# THE EVALUATION OF DIFFERENT REGIMES WHEAT CULTIVARS UNDER AGRO CLIMATE OF DERA ISMAIL KHAN

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ABSTRACT

Climate role in agriculture filed is being vital and every cultivar of wheat has its own production climate. An experiment was carried out in which different cultivars were selected to test under agro climatic conditions of Dera Ismail Khan and also to compare the yield potential of different regimes of wheat cultivars. The study was laid out in Randomized Complete Block Design with three replications. There were 9 varieties under study which were Ujala-16, Millet-11, Dharabi-11, Galexy-13, Barani 70, Maxi Pak, Sonilika, Bahawalpur-79 and Blue silver. The data was collected regarding parameters plant tallness (cm), tillers plant-1, spikelet spike-1, spike length (cm), grains weight spike 1 (gm), number of grains spike 1, 1000-Grains weight (gm), Grain yield (kg ha-1) and analyzed statistically. These cultivars have a descending order of decreasing yield and yield attributes as Galexy-13 > Ujala-16 > Millet-11> Blue Silver> Dharabi-11 > Bahawalpur > Maxi Pak > Barani-70> Sonilika. Thus, Galexy-13 and Ujala-16 is indorsed in the vicinity of District Dera Ismail Khan to obtain the maximum production of wheat crop.

## INTRODUCTION

Wheat crop is highly utilized as food commodity in the world globally after the rice crop (Bakhsh, Hussain & Khan, 2003). It is a most important and consumable crop in country like Pakistan because it accumulates in the GDP by 1.9% and annual production of wheat crop stayed at 25.75 million tones which have positive change of 0.5% to the last year production (Anonymous, 2017). Wheat grains are the staple food of Pakistani people and hence there is the need of increase the production of wheat crop to meet the need of highly increasing population of Pakistan. Agro-ecological areas of Pakistan have a very high variation due to difference topography of the various regions and therefore knowledge strengths should be emphasized on climate adaptation of wheat. The study was laid out in Randomized Complete Block Design with three replications. The climate adoptability of wheat crop is mostly depended on the cultivar selection (Doulat, Maqsood, Sikander & Muhammad, 2008).

Various environmental factors which are mostly characterized the wheat productivity such as temperature variation, fertility level of soil, precipitation of the area (Asif, Mustafa, Asim, Kisana, Mujahid, Ahmad & Ahmed, 2003). Yield of wheat crop is developed up to 50% with the provision of latest high yielding cultivars (Whiteman, 1985). The existing varieties of wheat can also perform better if the crop is managed well. The climate role in agriculture filed is being vital and every cultivar of wheat has its own production climate (Qamar, Ullah & Makeen, 2004). This thing also highlights need to compare performance of existing old and new cultivars of the wheat because comparison can also make clear importance of newly evolved varieties to produce more yields. The study was laid out in Randomized Complete Block Design with three replications. Thus, study was performed to characterize varietal performance of old and newly evolved varieties of wheat in the region of Dera Ismail Khan.

## MATERIAL AND METHODS

An experiment was performed at the Research Area of Agronomy Department, Faculty of Agriculture, Dera Ismail Khan in the cropping season of 2016-2017. The climate of Dera Ismail Khan was harsh throughout cropping season of wheat. Heat stress was found in the month of March and April (Table-1) which can affect the developmental stages of wheat crop. There were nine (9) varieties under study which were Ujala-16, Millet-11, Dharabi-11, Galexy-13, Barani 70, Maxi Pak, Sonilika, Bahawalpur-79 and Blue silver. The soil of experimental area is clay loam and has the following properties as: Soil porosity (51.59 %), Bulk density (1.23), Soil pH (8.5), Organic matter (0.21) and Electric conductivity (1107.34). The layout of research was designed with Randomized Complete Block Design (RCBD) having 3 replications. In trial 9 wheat varieties were cultivated while their seed was obtained from Plant Genetic Research Institute (NARC), Islamabad and named as: Galexy-13, Ujala-16, Millet-11, Blue Silver, Dharabi-11, Bahawalpur, Maxi Pak, Barani-70 and Sonilika.

Table 1 Average monthly Agro Metrological Data during October, 2016 to April, 2017.

| Months | Temperature ($^0$C) | | Relative humidity % | Rainfall (mm) |
|---|---|---|---|---|
| | Maximum | Minimum | | |
| October 2016 | 33.0 | 21 | 78 | ---- |
| November 2016 | 29.8 | 15 | 80 | --- |
| December 2016 | 22.3 | 05 | 87 | --- |
| January 2017 | 16.7 | 07 | 91 | 03 |
| February 2017 | 23.2 | 11 | 79 | 04 |
| March 2017 | 32.2 | 12 | 75 | 10 |
| April 2017 | 40.2 | 18 | 50 | --- |

Source: Arid Zone Research Institute, Ratta Kolachi, Dera Ismail Khan

The size of plot was 3 x 3 m and all agronomic practices were done at uniform level. These wheat varieties were sown in the early November of 2016 and crop was harvested at end of April, 2017. The study was laid out in Randomized Complete Block Design with three replications. The agronomic parameters were recorded such as Plant height (cm), tillers plant$^{-1}$ number, Number of Spikelet spike$^{-1}$, Spike length (cm), Grain weight spike$^{-1}$ (gm), Grain weight spike$^{-1}$ (gm), Grain weights per plant (g), Number of Grains spike$^{-1}$, 1000-Grain weight (gm), Grain yield (kg ha$^{-1}$) and analyzed statistically with help of analysis of variance technique and means comparison completed via Tukey's HSD Test (Black, 2011). The number of seed which were sown in each 1m$^2$ with seed rate of 100 kg ha$^{-1}$is given in Table-2 regarding to different varieties having difference in their 1000-grain weight.

