Advances in Life Science and Technology
ISSN 2224-7181 (Paper) ISSN 2225-062X (Online)
Vol.42, 2016

Screening of Wheat Germplasm for Various Phenological and Grain Yield Traits

Naeem Ahmad, Ahmad Zada Muhammad Junaid* Akhtar Ali
Agricultural Research Institute, Mingora, Swat. Khyber Pakhtunkhwa-Pakistan

Abstract
Wheat germplasm were evaluated at experimental Farm of ARI, Mingora Swat, for various characteristics. The experiment was arranged in Randomized Complete Block design with three replications. A plot size of 4x5 m^2 was maintained. Wheat Genotype, WG6 took maximum (138) days to heading followed by Genotype WG13 with maximum of 136 days while Genotypes, WG1, WG3, WG5, and WG12 took minimum of 133 days to heading. Genotypes WG1 and WG12 took maximum (184) days to maturity while Genotype WG2 and WG8 matured earlier (175 days). Maximum plant height (103 cm) at maturity was recorded in wheat Genotype WG11 which was significantly more than that of all other used Genotypes. The minimum of 88 cm plant height was recorded in Genotypes WG14 and WG19. Significantly higher yield of 4642 kg per hectares was recorded in Genotype WG15 followed by Genotype WG20 with grain yield of 4442 kg per hectares. It is concluded that variety well adapted to the agro-ecological conditions of Swat can be selected from these Genotypes for cultivation.
Keywords: Screening, Wheat germplasm, Phonological traits, Grain yield

Introduction

Wheat being an important staple food of Pakistan is grown on more than 80% area as compared to other cereals (Khan *et al.,* 2007). However, wheat production decreased to 25,478 thousand tones in 2014-15 as compared to 25,979 thousand tones in 2013-14 showing a decrease of 1.9 percent (Pakistan Economic Survey, 2014-15). In Pakistan per capita wheat consumption ranges from 120-125 kg/annum. The population is increasing at the rate of 2.1% annually and thus requires at least 4% increase in production in accordance with the population growth rate (Khan *et al.,* 2007). Therefore, it has become essential to evaluate new wheat germplasm with better adaptability and superior quality in term of yield and resistance to biotic and abiotic stresses.

Selection of best varieties is of vital importance in intensive farming in order to get maximum grain yield. There are high possibilities to increase wheat yield in Pakistan through developing new high yielding varieties. Cultivars are chosen on a number of characteristics including climate, grain quality, plant type, head type etc. but no variety can exhibits all the desirable attributes that can withstand the various risk factors. The improvement of 35-50% in wheat yield has been achieved by the introduction of newly high yielding cultivars in the country. The crop yield is low and consequently the northern areas suffer a shortage of about 20 to 30% deficit in total requirements of wheat in the area (Mirza *et al.,* 2003).

Agro ecological features of Northern Areas are totally different from rest of the country. In addition, the climatic conditions in term of temperature, rainfall and soil conditions within the region are extremely diversified. The farming communities in the region are cultivating either low yielding traditional varieties or those, which have been developed for other parts of the country. The overall objective of the study was to enhance the crop production through improved varieties of wheat keeping in view the importance of grain yield. The present study was conducted to determine the desirable wheat variety in the double cropping pattern of northern areas of the specific ecological zone of Malakand division

Materials and Methods

The current experiment was conducted at the experimental farm of ARI Mingora, Swat to evaluate twenty wheat genotypes. The experiment was laid out in randomized complete block design with three replications. A plot size of 4x5m^2 with row to row distance of 25 cm was maintained. Seed was sown at the rate of 120 kg ha^{-1}. Basal dose of 120: 90: 60 kg ha^{-1} of NPK was applied to the trial. All other agronomic practices were conducted uniformly. The data were recorded on days to heading, physiological maturity, plant height (cm) and grain yield (kg ha^{-1}).

Statistical Analysis

The recorded data was analyzed statistically using the computer software Statisitix v. 8.1. Least significant difference (LSD) test at 5% level of significance was used for mean comparison in case of significant difference according to Steel and Torrie, (1980).

Results and Discussion

Days to Heading

Data regarding days to heading are presented in Table-1. Statistical analysis of the data showed significant difference at 5% level of significance. Genotype WG6 took maximum (138) days to heading while genotypes WG1, WG3, WG12 and WG5 took minimum days (133) to heading. The difference in days to heading due to various genotypes/varieties might be due to genetic constitution of different wheat genotypes interacting with environmental effects. These results are in agreement with the results of Afzal and Nazir (1986) and Khokhar *et al.* (1985) who reported that days to heading varied greatly among various wheat varieties.

