www.ijrasb.com

ISSN (ONLINE): 2349-8889

Vandana Publications

IJRASB

Volume-3, Issue-5, September 2016

International Journal for Research in Applied Sciences and Biotechnology

Page Number: 4-6

Genetic Studies on Some Characters in Barley

Abhijit Giri[1], Yogesh Borkar[2]

[1, 2] Department Of Genetics And Plant Breedding, Arignar Anna Institute Of Science And Technology, Kanchipuram , Tamil Nadu, India

ABSTRACT

A total of 20 genotypes of 2-rowed barley were grown in a Randomized Block Design using 3 replications to study variability, heritability and genetic advance for 13 characters. Significant differences were observed among the genotypes regarding all the characters studied. Genotypic and phenotypic coefficients variability were higher in flag leaf width than other traits. Estimates of heritability ranged from 71.64% for days to maturity to 97.58% for peduncle length, while grain yield showed 84.28% heritability. Heritability coupled with high genetic advance was observed for number of grains per spike, grain yield per plant, peduncle length, flag leaf length and width and second leaf width indicating the importance of these traits in selection and crop improvement.

Keywords— Barley, variability, heritability

I. INTRODUCTION

Barley is an important cereal crop of the World and is a major source of food for large number of people living in cooler, semi-arid areas. It is cultivated in different states in India and is one of the most salt-tolerant crops. Apart from their use as food and feed 6-rowed and 2-rowed barley are also used for malt and brewing (Hockett and Standridge ,1975; Burger and LaBerge ,1985). Information about the genetic variability in this crop would be of great value for improvement by selection. The present experiment was made in 20 genotypes of 2-rowed barley to study the variability, heritability and genetic advance.

II. MATERIALS AND METHODS

This study consisted of 20 genotypes/lines of 2-rowed barley obtained from the Head, Department of Genetics and Plant Breeding, Banaras Hindu University, Varanasi. They were BCU-10, BCU-16, BCU-17, BCU-21, BCU-23, BCU-25, BCU-27, BCU-29, BCU-41, BCU-43, BCU-44, BCU-45, BCU-47, BCU-48, BCU-49, BCU-51, BCU-54, BCU-59, BCU-60 and BCU-2620. The materials were grown in a Randomized Block Design using 3 replications at the Agricultural Research Farm of S.D.J. Post-Graduate College, Chandeshwar, Azamgarh, U.P. Each entry was sown in 3 rows of 3 meter length keeping a distance of 30 cm between rows and 5 cm between plants. At the time of flowering, 10 plants were randomly selected from the middle row of each genotype and data were recorded on different characters. Analysis of variance was made according to Panse and Sukhatme (1967) and heritability in broadsense was estimated by Hanson et al. (1956).

III. RESULTS AND DISCUSSION

Analysis of variance showed that the genotypes differed significantly regarding all the characters under study *viz*. days to 50% flowering, days to maturity, plant height, number of tillers per plant, flag leaf length, flag leaf width, second leaf length, second leaf width, awn length, peduncle length, number of grains per spike, 100-grain weight and grain yield per plant. General means of the characters, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), broad sense heritability and genetic advance are presented in Table 1. As expected, PCV was greater tham GCV for all the characters. PCV was the highest for flag leaf width (30.2%), followed by flag leaf length (25.58%), number of grains per spike (24.69%), second leaf width (22.06%) and grain yield per plant (21.24%). Highest GCV was recorded for flag leaf width (28.86%), followed by number of grains per spike (24.20%), flag leaf length (23.33%), second leaf width (21.27%), peduncle length (20.56%) and grain yield per plant (19.5%). Low variability was recorded for days to maturity and days to flowering. High GCV indicated that substantial amount of genetic variability is present in the material regarding the particular character. High variability for grain yield was also reported by Prasad et al. (1973), Kishor et al. (2000) and Singh et al. (2008) in 6-rowed barley. Heritability is the proportion of genetic

variance in phenotypic variance (total variance), expressed as percentage. In the present study heritability was high (above 70%) for all the characters. The highest estimate of heritability was observed for peduncle length (97.58%), followed by number of grains per spike (96.04%), plant height (95.65%), second leaf width (93.02%), flag leaf width (90.91%) and awn length (90.75%). Heritability estimate for grain yield was 84.28%. High heritability indicated that the characters were less influenced by the environment. In 6-row and 2-row crosses, Madic (1996) observed high heritability for grain weight per plant. Esparza-Martinez and Foster (1998) also obtained high heritability for grain yield in 2-rowed barley. High heritability for different characters in barley, was also reported by Vimal and Vishwakarma, (1998); El-Bawab, (2003) and Wang et al. (2006).

