127) were noted in plant height. So far as yield is concerned moderate heritability (50.5%) and high genetic advance was estimated.

The results were in line with the findings of Idahosa *et al*. (2010) who observed moderate heritability and higher genetic advance and grain yield was found by Dar *et al*. (2010). Higher broad sense heritability estimates and lower genetic advance were also observed by Aytaç and Kýnacý (2009), among rapeseed/mustard genotypes. Those traits which showed higher heritability values are less influenced by the environmental conditions, so this parameter could be used for selection purposes in breeding. Higher broad sense heritability estimate and considerable genetic advance could be a valuable tool for breeders to select improved genotypes of *Brassica juncea* L.

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