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EVALUATION OF LOCAL LANDRACES OF WHEAT FROM DISTRICT BANNU FOR YIELD AND YIELD ATTRIBUTES, KHYBER PAKHTUNKHAWA, PAKISTAN

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ABSTRACT

Wheat is staple food to around the world. In Pakistan people daily consume wheat in the form of bread and various other cookies. In this study 06 different landraces were collected from different areas of District Bannu and evaluated for their yield and yield attributes. The data collected were subjected to Pearson's correlation and analysis of variance and LSD test. Statistical correlation revealed that the negative impact of plant height on leaves angle. Leaf angle also showed positive effect on panicle length. ANOVA and LSD test revealed that DL heavy and highest yielding landrace in the trial. Therefore, the landrace is recommended for exploitation in District Bannu. The heavier are suggested to be mapped for the candidate genes involved and could be used in any breeding program.

Keywords: Yield, Bannu, landraces, wheat, leaf

1. INTRODUCTION

Today, wheat is one of the most vital grain crops in the world and comes in a variety of forms. The two most widely used types of wheat are durum wheat (T. turgidum Durum), which is used to make pasta and semolina, and common wheat (Triticum aestivum, popularly known as bread wheat), which accounts for almost 95% of all wheat consumed worldwide.

1.1. Origins of Wheat

According to genetic and archaeological research, wheat fully emerged with the advent of the modern world in the hilly Karacadag region of southeast Turkey. There are two varieties of domesticated wheat: Anicorn or monococcum, which dates back approximately 10,000 years, and Weimar wheat (which includes both T. araraticum and T. evidence dicoccoides SSP). Ancient wheat varieties Spelt, T. spelta, and T. timopheevii urbanized in the late Neolithic era; none of these species are very common in the market now. The research started, and the framework that holds the trunk wheat shafts together and stores them until needed, shatters to allow the wheat seeds to disperse on their own. The largest seeds of the domesticated forms are those of the wild forms of wheat, and the backbone is breaking. These are the main distinctions between wild and domesticated wheat. However, humans are not physically equipped for that operation; instead, they choose to wait until the wheat plants are ready to harvest it. Undoubtedly, if the farmer has chosen to harvest the wheat when he observes that it is geared up and that the backbone is still present: they only receive the wheat, so that is what, on farms the wheat plant and in the wheat selection procedure with a backbone that has not become loose at the time of harvest.

1.2. Wheat in Pakistan

As the primary food crop and society's mainstay, wheat takes centre stage in Pakistan while the nation's agricultural policy are being formed. The targeted amount of wheat to be produced in the region in 2010–11 is 9.045 million hectares, or 25 million tonnes. Wheat was planted on 8.8 million hectares, down from 9.132 million hectares the year before, indicating a 3.6 percent decline. As a result, the region saw a decline in 2011. MINFA (2012) reports that bountiful wheat crop of 24.2 million tones has been anticipated, representing a 3.9 percent increase over the previous year's crop of 23.3 million tonnes. Pakistan's national average remains very low when compared to other wheat-producing nations. Considering that the impacted half of the salt is found within the command channel, increasing the wheat's resistance to salt can significantly raise yield per hectare and elevate Pakistan's standing in relation to other nations in terms of wheat production.

1.3. Goals of the study

1- Gather local landraces in District Bannu an d examine yield and yield attributes between cultivars.
2- To choose variable cultivars for future bree ding programmes and to develop the best suitable cultivars for District Bannu.

2. METHODS AND TECHNIQUES

2.1. Research Area

The current study was conducted in the University of Science and Technology, Bannu's Department of Botany in 2018–2019. In 2018, many visits were made to the various districts in Bannu. Based on their visual observations, six different landraces—SK (Sikandar Khel), GW (Ghori Wala), DL (Della Zak), MW (Manji Wala), AM (Amin), and WD (Wadan) as control—were gathered from various locations and cultivated in three distinct blocks within the University of Science and Technology Bannu's greenhouse. For every landrace under control, there are six duplicates in each of the four blocks. The**1st block** was well watered while the **2nd block** was not watered. Similarly, in the **3rd block** area was properly used and also watered. Once germination occur the excess of weeds were removed, and pesticides were sprayed in whole field. Phenotypic data of six selected plants was taken regularly and its various important quantitative agromorphological traits were studied such as days to flower initiation (DFI), days to 50% flower (50% DF), days to flower completion (DFC), leaf length (LL), leaf width (LW), pod shatter resistance-I-IV, plant height (PH), main raceme length (MRL), pods per main raceme (P/MR), stem thickness (ST), pod length (PL), pod width (PW), seeds per pod (S/P), seed yield per plant (SY/P) and 1000 seeds weight.

