IJPS INTERNATIONAL JOURNAL OF PLANT SCIENCES
e ISSN-0976-593X Volume **10** | Issue 1 | January, 2015 | 57-59
DOI: 10.15740/HAS/IJPS/10.1/57-59
Visit us - *www.researchjournal.co.in*

RESEARCH ARTICLE

Genetic variability and heritability studies on bread wheat (*Triticum aestivum* L.)

■ **GOVIND PATI TRIPATHI, N.S. PARDE, D.K. ZATE AND GAIBRIYAL M. LAL**

SUMMARY

Genetic variability was studied in thirty diverse genotypes of wheat evaluated during *Rabi* season of 2007-2008 under agro climatic conditions of Allahabad. The study revealed highly significant differences for all the characters studied, indicating the presence of substantial genetic variability. The phenotypic and genotypic co-efficient of variation (PCV and GCV) was moderate high for tiller per plant followed by grain yield per plant and biological yield per plant. While the heritability was found to be highest in plant height followed by days to 50 per cent flowering, strove yield per plant, number of grains per spike, test weight and grain yield per plant. High heritability coupled with high genetic advance was observed in plant height, strove yield and harvest index which indicates the presence of good amount of variability for these traits.

Key Words : Genetic variability, Heritability, Genetic advance, *Triticum aestivum* L.

How to cite this article : Tripathi, Govind Pati, Parde, N.S., Zate, D.K. and Lal, Gaibriyal M. (2015). Genetic variability and heritability studies on bread wheat (*Triticum aestivum* L.). *Internat. J. Plant Sci.,* **10** (1): 57-59.

Article chronicle : Received : 19.10.2014; **Revised :** 24.11.2014; **Accepted :** 10.12.2014

Wheat is principal nutritious cereal of word, especially the temperate region. It is the staple food for more than 35 per cent of the world population. So we need immediate attention for grain yield improvement. Genetic variability is an essential component of any breeding programme, design to improve the characteristics of crops. The available variability in a population can be partitioned in to heritable and non heritable variation with the aid of genetic parameters such as variance, genotypic co-efficient of variations heritability and genetic advance which serve as a basis for selection. The correlation and path analysis studies are important assets to the breeder. Correlation co-efficient provides basic criteria for selection and leads to directional model based on yield and its components in the field experiments. Path co-efficient analysis is an efficient statistical technique specially designed to quantify the inter relationships of different components and their direct and indirect effects on grain yield. Such studies determine the association between yield and its attribute and give an idea of contribution of each attribute towards the yield.

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :
N.S. PARDE, Department of Agricultural Botany, College of Agriculture, Golegaon, HINGOLI (M.S.) INDIA

Address of the Co-authors:
D.K. ZATE, Department of Agricultural Botany, College of Agriculture, Golegaon, HINGOLI (M.S.) INDIA

GOVIND PATI TRIPATHI AND GAIBRIYAL M. LAL, Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture Technology and Sciences, ALLAHABAD (U.P.) INDIA

MATERIAL AND METHODS

The field experiment was conducted at research field of Allahabad Agricultural Institute Deemed University, Allahabad, Uttar Pradesh, during *Rabi* season of 2007-2008 to evaluated 30 genotypes of wheat. These genotypes were evaluated in Randomized Block Design with two replication.

Each treatment consisted of five line, the distance between line to line was 25cm and plant to plant distance 5cm with recommended agronomic practices. The data were recorded to five randomly selected plant from each replication for character like plant height, days to 50 per cent flowering, days to maturity, tiller per plant, spike length, number of grain per spike, test weight, biological yield per plant, harvest index and grain yield per plant. The data were subjected to analysis of variance and genetic variability parameters and subsequently genotypic and phenotypic corelation was estimated according to the procedure of Singh and Choudhary (1977) and path analysis by Dewey and Lu (1959).

RESULTS AND DISCUSSION

Analysis of variance revealed significant difference among 30 genotypes for all traits under study revealed that direct selection will be useful for wheat improvement.

The estimation of genotypic co-efficient of variance (GCV) was high range for tiller per plant (21.102) followed by grain yield per plant (17.992), biological yield per plant (17.478) and plant height (15.452) and phenotypic co-efficient of variance (PCV) was high range of tiller per plant followed by grain yield per plant (18.64), biological yield per plant (17.69) and harvest index (15.60), Rafat *et al.* (2005) compare PCV to GCV for all characters. The higher magnitude of GCV and PCV were recorded for tiller per plant, grain yield per plant, biological yield per plant suggesting sufficient variability and thus, offer better scope for genetic improvement through selection of these traits.

The proportion of genetic variability which is transmitted from parents to offspring is reflected by heritability (Lush, 1945). High heritability alone is not enough to make sufficient improvement through selection in genetic advance generation where accompanied by substantial amount of genetic advance. The estimates of heritability were high for plant height, days to 50 per cent flowering and biological yield per plant.

Johnson *et al.* (1955) suggested heritability and genetic advance when calculated together would prove more useful in predicated the result of selection phenotypic expression.

