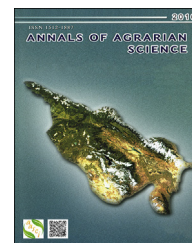


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# Performance of different bread wheat varieties for yield and yield attributes under diallel combinations

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## ABSTRACT

The present research work was conducted during winter 2013–14 and 2014–15 at Agricultural Research Station, Chitral-Pakistan. Objectives of the present research was to determine the mean performance and correlations of parents, direct and reciprocal crosses in bread wheat varieties for different yield components under 6X6 diallel combinations. Days to heading of parents exhibited highly significant differences for plant height, grains per spike, grain weight per spike, 100-grain weight and grain yield while significant for days to heading and days to maturity and non significant for biological yield. Both direct and reciprocal crosses showed highly significant differences for all the studied traits. Correlations of grain yield with 100-grain weight of parents was significant and positive while grains per spike and grain yield with plant height of direct crosses was significant and positive and grain yield with biological yield of reciprocal crosses was highly significant and positive. Maximum days to heading of parent (Dirk), direct cross (NR-218 X Dirk), reciprocal cross (Pirsabaq-2013 X Dirk) and difference were 171 days, 170 days and 172 days, and 6 days, respectively. Parent (Dirk), direct (NR-218 X Dirk) cross, reciprocal cross (Dirk X pirsabaq-2013) and difference were 190 days, 184 days, 189 days and 7 days, respectively. Maximum 138.97 cm, 115.00 cm and 129.17 cm plant height was recorded by parent (Dirk), direct cross (NR-218 X Dirk) and reciprocal cross (Pirsabaq-2013 X Dirk) while the maximum difference was 25.1 cm. Parent (N-46), direct cross (NR-218 X N-46), reciprocal cross (N-46 X Dirk) and difference for grains per spike was 61 grains, 66 grains, 71 grains and 22 grains and was maximum. Recorded maximum grain weight per spike of parent (Fakhr e Sarhad), direct cross (Dirk X Pirsabaq-2013), reciprocal cross (Fakhr e Sarhad X Pirsabaq-2013) and difference were 3.33 g, 4 g, 5 g and 3 g, respectively. Parent (Dirk), direct cross (Dirk X N-46), reciprocal cross (Fakhr e Sarhad X Pirsabaq-2013) and difference for 100-grain weight was 9 g, 6 g, 7 g and 2 g and was maximum. Maximum biological yield for parents (NR-218), direct cross (NR-218 X Dirk), reciprocal cross (Fakhr e Sarhad X Dirk) and difference were 1.1001 kg/Plot, 0.6853 kg/Plot, 1.15 kg/Plot and 0.8147 kg/Plot, respectively. The recorded maximum grain yields for parent (Suliman-96), direct cross (Dirk X N-46), reciprocal cross (Dirk X NR-218) were 1.0175 kg/Plot, 0.575 kg/Plot, 1.405 kg/Plot and 0.895 kg/Plot, respectively.

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## Introduction

Bread wheat (*Triticumaestivum* L.) belongs to family gramineae, the most consumable, important and popular family of the plant kingdom. Wheat is the most important food grain of Pakistan and is the rich source of energy and protein for the world population [1]. Based on consumption, wheat comes first in Pakistan followed by rice and maize, respectively. Area and production of wheat in 2011–12, 2012–13, 2013–14 was 8649.8, 8660.2, 9199.3 thousand hectares and 23473.4, 24211.4, 25979.4 thousand tones [2], respectively showing that both area and production from 2011 to 2014 increased gradually.

As more than 70 percent of population in Pakistan depends on dairy and crop farming, for which grain and forage yield become emerging problems especially in cold winter when the availability of forage become scarce and the life of livestock can hear the signals of danger. In order to solve these problems plant breeder must struggle for both grain as well as forage yield in wheat breeding program. Both grain and plant height are important objectives for any wheat breeding program because grain provides energy, protein and dietary fiber in human nutrition while height can increase the straw yield which becomes the important forage for livestock. Increase in plant height can increase the forage production in wheat crop. Selection of varieties for breeding program with maximum plant height can improve grain and forage production in wheat. Therefore, breeding for plant height as well as grain yield are the foremost challenges for wheat breeder.

Plant height, number of grains per spike, grain weight per spike, 100-grain weight, biological yield and grain yield contribute equally to average grain yield of wheat crop. When, both direct and reciprocal crosses showed better performance over parents for a particular trait shall be selected and forwarded to the next generation of selection. In order to improve

a specific wheat trait, plant breeder shall focus on varieties showing better crossing combinations for a desired trait in parents involved in crossing program.

Using morphological attributes like plant height, awned, awnless and partially awned as markers in the F<sub>1</sub>wheat populations, selection process can easily be handled by wheat breeders because traits with different morphological attributes can be distinguished easily from other traits both in direct as well as in reciprocal combinations. Genetic variation can be estimated using morphological and molecular markers in wheat varieties [3]. Correlation analysis can direct the attention of wheat breeder in the desired direction for a specific trait either in positive or in negative. Positive and significant correlations suggest that increase in one trait will ultimately increase the magnitude of other trait. Highly significant differences among wheat genotypes while grain yield were positively and significantly correlated with grains per spike and 100-grain weight were reported [4]. Phenotypic correlations of plant height with grains per spike and 100-grain weight were significant and positive [5]. Keeping in view the problems of grain and forage yield, crosses among six varieties including varieties with maximum plant height were under taken under diallel combinations for various yield and yield components, the present study was conducted with the aim to determine mean performance, Lsd and Pearson's correlations for different yield components in parents, direct and reciprocal crosses.

## Objectives and methods

The study was conducted during winter 2013–14 and 2014–15 in the experimental plots of Agricultural Research Station, Chitral (Pakistan). Six wheat varieties viz., NR-218,

**Table 1 – Means squares of parents, direct and reciprocal crosses for days to heading (DTH), days to maturity (DTM), plant height (PH), grains per spike (GPS), grains weight per spike (GWPS), 100-grains weight (100-GW), biological yield (BY) and grain yield (GY) in different bread wheat varieties under diallel combinations.**

SOV	D.F	Days to heading	Days to maturity	Plant height (cm)	Grains per spike	Grain weight per spike (g)	100-Grain weight (g)	Biological yield (kg/Plot)	Grain yield (kg/p lot)
Replications (Parents)	2	58.3889	6.1667	86.72	0.500	1.409	8.71	0.08834	0.03895
Parents	5	35.1222*	75.333*	1246.52**	145.967**	1.1667*	8.400**	0.08638NS	0.07152**
Error	10	8.9222	21.300	19.57	24.967	0.26667	9.696	0.0785	0.00102
Total	17								
Replications (Direct Crosses)	2	6.6889	0.8667	5.585	1.422	3.040	1.651	0.00103	0.07042
Direct Crosses	14	30.4252**	12.7714**	259.975**	306.994**	1.37143**	2.08571**	0.09569**	0.07675**
Error	28	0.4984	1.2238	3.098	3.708	8.217	4.144	0.00250	0.01292
Total	44								
Replications (Reciprocal Crosses)	2	20.2667	2.4667	93.087	19.289	6.640	2.072	0.00021	8.009
Reciprocal Crosses	14	19.5143**	27.1048**	463.534**	102.641**	2.65714**	1.57143**	0.41313**	0.38809**
Error	28	3.1238	2.2286	29.001	29.527	2.125	5.717	0.00013	5.453
Total	44								

\*, \*\* = Significant at 5% and 1% Level of Significance.  
NS = Non Significant.

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