

## EVALUATION AND ESTIMATION OF HERITABILITY AND GENETIC ADVANCEMENT FOR YIELD RELATED ATTRIBUTES IN WHEAT LINES

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### Abstract

Ten wheat genotypes were evaluated for estimation of heritability and genetic advance of various yield related parameters viz. spike length, number of spikes per plant, number of spikelets per spike, number of grains per spike, 1000 grain weight and grain yield per plant. Among all the studied characters, number of grains per spike, 1000 grain weight and grain yield per plant showed high values of heritability coupled with high genetic advance that result in prevailing suitable conditions for selection.

### Introduction

Continuous evaluation of wheat varieties is done before the release of a variety for commercial purpose and to avoid gradual deteriorating in the field. Extensive testing of wheat genotypes under varying environments has been practiced for screening relatively stable cultivars (Aggarwal & Sinha, 1984). The success of a crop improvement program depends upon the amount of genetic variability existing in the germplasm. To bring the heritable improvements in economic characters through selection and breeding estimation of genetic parameters must be made before starting a program. There are different techniques available to compute the genetic parameters and the index of transmissibility of characters. Heritability estimates provides information about the extent to which a particular character can be transmitted to the successive generations. Knowledge of heritability of a trait thus guides a plant breeder to predict behavior of succeeding generations and helps to predict the response to selection. High genetic advance coupled with high heritability estimates offer a most suitable condition for selection (Larik *et al.*, 1989). Therefore, availability of good knowledge of heritability and genetic advance existing in different yield parameters is a pre-requisite for effective plant improvement exercise. Different researchers like Ashraf *et al.* (2002), Arshad & Chowdhry (2003), Kamal *et al.* (2003), Khalil & Afridi (2004), Ansari *et al.* (2005), Inamullah *et al.* (2006) and Shabana *et al.* (2007) in their studies have reported the presence of high heritability and genetic advance in different yield related attributes in wheat. Keeping in view the importance of these techniques, the present study was conducted to evaluate the yield potential of wheat genotypes under rainfed conditions.

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## Materials and Methods

The experimental material used in the present study comprised of ten wheat genotypes/lines viz. Chakwal-86, Iqbal-2000, Uqab-2000, GA-2002, 00FJ03, IC-001, IC-002, NR-234, 3C061 and 3C062 differing for the characters investigated. The seed of wheat genotypes/lines was obtained from Barani Agricultural Research Institute, Chakwal and National Agricultural Research Center, Islamabad and was sown in the experimental area of Department of Plant Breeding and Genetics, University of Arid Agriculture; Rawalpindi during 2004-2005 in randomized complete block design with three replications. All the cultural practices were performed as recommended. The plant data during the cropping season and after harvesting were noted. The data was collected on ten randomly selected plants in each row for different parameters viz. spike length, number of spikes per plant, number of spikelets per spike, number of grains per spike, 1000 grain weight and grain yield per plant. Significance of the data was ascertained by analysis of variance as proposed by Steel & Torrie (1980) while phenotypic and genotypic coefficient of variation, heritability (broad sense) and genetic advance estimates were worked out according to the procedure described by Mehdi & Khan (1994).

## Results and Discussion

Analysis of variance presented in Table 1 expressed highly significant results for all the traits studied. Among estimates of heritability and genetic advance (Table 2), spike length exhibited moderate broad sense heritability (62.22%) with low genetic advance (1.16). Moderate heritability estimates suggested that selection should be delayed to more advance generations for this character. Low genetic advance indicates slight chances of improvement of this trait in subsequent generations as discussed by Mahmood & Shahid (1993), and Firouzian *et al.* (2003). High heritability values (82.69%) coupled with high genetic advance (4.89) were observed for number of grains per spike similar with the finding of Masood *et al.* (1986). 1000 grain weight exhibited high heritability values (95.6%) with high genetic advance (12.64) in conformity with the finding of Pawar *et al.* (1989), Khan & Bajwa (1993), and Ashraf *et al.* (2002).

Grain yield per plant displayed high heritability estimates (85.7%) with relatively high value of genetic advance (6.05). These estimates reflect the possibility of effective selection for this trait. Moreover high heritability with high genetic advance suggested that selection could be practiced for this trait as reported by Masood & Chaudhry (1987). Low heritability estimates (59.5%) with low genetic advance (1.2) were observed for

**Table 1: Mean squares of grain and yield related attributes for ten wheat lines**

Source of variance	Degree of freedom	Spike length	Number of spikes per plant	Number of spikelets per plant	Number of grains per spike	1000 Grain weight	Grain yield per Plant
Genotypes	9	2.626**	2.904**	4.981**	29.93**	164.457**	43.798**
Replications	2	0.4	0.833	0.433	6.433	2.75	19.387
Error	18	0.437	0.537	0.581	1.952	2.484	2.306

\*\* = Highly significant

**Table 2: Estimation of heritability and genetic advance of different yield related attributes of ten wheat Lines**

Attributes	Spike length	Number of spikes per plant	Number of spikelets per plant	Number of grains per spike	1000 Grain weight	Grain yield per plant
$h^2$	62.22	59.5	71.62	82.69	95.6	85.7
G.A	1.16	1.2	1.8	4.89	12.64	6.05

$h^2$  = Heritability; G.A =Genetic advance

number of spikes per plant (Table 2) indicating low transfer of this trait in the subsequent generations similar in agreement with the findings of Amin *et al.* (1990). For number of spikelets per spike, moderate heritability estimates (71.62%) were obtained with low genetic advance (1.8). Moderate heritability with low genetic advance indicates slight chances of improvement of this trait in subsequent generations as discussed by Sharma *et al.* (1986).

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