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Short Note

Quantitative Analysis of Yield Contributing Traits and Seed Quality Parameters of Wheat(*Triticum aestivum* L.)

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ABSTRACT

In the present investigation 72 exotic and indigenous genotypes of bread wheat along with three checks were evaluate during *Rabi* season, 2013-14.The experiment was conducted in Augmented Block Design having 8 blocks of plots each at Men Experiment Station farm and seed attributes tested in Seed Testing Laboratory of Seed Technology Section, Narendra Deva University of Agriculture & Technology, Narendra Nagar Kumarganj, Faizabad (U.P.). Highly significant differences were observed among the genotypic for all the seed yield traits. The phenotypic coefficient of variability (PCV) ware close to genotypic coefficient of variability (GCV) for more of the traits which indicate that environmental effect has no considerable effect on the total phenotypic variation. Vigour index showed the highest genotypic coefficient of variation followed by vigour 1000-seed weight, days to maturity and plant height. A highest estimate of both heritability and genetic advance was exerted by 1000-seed weight followed by number of tiller per plant and Vigour index. 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.

Keywords: Wheat, GCV, PCV, genetic advance, heritability, seed yield.

Wheat (*Triticum aestivum* L. em. Thell.; 2n=42), a self-pollinated crop of the *Graminae* family (Sub-family *Poaceae*) and genus *Triticum*, is the world's largest famous energy rich cereal crop (Kumar *et al*., 2014). It has been described as the 'King of cereals' because of the acreage it occupies, high productivity and the prominent position it holds in the international food grain trade. Globally, *aestivum* wheat is most important species which covers 90 per cent of the area. Second popular wheat being durum wheat which covers about 9 per cent of the total area while *T. diccoum* wheat and *T. monococcum* wheat cover less than the one per cent of the total area. The availability of genetic variability is the basic pre-requisite for genetic improvement through systematic breeding programme. For developing wheat varieties, indigenous and exotic germplasm is the back bone of successful breeding programme for improving yield and yields contributing traits. It is true that more diverse plant greater are the chances of obtaining high heterotic crosses and broad variability in segregating generations during genetic improvement. Selection and hybridization techniques are used for improving genetic constitution of a genotype. Selection is usually practiced for pooling favourable genes while hybridization is predominantly utilized to accumulate favourable genes in a variety for obtaining better performance for this purpose donor can be sorted out from available germplasm, because germplasm serves as valuable natural reservoir providing several better attributes. The identification of donor parent for important characters through assessment to genetic variation in the available germplasm and the information about character association are required to device a successful breeding programme.

The present study was designed to work out status of variability, heritability and genetic advance among the seventy two wheat genotypes at field experiment under present investigation was conducted during *Rabi*, 2013-14 at Main Experiment Station (MES) Kumarganj and lab experiments were conducted in Seed Testing Laboratory Seed Technology Section, N.D. University of Agriculture and Technology, Narendra Nagar (Kumarganj) Faizabad (U.P.). The experimental materials of studies comprised of 72 wheat varieties/lines/genotypes from Australian and Indian origin excluding 3 check varieties *viz*., PBW-502, HUW-234 and NW-2036. The experiment was laid out in Augmented Design. The observation were recorded on eleven different seed yield traits viz. days to days to 50% flowering, days to maturity, plant height (cm), number of tillers/plant, length of spike (cm), number of spikelets/spike, 1000-grain weight (g), seed yield/plant, seed germination (%), seedling length (cm) and vigour index. Standard statistical techniques such as analysis of variance (Federer, 1956), genotypic and coefficient of variation (Burton and de Vane, 1953), estimate of broad sense Heritability (h^2b), (Hanson *et al*,. 1956), and genetic advance as per cent of the mean was computed by (Johnson *et al*., 1955).The vigour index was calculated as per the method prescribed by Abdul-Baki and Anderson (1973) and expressed in whole number.