2.2. Analysis

After doing an analysis of variance on the control and drought data, Statistic v.8.1 was used. Additionally, Pearson correlation between the attributes of the two matrices was applied to the data.

3. Results

Phenotypic evaluation of control plots

The following tables provide a description of the findings obtained from the data on several morphological criteria. The landraces' yield performance has been observed in this field research through the utilization of the regional genotype. Highly significant but negative correlation was found between plant height and general leaf angle. Positive and significant correlation was found between plant height and number of tillers per plant, followed by between panicle length and flag leaf angle. Most of the traits also showed correlation but were non-significant (Table 1).

Table 1: ***Pearson correlation between different traits of control***

	PH	NT	FLL	FLW	GLL	GLW
NT	0.8111*					
FLL	0.7644	0.7927				
FLW	-0.0706	-0.0677	-0.4715			
GLL	0.6848	0.5436	0.6980	-0.6916		
GLW	0.0963	0.4163	0.5779	-0.3108	0.2663	

PL	-0.4666	-0.0347	-0.2649	0.5366	-0.6717	0.4523
BIL	0.2262	0.4088	0.1898	-0.1199	0.4970	0.5262
FLA	-0.6321	-0.4726	-0.3973	0.4709	-0.7930*	0.2834
GLA	-0.9498**	-0.6345	-0.5836	0.0811	-0.7016	0.1674
PW	0.5852	0.7535	0.2385	0.2959	0.3320	0.0591
PPW	0.3948	0.6268	0.2875	0.6430	-0.2024	0.3738

Table 2: ***Yield and yield attributes of control of different plant traits of Triticum plants***

	PL	**BIL**	**FLA**	**GLA**	**PW**
BIL	0.1602				
FLA	0.8069*	-0.2092			
GLA	0.6664	-0.1667	0.7569		
PW	0.0637	0.6256	-0.4674	-0.5377	
PPW	0.6075	0.2524	0.2824	-0.1767	0.6003

Table 4.3 Yield and yield attributes as exhibited by various landraces

	PH	**NT**	**FLL**	**FLW**	**GLL**	**GLW**
SK	77.00E	7.000C	26.800B	1.8333A	28.333B	1.2000A
GW	85.50CD	10.667BC	33.333A	1.5333AB	31.500AB	1.3667A
DL	127.67A	23.333A	36.500A	1.5333AB	37.33AB	1.3000A
MW	118.90B	12.667BC	33.367A	1.4667B	39.567A	1.2667A
AM	84.00D	9.000BC	32.267AB	1.1333C	37.167AB	1.2667A
WD	92.33C	16.000AB	32.333AB	1.4333BC	37.333AB	1.3667A
Mean	97.567	13.111	32.433	1.4889	35.206	1.2944
SD	20.694	5.8866	3.1620	0.2248	4.3100	0.0647
CV	21.210	44.898	9.7492	15.096	12.242	4.9977
Min	77.00	7.000	26.800	1.1333	28.333	1.2000
MAX	127.67	23.333	36.500	1.8333	39.567	1.3667

The tallest plants (127.67 cm) were produced by DL, followed by MW and WD. Lowest plant height of (77 cm) was shown by SK. Grand mean for the trait was 97.567 with SD of 20.694 with coefficient of variation of 21.21%. The number of tillers per plant ranged from 7-23.33 with 5.88 SD and (44.898%) of coefficient of variations. Highest value was noted for DL while lowest was manifested by SK. Grand mean for number of tillers per plant was 13.111. Longest flag leaf (36.5 cm) was recorded for DL, followed by MW and WD. Shortest flag leaf (26.8 cm) was recorded for SK. The trait was recorded with very low SD with 9.74% of CV with grand mean of 32.433 cm. Broad flag leaves (1.833 cm) were noted for SK while narrowest flag leaves (1.1333 cm) exhibited by AM. Grand mean for the trait was 1.4889 cm with 15.096% of CV. The general leaves length ranged from 28.333-39.567 cm. The grand mean for the GLL was 35.206 cm with SD of 4.31. CV% for GLL was (12.242%). For general leaf width grand mean of 1.294 cm with 0.0647 SD was calculated. Leaf width ranged from 1.2-1.3667 cm with 4.9977% of coefficient of variations. The broad leaves were exhibited by GW and WD while narrow leaves were found in the SK (Table 4.3).