Table 1 : Analysis of variance for different quantitative characters in wheat

Sr. No.	Characters	Mean sum of squares		
		Replications	Treatments	Error
	Degree of freedom	1	29	29
1.	Days to 50% flowering	0.42	54.83*	0.6235
2.	Days to maturity	1.07	11.83*****	1.4460
3.	Plant height	0.94	485.75*****	1.7246
4.	Effective tillers per plant	0.40	6.51*****	0.2588
5.	Spike length	0.42	2.79*****	0.2799
6.	Number of grain per spike	3.31	29.81*****	0.6828
7.	1000 seed weight	2.08	26.28*****	0.6895
8.	Strove yield per plant	0.14	62.97*****	0.7784
9.	Harvest index	0.06	69.39*	4.5140
10.	Seed yield per plant	0.17	10.22*	0.36

* indicate significance of values at P=0.05

Table 2 : Estimation of component of variance and genetic parameters for 10 characters in 30 genotypes of wheat

Sr.No.	Characters	VP	VG	GCV	PCV	h^2(bs)	GA	GG
1.	Days to 50% flowering	27.73	27.10	7.04	7.12	97.8	10.60	14.35
2.	Days to maturity	6.64	5.19	2.01	2.27	78.2	4.15	3.65
3.	Plant height	243.74	242.01	15.45	15.51	99.3	31.93	31.72
4.	Tiller per plant	3.39	3.13	21.10	21.96	92.4	3.50	14.78
5.	Spike length(cm)	1.53	1.25	11.38	12.58	81.8	2.09	21.19
6.	No. of grain per spike	15.25	14.57	8.88	9.08	95.5	7.68	17.86
7.	Test weight(g)	13.49	12.80	9.41	9.66	94.9	7.18	18.87
8.	Strove yield /plant(g)	31.87	31.09	17.48	17.69	97.6	11.35	35.56
9.	Harvest index	36.95	32.44	14.62	15.61	87.8	10.99	28.22
10.	Grain yield per plant(g)	5.29	4.93	17.99	18.64	93.2	4.42	35.77

VP= Genotypic variance, VG= Phenotypic variance, GCV= Genotypic co-efficient of variation, PCV= Phenotypic co-efficient of variation, h^2 =Heritability, GA= Genetic advance, GG=Genetic gain.

The highest genetic advance was recorded for plant height, biological yield per plant, harvest index, days to 50 per cent flowering. High heritability along with high genetic advance for plant height, selection will be means the additive gene action will be shows. High heritability coupled with moderate genetic advance for biological yield, harvest index and days to 50 per cent flowering that means the non additive gene action and shows selection may or may not be effective.

In the present investigation genotypic correlation co-efficient were greater magnitude than phenotypic correlation co-efficient. The grain yield was positive and significantly correlated with test weight, biological yield per plant and harvest index Sharma *et al.* (2006) also reported grain yield was positively and significant correlated with biological yield, suggesting that yield is the function of these characters and selection for these characters would be effective. It indicates strong relationship of these traits with seed yield and, therefore, by increasing the value of these component traits, yield may easily be pushed up thus, selection for these traits will be useful in improving seed yield in bread wheat. The grain yield was negatively correlated with days to 50 per cent flowering, days to maturity, spike length and number of grain per spike.

Grain yield is a complex character depends upon other component characters, which exert their effects directly and indirectly. Direct effect of any character on grain yield gives an idea about effective selection that can be made to bring improvement in latter. The indirect effect indicates the inter relationship of component characters towards contributes to yield. In the present investigation biological yield per plant had highest positive effects followed by harvest index, days to maturity, spike length and test weight Singh *et al.* (2003) also reported that biological yield per plant, test weight had positive direct effect on grain yield. These traits had strong positive association with grain yield, indicating importance of direct selection for these traits. Tiller per plant, grain per spike, plant height and days to 50 per cent flowering had high negative indirect effects as well as negative association with yield. Similar trend was also observed by Gupta *et al.* (1979).

REFERENCES

Deswal, R.K., Grakh, S.S. and Berwal, K.K. (1996). Genetic variability and characters association between grain yield and its components in wheat. Annals of Biology, Ludhiyana (PUNJAB) INDIA.

Dewey, D.R. and Lu, K.H. (1959). A correlation and path co-efficient analysis of component of crested wheat grass seed production. *Agron J.*, **51**:515-518.

Gupta, R.R., Ahmed, Z. and Dixit, P.K. (1979). Path co-efficient analysis in macroni wheat. *India J. Agric. Sci*., **49** : 238-243.

Gupta, R.R., Ahmad, Z., Shyam, R. and Singh, A. (1980). Association and path analysis in tritical. *Indian J. Agric. Sci.*, **50**:202-207.

Johnson, H.W., Robinson, H.F. and Comstock, R.E. (1955). Estimation of genetic and environmental variability in soybeans. *Agron. J.*, **47** : 314 - 318.

Lush, J. L. (1949). Heritability of quantative traits in farm animals Proceed. 8th Internat. Congrass Genetics 1948. Heribos (Suppl.) 356-357.

Sharma, Vivek, Pawar, I.S. and Munjal, Renu (2006).Varivality parameters,correlation and path co-efficient for yield, its components and quality traits in bread wheat. *National J. Plant Improv.*, **8** (2) 153-155.

Singh, I.R.S., Paroda, S.K., Sharma and Choudhary, R.K. (1987). Correlation and path analysis in wheat. Harayana Agricultural University, HARAYANA, INDIA.

Singh R.K. and Choudhary, B.D. (1977). Biometrical methods inquantitative genetic analysis. Kalyani Publication, NEW DELHI, INDIA.

Singh, V., Singh, D. and Singh, N. (2003). *National J. Plant Improv. Hisar, India*, **5** (2) :106-109.

Sultana, Rafat and Malik, S.K. (2005). Genetic variability and character association between yield and yield attributing traits in bread wheat. Annals of Agriculture Research, NEW DELHI, INDIA.