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The analysis of variance revealed highly difference among the genotypes for all the eleven studied characters an indicated presence of considerable amount of variability in the genotypes (Table1). The magnitude of environmental variance was relatively lower than the genotypic variation. It indicated that there was not considerable effect of environment on the genotypic coefficient of variability (GCV). Highest magnitude of genotypic coefficient of variation was observed for vigour index (54984.14) followed by 1000-seed weight (46.32), day to maturity (17.04) and plant height (8.79)while high value of phenotypic coefficient of variability (PCV) was estimated for vigour index followed by 1000-seed weight (47.72), day to maturity (31.19) and plant height (16.45) (Dhanda *et al.*,2004, Wani *et al.*, 2011, Mehta *et al.*,2013 and Kumar*et al.*, 2014). This indicated greater scope of obtaining high selection response for these traits owing to presence of high genetic variability. This can be ascertained from the heritability estimates in broad sense which include both additive and non-additive gen effects. Heritability in broad sense (h^2_b) and genetic advance in per cent of mean as direct selection parameters provide index of transmissibility of traits which gives indication about the effectiveness of selection in improving the characters. Highest estimates of both heritability and genetic advance was exerted by 1000-seed weight (97.07&38.02) followed by number of tillers per plant (96.76 & 38.19), vigour index (91.25 & 21.17) and seedling length (87.03 & 16.45) respectively (Singhara, 2003 and Chandra*et al.*,2010). Heritability and genetic advance indicated that the additive nature of gene action was reliable for the characters such as 1000-seed weight, number of tillers per plant and vigour index for selection and emerged as ideal traits for improvement through selection. The most preferable genotypes having high variability, heritability and genetic advance for characters other than seed yield per plant may be used as donor parents in hybridization programme for improving the characters for which they showed high value of heritability and genetic advance (Table 2). The improvement of complex character like seed yield per plant depends upon the genetic variability, heritability and genetic advance. This suggested possibility of obtaining reasonable improvement through selection. The results suggest the possibility of improving seed yield traits through superior genotypic selection.

Table 1: Analysis of variance of augmented design for 11 characters of wheat germplasm

Characters	Source of variation		
	Blocks	Checks	Error
	D.F.(7)	D.F.(2)	D.F.(14)
Days to 50% flowering	0.327	50.560**	5.166
Days to maturity	0.950	150.500**	14.146
Plant height (cm)	0.400	78.010**	7.657
No. of tillers per plant	0.002	5.751**	0.023
Length of spike (cm)	0.006	0.650**	0.095
No of spikelets per spike	0.128	11.825**	2.518
1000-seed weight (g)	0.048	371.986**	1.399
Seed yield per plant	0.002	0.875**	0.032
Seed germination (%)	0.493	51.633**	9.177
Seedling length (cm)	0.037	31.796**	0.581
Vigour Index	325.42	445142.200**	5269.279

* and ** significant at 5% and 1% level of probability, respectively.

Table 2: Estimates of range, grand mean, phenotypic (PCV) and genotypic (GCV) coefficients of variation and genetic advance in percent of mean (G) for eleven characters in wheat.

Character	Range	Grand mean $\overline{X}$	PCV (%)	GCV (%)	Genetic advance in per cent of mean (G) (%)	Heritability (h^2b(%)
Day to 50 % flowering	69.84-83.99		7.68	2.51	2.62	32.73
Day to maturity	104.24-117.80	109.50 ±1.88	31.19	17.04	5.35	54.65
Plant height (cm)	80.97-101.29	93.47 ±1.38	16.45	8.79	5.06	53.45
No. of tillers per plant	3.53-5.64	4.05 ±0.08	0.74	0.71	38.19	96.76

Length of spike (cm)	8.28-12.39	9.95 ±0.16	0.16	0.07	3.65	42.04
No. of spikelets per spike	41.87-62.58	49.97 ±0.79	3.68	1.16	2.51	31.59
1000-seed weight(g)	25.92-50.42	37.64 ±0.59	47.72	46.32	38.02	97.07
Seed yield per plant	5.11-8.52	6.12 ±0.09	0.14	0.11	10.37	76.42
Seed germination (%)	89.78-98.01	94.88 ±1.51	14.48	5.31	3.05	36.64
Seedling length (cm)	20.93-16.93	22.80 ±0.38	4.48	3.90	16.45	87.03
Vigour index	1601.68-2705.82	2164.24 ±36.30	60253.42	54984.14	21.17	91.25

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