Days to Maturity

Data regarding days to maturity are presented in Table-1. Statistical analysis of the data showed significant difference at 5% level of significance. Genotypes WG1 and WG12 took maximum (184) days to maturity, while genotype WG2 and WG8 matured earlier (175 days). The difference in days to maturity in various genotypes might be due to genetic variability of these wheat genotypes and other environmental effects. These results are in line with the results of Falaki *et al.* (2009) who reported that days to maturity varied greatly among various wheat varieties

Plant Height

Data regarding plant height are presented in Table-1. Statistical analysis regarding plant height revealed significant difference at 5% level of significance. Maximum plant height (103 cm) at maturity was recorded in wheat genotype WG11 which was significantly more than that of all other used genotypes. The minimum plant height (88cm) was recorded in genotypes WG14 and WG19. The difference in plant height among various genotypes might be due to genetic variability among different wheat genotypes interacting with environmental conditions. These results are quite in accord with the result of Afzal and Nazir (1986), Falaki *et al.* (2009) and Khokhar et al. (1985) who reported that plant height varied greatly among various wheat varieties.

Grain Yield (kg ha^{-1})

Data concerning grain yield kg ha^{-1} are reported in Table-1. Statistical analysis of the data revealed that there was significant variation at 5% level of significance in grain yield kg ha^{-1}. Maximum grain yield (4642 kg/ha) was produced by wheat genotype WG15 while minimum grain yield (3267 kg/ha) was produced by genotype WG19. These results are in conformity with those of Maqsood *et al.* (2000) and Hussain *et al.* (2001).

Conclusions and Recommendations

It was concluded regarding grain yield that wheat genotype WG15 performed better than other wheat genotypes in the agro-climatic conditions of district Swat, Khyber Pakhtunkhwa. Maximum yield per unit area was produced by the aforementioned genotype. It also produced maximum straw yield which is the need of livestock. Therefore it is recommended that the selected genotype must be tested for further evaluation and screening in different ecological zones of Swat.

Table 1: Data on phenological parameters and grain yield of wheat germplasm

Wheat Genotypes	Days to heading	Days to maturity	Plant height (cm)	Grain yield (kg ha^{-1})
WG1	133 d	184 a	99abc	4392abcd
WG2	135bc	175 e	94bcde	3883bcdefg
WG3	133 d	183ab	92cde	3992abcdefg
WG4	135bc	179bcde	95bcde	4433abcd
WG5	133 d	177 de	99abc	4208abcde
WG6	138 a	183ab	95bcde	4000abcdef
WG7	135bc	176 de	95bcde	3875bcdefg
WG8	134 cd	175 e	98abcd	3808cdefg
WG9	135bc	179bcde	94bcde	4217abcde
WG10	135bc	180abcd	98abcd	3642efg
WG11	134 cd	183ab	103 a	3792cdefg
WG12	133 b	184 a	97abcd	3708defg
WG13	136 b	180abcd	101ab	4583ab
WG14	134 cd	182abc	88 e	4100abcdef
WG15	134 cd	179bcde	93cde	4642 a
WG16	134 cd	177 de	92cde	4183abcde
WG17	135bc	182abc	96abcd	4125abcdef
WG18	134 cd	178cde	91 de	3425fg
WG19	134 cd	182abc	88 e	3267 g
WG20	134 cd	177 de	94bcde	4442abc
LSD	**3.32**	**8.53**	**7.749**	**725.2**
CV %	**0.81**	**1.65**	**4.93**	**10.87**

Literature Cited

Afzal, M. and M.S. Nazir. 1986. Response of two semi-dwarf wheat varieties to sowing dates. Pak. J Agric. Res. 24(1): 10-14.

Falaki, A.M., S. Miko, I.B. Muhammad, I.U. Abubakar and J.A. Valencia. 2009. Evaluation of some improved breed wheat varieties at Chiyako, Jigawa State, Nigeria. ARPN. J. Agric. Bio. Sci. 4: 1-9.

Husain, S., A. Sajjad, M.I. Hussain and M. Saleem. 2001. Growth and yield response of three wheat varieties to different seeding densities. Int. J. Agric. Bio. 228-229.

Khan, M.I., M. Tila, F. Subhan, M. Amin and S.T. Shah. 2007. Agronomic evaluation of different bread wheat (*Triticum aestivum L.*) genotypes for terminal heat stress. Pak. J. Bot. 39: 2415-2425.

Khokhar, M.S., M.S. Sheikh, M.S. Siddique and M.S. Mazir. 1985. Effect of different seeding densities and nitrogen levels on yield of two wheat genotypes. Pak. J. Agric. 6: 150-152.

Maqsood, M., M.U. Hssan, M.T. Khalid and M. Ahmad. 2000. Comparative growth and yield performance of various wheat cultoivars. Int. J. Agric. Bio. 374-375.

Mirza, H., J.I. Wasiullah, M. Illyas. 2003. Evaluation of wheat varieties under the agro climatic conditions of Barani Agriculture research station Kohat. Pak. J. Agron. 2(1): 8-12.

Pakistan Economic Survey. 2014-15. Economic Advisor's Wing. Finance Division. Govt. of Pakistan.

Steel, R.G.D. and J.H. Torrie. 1980. Principles and procedure of statistics 2ndedMc, Graw Hill, New York.