Table 3 *Yield and yield attributes as exhibited by various landraces*

	PL	BIL	FLA	GLA	PW	PPW
SK	11.933A	6.0767B	46.667AB	46.000AB	38.440AB	9.621C
GW	12.333A	6.1400B	56.667A	48.667A	35.463B	11.328B
DL	11.333A	6.3100B	31.667B	28.333BC	41.293A	13.889A
MW	10.500A	6.5500AB	33.333AB	26.8333C	38.580AB	7.786D
AM	10.667A	6.0733B	33.333AB	43.333ABC	35.740B	2.118E
WD	12.100A	7.2233A	40.000AB	43.333ABC	40.863A	10.741BC
Mean	11.478	6.3956	40.278	39.417	38.397	9.2472
SD	0.7696	0.4443	9.7989	9.3890	2.4565	4.0301
CV	6.7052	6.9477	24.328	23.820	6.3978	43.582
Min	10.500	6.0733	31.667	26.833	35.463	2.1180
MAX	12.333	7.2233	56.667	48.667	41.293	13.889

Long panicle of (12.333 cm) was recoded for GW while shortest of (10.5 cm) was noted for MW. Grand mean of (11.478 cm) with (0.7696) SD was recorded. %CV of 6.7052% was exhibited by panicle length. Stem thickness range from 6.0733 cm to 7.2233 cm. sturdy stem was recorded for WD while flexible was exhibited by AM. Grand mean of 6.3956 cm with 0.4443 and 6.9477% of SD and CV% respectively. Erect flag leaf was recorded for DL while droopy leaves were recorded for GW. Grand mean was 39.417 with 9.7989 SD and 24.328 % of CV. Similarly, droopy leaves were recorded for GD while shortest angle was exhibited by MW. Thousand grain weight ranged from 35.463-41.293 g. highest 1000-grain weight was recorded for DL, followed by DW while lowest was noted for GW. Grand mean of 38.397 g was recorded with 2.4565 of SD and 6.3978 of %CV. Grain yield per plant ranged from 2.118-13.889 g. Highest plant yield was recorded for DL, followed by GW while AM exhibited the lowest grain yield per plant. Grand mean of 9.2472 g with 4.0301 SD and 43.582% of coefficient of variations.

1- DISCUSSIONS

The world population is rising day by day. To meet such challenges we have to produce more food. Pakistan is also at surge of population increase, thus breeder must to enhance the yield ceiling of food crops. Wheat is a powerful, multifunctional plant that is highly valued everywhere in the world. Hardly a patron on the face of the planet has not grown and attempted to enhance this grain crop. The best method for overcoming these difficulties is to choose the right germplasm and to develop it. According to Genc et al. (2010), salinity is another significant barrier to agricultural development on dry ground worldwide. Another scenario is climate change. Therefore, the selection and cultivation of local landraces is an essential strategy to fit the local environment and challenges faced for improved crop yields. The exceptional multipurpose properties of wheat can be exploited for economic, environmental and health purposes. This research is an effort to collect and evaluate for encouraging cultivars in District Bannu. For this purpose we collected 06 wheat landraces grown in the area for several years. Sabghania et al. (2014) also evaluated the morphological characterization of bread wheat grown in Iran.

In the present study DL, followed by MW showed highest plant height of 127 cm and 118 cm respectively. Akhtar et al. (2001) evaluated ten wheat varieties i.e. Inqalab-91, Sulaiman-96, Bakhtawar-92, Punjab-96, Pirsabak-91, Daman-98, Sarsabz, Sughat, MH-97 and Dera-98, in which the Dera-98 had the maximum height of 104 cm. DL showed a maximum 1000-grain weight of 41 g while the study of Akhtar et al. (2001) the Daman-98 showed 51 g of 1000-grain weight. Renold et al. (2002) suggested that thousand grain weight best explain the genotype environment interaction in wheat.

2- CONCLUSION AND RECOMMENDATION

a. Conclusion

DL showed the highest grain yield per plant, followed by GW. Similarly, DL also showed highest 1000-grain weight followed by WD. As the plant height increase it negatively affects the flag leaf angle. Similarly increase in general leaf length is negative effect on flag leaf angle.

b. Recommendation

DL is recommended as cultivar in different irrigated areas of District Bannu Further it is suggested that DL should be tested for drought stress as most of area in District Bannu is rained area. The DL should be tested for 1000-grain weight and the putative genes responsible should be utilized for breeding program.

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