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GENETIC VARIABILITY PARAMETERS STUDY IN WHEAT [*TRITICUM AESTIVUM* (L.) GARTON]

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ABSTRACT

The present investigation was conducted at Research Farm, School of Agriculture, Graphic Era Hill University, Dehradun during Rabi, 2023. Thirteen genotypes along with three checks were studied to assess the genetic variability, among genotypes using RBD design. The analysis of variance revealed a highly significant difference for most of the traits studied viz days to ear emergence, days to maturity, plant height (cm), number of spikelets per ear, number pf grains per ear, flag leaf area (cm^2), thousand grain weight (g), grain yield per plant (g) and grain yield (quintal per hectare). Low magnitudes of PCV and GCV were observed for characters viz., days to ear emergence, days to maturity, plant height (cm), number of tillers per plant, number of ears per plant, ear length (cm), number of grains per ear, thousand grain weight (g), grain yield (quintal per hectare) and grain yield per plant (g). High heritability coupled with moderate genetic advance as percentage of mean was observed for days to ear emergence, number of spikelets per ear, grain yield per plant (g) and grain yield (quintal per hectare).

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Keywords: Heritability, wheat, PCV, GCV, Genetic Advance.

INTRODUCTION

Wheat (*Triticum aestivum*) is an annual plant of Gramineae family. It belongs to genus Triticum. It is a self-pollinated crop. It is originated from South West Asia. Wheat has a relatively high content of niacin and thiamine. It contains 'gluten' which is very essential for bakers. It contains more protein than other cereal (Singh et al., 1983). It provides on an average of 70% of total carbohydrates, 59.2% starch, 12.61% protein, 6.7% pentosans, 2.0% reducing sugars, 1.8% ash and 1.54% lipids. It supplies 327 calories $(100)^{-1}$ gram of food. It provides vitamins and minerals such as calcium (37 mg g), nicotinic acid (5.4 mg $(100^{-1}$ g), iron (4.1 mg $(100^{-1}$ g), thiamine (0.45 mg $(100^{-1}$ g) and $(100^{-1}$ g) riboflavin (0.13 mg $(100^{-1}$ g) (Lorenz and Kulp, 1991).

India is the second largest producer of wheat in the world after China (FAO, 2022). In India, major wheat producing states are Rajasthan, Karnataka and Maharashtra (Agricultural Statistics at a Glance, 2022). In India, wheat is grown in an area of 32 million hectares with an annual production of 113.50 million metric ton (USDA, 2023). Information about the genetic parameters like heritability and genetic advance among characters under selection is very useful for predicting genetic progress in breeding programme and developing efficient breeding strategies (Falconer and Mackay, 1996). The amount of variability present in breeding material plays an important role in the progress of improvement of crop plants through selection. High genetic advancement as well as high heritability offers the better scope for selection (Johnson et al., 1955).

MATERIAL AND METHODS

The present research work was carried out during Rabi season, 2022 at Research Farm School of Agriculture,

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Graphic Era Hill University, Dehradun, India. The experimental material comprised of 13 entries along with 3 check varieties in 4 replications. The experiment was conducted in Randomized Block Design (RBD). The experimental plot size comprised 10 rows 6 m each at 30 cm apart with net area of 14.4 m2. Ten random plants from each entry were selected and the following observation were recorded for days to ear emergence, days to maturity, plant height (cm), number of tillers per plant, number of ears per plant, number of grains per spikelet, flag leaf area (cm^2), number of spikelets per ear, ear length (cm), thousand grain weight (g), grain yield per plant (g) and grain yield (quintal per hectare). Data were analysed for the variability, heritability, genetic advance for the characters.

RESULT AND DISCUSSION

Analysis of variance of different character are presented in Table 1. The variances (mean square) were highly significant for the traits under study viz., days to ear emergence, days to maturity, plant height (cm), number of spikelets per ear, number of grains per ear, flag leaf area (cm^2), thousand grain weight (g), grain yield per plant (g) and grain yield (quintal per hectare). Emmadishetty et al., (2022) and Chaudhary et al., (2022) also reported high magnitude of variability for various characters in Wheat.

Genetic parameters for variation calculated for different yield and yield attributing characters are presented in Table 2. The estimates phenotypic coefficient of variation (3.78% to 18.53%) slightly

Table 1: ANOVA showing Mean sum of squares for yield and yield attributing characters of Wheat.

