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Studies on genetic variability in wheat (*Triticum aestivum* L.)

Y. N. PATEL[1*], M. S. PATEL[2], N. N. PRAJAPATI[3], ASHOK N. CHAUDHARY[4] AND N. B. JOSHI[5]

Centre for Crop Improvement,

S. D. Agricultural University, Sardarkrushinagar, Banaskantha-385 506, Gujarat

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ABSTRACT

Forty genotypes of wheat evaluated for the estimation of variability, heritability and genetic advance. Analysis of variance revealed considerable among of variability among the genotypes for yield and its components traits viz. Days to 50 % flowering, Plant height, Effective tillers per meter length, Days to maturity, Grain yield (kg/ net plot), Fodder yield (kg/ net plot) and Test weight (gm). High phenotypic coefficient of variation (PCV) value than genotypic coefficient of variation (GCV) value for all the traits. High genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) value observed for grain yield per net plot, plant height and Effective tillers per meter length. Broad sense heritability, Genetic advance and genetic advance percent of mean was observed high for plant height and test weight respectively. These characters governed by additive gene action therefore direct selection may be effective.

Key words: Genetic variability, wheat.

Wheat is an important world largest cereal crop belongs to family *Graminae* (*Poaceae).* It has been described as the "King of cereals" because of the acreage it occupies, high productivity and prominent position it holds in the international food grain trade. In India, wheat is the second most important cereal crop after rice covering an area of 30.79 million hectares. Total annual production of wheat in India is 98.51 million tonne with the productivity of 3.20 tonne per hectare during 2017-18 (Anon. 2017-18). India is the second largest wheat producer (approximately 12 per cent world wheat production) and consumer after china. In Gujarat, wheat is an important Rabi crop and is grown almost throughout the state with 1.05 million hectare area under cultivation, total production of 3.05 million tonne and an average yield of 2.89 tonne per hectare during 2017-18 (Anon. 2017-18). Genetic variability is essential for initiating an effective and successful breeding programme and it become important to study the level of genetic variability available in the existing genotype. The study of genetic advance with heritability estimates future classify the nature of character which can be improved through selection, therefore, the present investigation was under taken to study variability , heritability and genetic advance in wheat.

[1]Agricultural officer, [2]Associate Research Scientist, [3&4]Assistant Research Scientist, [5]Agriculture assistant, Centre for Crop Improvement, S. D. Agricultural University, Sardarkrushinagar

*Email: yogeshpbg@gmail.com

MATERIALS AND METHODS

Forty wheat genotypes obtained from wheat research station, S. D. Agricultural University, Vijapur were used for the experiment. The experiment was conducted at centre for crop improvement, S. D. Agricultural University, Sardarkrushinagar during Rabi-2017-18. All 40 genotypes were grown in randomized block design with two replications in six row plots of 6 miter length, keeping row to row distance 20 cm for each genotype. All the recommended package of practices were followed to raise the crop. Observation were recorded and analyzed in terms of mean and variability parameter on seven characters viz., Days to 50 % flowering, Plant height, Effective tillers per meter length, Days to maturity, Grain yield (kg/ net plot), Fodder yield (kg/ net plot) and Test weight (gm).

RESULTS AND DISCUSSION

The analysis of variance revealed significant variability due to genotypes for all the traits except

fodder yield (Table-1). Indicating thereby wide range of genetic variability and scope for selection for there traits. Significant variation for the characters was also observed by earlier workers Mahmood *et al.,* (2005); Nagireddy and Jyothula (2009); Nayeem *et al.,* (2002); Kahrizi *et al.,* (2010) and Kumar *et al.,* (2014).

In present study, the phenotypic and genotypic coefficient of variation exhibited wide range for all characters and also exhibited high phenotypic coefficient of variation (PCV) values than genotypic coefficient of variation (GCV) values, suggesting the influence of environmental factors for characters. The high estimates of genotypic co-efficient of variation and phenotypic co-efficient of variation were observed for grain yield kg per net plot followed by plant height (cm),test weight (g) and effective tillers per meter length. Similar results were observed by Kallimullah *et al.,* (2012) and Kumar *et al.,* (2014).

The characters *viz*., days to 50 % flowering followed by test weight (gm), plant height (cm) and days to maturity showed high broad sense heritability. Similar results were observed by Ahmad *et al.,* (2007); Cheema *et al.,* (2006), Khan *et al.,* (2007) and Kumar *et al.,* (2014). The high heritability indicates that selection on the basis of phenotype may prove effective for these characters. Plant height (cm) followed by test weight (gm) exhibited highest value of genetic advance, Similar results were observed by Kumar *et al.,* (2014), Singh *et al.,* (2005); Ahmad *et al.,* (2007) and Sharma and Garg (2002). Plant height (cm) exhibited highest value of genetic advance as percent of mean followed by test weight (gm), grain yield kg per net plot, effective tillers per meter length and days to 50 % flowering. Simillar results were observed by Patel and Jain (2002); Mukherjee *et al.,* (2008); Kamboj (2010) and Kumar *et al.,* (2014).

High heritability along with high genetic advance was observed for plant height (cm) and test weight (gm). These characters governed by additive gene action therefore direct selection may be effective. The grain yield per plant show moderate heritability with high genetic advance as percent of mean showed non additive gene action and can be improved through hybridization followed by selection.

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Table 1 Analysis of variance of mean sum of squares for seven characters under study in wheat (*Triticum aestivum* L.)

Character	Replication (d.f. =1)	TREATMENTS (d.f. =39)	Error (d.f. = 39)
Days to 50 % flowering	1.25	9.20***	0.56
Plant height (cm)	1260.88***	102.26***	22.22
Effective tillers per meter length	2132.12***	78.40*	42.20
Days to maturity	0.45	4.21***	1.20
Grain yield (kg/ net plot)	5.39***	0.14*	0.07
Fodder yield (kg/ net plot)	6.23***	0.14	0.10
Test weight (gm)	1.02	34.50***	5.57

Table 2 Estimates of Genetic variability parameters for seven characters under study in wheat (*Triticum aestivum* L.).

S.No.	Character	Mean	Range	GCV	PCV
1.	Days to 50 % flowering	55.43	48.0 - 58.5	3.89	4.13
2.	Plant height(cm)	76.69	62.3 - 90.5	8.25	10.29
3.	Effective tillers per meter length	55.41	37.5 - 67.5	7.68	14.01
4.	Days to maturity	108.40	105.0 - 111.0	1.13	1.52
5.	Grain yield (kg/ net plot)	1.91	1.28 - 2.58	9.24	17.24
6.	Fodder yield (kg/ net plot)	2.22	1.57 - 2.71	6.28	15.50
7.	Test weight (gm)	49.24	41.49 - 57.34	7.72	9.09

Table 3 Estimates of heritability, Genetic advance & genetic advance as percentage over mean for seven characters under study in wheat (*Triticum. aestivum*L.).

S. No.	Characters	Heritability (%)	Genetic Advance	Genetic Advance as percentage of Mean.
1.	Days to 50 % flowering	0.89	4.03	7.54
2.	Plant height(cm)	0.64	10.45	13.63
3.	Effective tillers per meter length	0.30	4.80	8.67
4.	Days to maturity	0.56	1.89	1.74
5.	Grain yield (kg/ net plot)	0.29	0.19	10.20
6.	Fodder yield (kg/ net plot)	0.16	0.12	5.24
7.	Test weight (gm)	0.72	6.65	13.51