Genetic advance expressed as percentage of mean was the highest for flag leaf width (56.67%), followed by number of grains per spike (48.86), flag leaf length (43.83%), second leaf leaf width (42.23), peduncle length (41.84%) and grain yield (36.87%). Other characters showed moderate genetic advance except days to maturity which had low genetic advance. Number of grains per spike, flag leaf length and width, second leaf length, peduncle length and grain yield per plant showed high heritability coupled with high genetic advance. Vimal and Vishwakarma (1998) observed high heritability along with high genetic advance for tillers per plant, length of spike, spikelets per spike and grain yield per plant in barley. Panse (1957) stated that high heritability coupled with high genetic advance indicates the additive gene effects while high heritability coupled with low genetic advance indicates the nonadditive gene effects for control of the particular character. The present study indicated that number of grains per spike, flag leaf length and width, second leaf length, peduncle length and grain yield per plant showing high heritability and high genetic advance are important characters to be considered for selection and improvement of the crop.

Table 1: General mean, genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability and genetic advance in 2-rowed barley

S.N.	Characters	General mean □ S.E.	(PCV) (%)	(GCV) (%)	Heritability (%)	Genetic advance	Genetic Advance (% of mean)
1.	Days to 50% flowering	72.62 ± 1.23	8.61	8.09	88.37	11.38	15.67
2.	Days to maturity	100.98 ± 0.79	2.55	2.16	71.64	3.79	3.76
3.	Plant height (cm)	71.04 ± 0.96	11.24	10.99	95.65	15.73	22.14
4.	Tillers per plant	10.34 ± 0.28	12.12	11.18	85.05	2.20	21.23
5.	Flag leaf length (cm)	10.83 ± 0.65	25.58	23.33	83.17	4.74	43.83
6.	Flag leaf width (cm)	0.60 ± 0.03	30.27	28.86	90.91	0.34	56.67
7.	Second leaf length (cm)	21.04 ± 0.86	16.25	14.62	80.93	5.70	27.10
8.	Second leaf width (cm)	0.94 ± 0.03	22.06	21.27	93.02	0.39	42.23
9.	Awn length (cm)	13.29 ± 0.28	12.40	11.81	90.75	3.08	23.17
10.	Peduncle length (cm)	24.02 ± 0.45	20.81	20.56	97.58	10.05	41.84
11.	Grains per spike	17.94 ± 0.50	24.69	24.20	96.04	8.76	48.86
12.	100-grain weight	4.58 ± 0.17	13.82	12.06	76.06	0.99	21.66
13.	Grain yield per plant (g)	5.43 ± 0.26	21.24	19.50	84.28	2.00	36.87

REFERENCES

[1]Burger W. C. and LaBerge D. E., 1985. Malting and brewing quality In: Barley. Edited by D.C. Rasmusson. (Publ. Amer. Soc. Agron., Crop Science Soc. America, Soil Science Soc. America), Madison, Wisconsin, U.S.A.: 367-401.

[2]El-Bawab A.M.O., 2003. Genetic studies on some characters in barley. Egyptian J. Agric. Res., **81**(2): 581-593.

[3]Esparza-Martinez J. H. and Foster A. E.,1998. Genetic analysis of days to flowering and other characteristics of two-rowed barley. Agricultura - Tecnica.en. Mexico **24** (2) : 131-144.

[4]Hanson C. H., Robinson, H. F. and Comstock, R. E.; 1956. Biometrical studies of yield in segregating populations of Korean Lespedeza. Agron. J. **48**: 268-272.

[5]Hockett E. A. and Standridge N. N.,1975. Relationship of agro-nomic and malt characteristion of isogenic traill to breeding two- and six-rowed barley. In: Barley Genetics Vol. III .Edited by H.Gaul. (Proc. III Int. Barley Genet. Symp), Garching : 594-603.

[6]Kishor R., Pandey D. D. and Verma S. K., 2000. Genetic variability and character association in hull-less barley (*Hordeum vulgare* L.). Crop Res. Hisar,**19**(2) : 241-244.

[7]Madic,M., 1996. Inheritance of spike traits and grain yield in barley hybrid. Rev. Res. Work at Fac. Agr. Belgrade, **41** (1) : 53-65.

[8]Panse V. G., 1957. Genetics of quantitative characters in relation to plant breeding. Indian J. Genet. Pl. Br.,**28** : 225-229.

[9]Panse V. G.and Shukhatme P. V.,1967. Statistical Methods for Agricultural Workers. 2nd ed., I.C.A.R., New Delhi.

[10]Prasad G., Yadav J. R. and Dwivedi,D. P.,1973. Study of genotypic and phenotypic variability in barley (*Hordeum vulgare* L.). J. Sci. Res., B. H. U., **23**: 31-36.

[11]Singh S. K., Sirchi A., Kerkhi S. A., Singh O., Kumar V., Singh A., Singh S. P. and Singh R. P., 2008. Genetic variability in components for grain yield in barley (*Hordeum vulgare* L.). Environ. and Ecol., **26**: 2379-2381.

[12]Vimal S. C. and Vishwakarm, S. R.; 1998. Heritability and genetic advance in barley under partially reclaimed saline-sodic soil. Rachis,**17** (1-2): 56-57.

[13]Wang J., Zhou M., Huang Z. Lu, C. and Xu R.; 2006. Genetic analysis of quantitative traits of a doubled haploid population in barley. J. Yang Zhou Univ. Agr. Life Sci., **27** (3) : 65-69.