Source	d.f	Days to ear emergence	Days to maturity	Plant height (cm)	Number of tillers per plant	Number of ears per plant	Number of spikelets per ear	Ear length (cm) (g)	Number of grains per ear	Flag leaf area (cm^2)	Thousand grain weight (g)	Grain yield per plant	Grain yield (quintal per hectare)
Replications	3	3.275	2.456	102.496	0.152	0.183	6.634	2.070	19.084	7.548	2.774	1.907	21.132
Treatments	15	86.867**	83.605**	122.563**	0.584	0.672	13.712**	1.708	53.255**	83.073**	14.068**	7.014**	66.350**
Error	45	4.196	2.513	38.155	0.153	0.081	1.559	0.853	7.562	13.581	1.998	0.745	8.435

**Significant at 1% L.O.S
*Significant at 5% L.O.S

Table 2: Genetic parameters of variation of yield and yield attributing characters of Wheat.

S. No.	Name of the character	Mean	Range	GCV (%)	PCV(%)	Heritability	Genetic Advance	Genetic Advance as percentage of Mean in %
1.	Days to ear emergence	75.56	65.25-81.30	6.01	6.59	83.12	8.53	11.3
2.	Days to maturity	126.21	121.75-134.95	3.56	3.78	88.97	8.74	6.93
3.	Plant height (cm)	100.12	92.17-108.61	4.58	7.68	35.61	5.64	5.64
4.	Number of tillers per plant	8.93	8.45-9.55	3.67	5.71	41.40	0.43	4.87
5.	Number of ears per plant	7.24	6.55-7.70	5.30	6.60	64.47	0.63	8.77
6.	Number of spikelets per ear	19.97	17.05-23.35	8.72	10.73	66.08	2.91	14.61
7.	Ear length (cm)	11.20	10.34-12.15	4.12	9.22	20.04	0.42	3.80
8.	Number of grains per ear	55.24	48.35-61.85	6.11	7.88	60.16	5.40	9.77
9.	Flag leaf area (cm^2)	30.01	25.32-38.66	13.88	18.53	56.12	6.43	21.43
10.	Thousand grain weight (g)	38.67	35.63-41.15	4.49	5.79	60.16	2.77	7.17
11.	Grain yield per plant (g)	15.53	13.29-17.49	8.06	9.79	67.79	2.12	13.67
12.	Grain yield (quintal per hectare)	51.50	44.28-56.92	7.38	9.29	63.18	6.23	12.09

higher than of genotypic coefficient of variation (3.56% to 13.88%) indicated less effect of environment in expression of traits.

Among the different yield attributing characters, flag leaf area (cm^2) had the moderate magnitude of genotypic coefficient of variation (13.88%). The moderate magnitude of phenotypic coefficient of variation were recorded for number of spikelets per ear (10.73%) and flag leaf area (cm^2) (18.58%). The low magnitude of GCV and PCV were recorded for days to ear emergence (6.01% & 6.59%), days to maturity (3.56% & 3.78%), plant height (cm) (4.58% & 7.68%), number of tillers per plant (3.67% & 5.71%), number of ears per plant (5.30% & 6.60&), ear length (cm) (4.12% & 9.22%), number of grains per ear (6.11% & 9.22%), thousand grain weight (g) (4.49% & 5.79%), grain yield per plant (g) (8.06% & 9.79%) and grain yield (quintal per hectare) (7.38% & 9.29%). Moderate GCV and PCV for flag leaf area were reported by Sohail *et al.*, (2018) and Barman *et al.*, (2022). High heritability coupled with moderate genetic advance as per cent of mean was reported for days to ear emergence, number of spikelets per ear, grain yield per plant (g) and grain yield (quintal per hectare). Moderate PCV and high heritability coupled with moderate genetic advance were reported for number of spikelets per ear by Kumari *et al.*, (2022).

CONCLUSION

The present study illustrated the existence of wide range of variations for most of the traits among genotypes. The moderate magnitude of phenotypic coefficient of variation were recorded for flag leaf area and number of spikelets per ear. Flag leaf area (cm^2) had the moderate magnitude of genotypic coefficient of variation. High heritability coupled with moderate genetic advance as per cent of mean was reported for days to ear emergence, number of spikelets per ear, grain yield per plant (g) and grain yield (quintal per hectare). Thus, these traits can be used as selection indices in wheat to bring about the improvement in yield.

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