Table 2. Number of Seed Sown with respect to Different Varieties

| Varieties | Seed Sown in 1 m$^2$ | Varieties | Seed Sown in 1 m$^2$ |
|---|---|---|---|
| Barani-70 | 257 | Sonalika | 286 |
| Maxi Pak | 242 | Ujala-16 | 198 |
| Blue Silver | 221 | Millet-11 | 211 |
| Bahawalpur-79 | 200 | Dhrabi-11 | 231 |
| Galexy-13 | 190 | | |

## RESULTS AND DISCUSSIONS

### Plant Height (cm)

Results which represent the significant difference in plant height are referred in Table-3. Although in wheat crop the plant height factor is associated with the wheat cultivars but

in some cases it effects from different cultural practices like soil preparations, irrigation practices, fertilizer doses etc. The maximum plant height (114.22 cm) was attained by Bahawalpur-79 followed by Dhrabi-11 which has plant height of 90.11 cm. Minimum plant height (69.83 cm) was obtained by the Sonalika. The mentioned figures/results are in agreement with the conclusions of Qamar et al. (2004), Akbar, Ali, Shafi, Ahmad, Bakht & Saeed, 2000) and Ali, Shah, Hussain, Shah & Munir, 2007) in which he explained that said factor i.e. plant height was influenced expressively by wheat varieties genotype.

**Number of Tillers Plant$^{-1}$**

The tillers plant$^{-1}$ number is the basic yield contributing character of wheat crop. This data was influenced significantly by varieties as shown in Table-3. The plants of Galexy-13 were produced determined tillers number (10.33) trailed by Ujala-16 which have number of tillers as 9.67. The least number of tillers (5.00) was showed by Sonilika. Contradicted effects was found by Ahmed, Shah, Hassan, Raziuddin & Muhammad, 2004) as per their description there was non-significantly influencing of different wheat varieties on wheat crop.

**Number of Spikelet Spike$^{-1}$**

The Spikelet spike$^{-1}$ is very noteworthy data and its results are shared in Table-3, which shows that different varieties influenced significantly on figures of number of Spikelet spike$^{-1}$**.** Galexy-13 obtained greatest number of the spikelet spike$^{-1}$ as 27.75 which were followed by Ujala-16 with number of Spikelet spike$^{-1}$(26.20)**.** Poor development of number of Spikelet spike$^{-1}$was shown by Sonolika as it produced lowest number of spikelet spike$^{-1}$ as 13.37. As per above shared figures the results are in-line with the finding of Gul, Saeed, Khan, Latif, Ali, Rehman & Rehman (2012) in which they have of the view that vatiral difference is influenced positively over the spikelet spike$^{-1}$ data.

**Spike Length (cm)**

The results pertaining to spike length data are expressed in the Table-3 which shows that varieties have significant influence the size of spike i.e. spike length. Longest spikes (26.42 cm) were produced by Galexy-13 and followed by Ujala-16 which has spike length of 24.78 cm. Poor spike growth was attained by Sonolika as plants of this variety have shortest spikes having spike length of 11.69 cm. these finding are in consistence with Ubaid, Udin, Mohammad, Ullah & Ali (2007) in which they justified that spike length significantly varied with the influence of Genotype. However, some contradictive results were given by Shen, Xu, Zhang & Wang (1997) in which they described that the spike length was not expressively influenced by varieties.

Table 3 Varietal influence on Plant Height

| Varieties | Plant Height (cm) | No. of Tillers Plant$^{-1}$ | No. of Spikelet Spike$^{-1}$ | Spike length (cm) |
|---|---|---|---|---|
| Barani-70 | 72.05 f | 6g | 15.21 i | 13.20 g |
| Maxi Pak | 72.97 f | 6.33g | 17.00 g | 14.02 g |
| Blue Silver | 114.22 a | 8.33d | 23.63 d | 19.91 d |
| Bahawalpur-79 | 74.25 g | 7e | 19.61 f | 15.57 f |
| Galexy-13 | 88.25 c | 10.33a | 27.75 a | 26.42 a |
| Sonalika | 69.63 g | 5.00h | 13.37 d | 11.69 h |
| Ujala-16 | 78.22 e | 9.67b | 26.20 b | 24.78 b |
| Millet-11 | 85.32 d | 9.00c | 24.96 c | 21.46 c |
| Dhrabi-11 | 90.11 b | 7f | 22.33 e | 17.35 e |
| LSDs | 1.18 | 0.52 | 1.21 | 1.51 |

**Grains Weight Spike$^{-1}$ (gm)**
The Table-4 is showing the results of grains weight, which expresses that significant difference among the different wheat varieties is visible in terms of grains weight spike$^{-1}$. The determined grains weight spike$^{-1}$ (5.25 gm) was attained by Galexy-13 and Ujala-16 followed it having grains weight spike$^{-1}$ of 5.06 gm. Minimum grains weight spike$^{-1}$ was noticed by Sonolika. This study is in accord to finding of Shen et al. (1997) in which he proved that grains weight per spike were affected considerably by variety.

**Number of Grains Spike$^{-1}$**
The significant figures were recorded in number of grains spike$^{-1}$ influenced by varieties as described in Table-4. Greatest number of grains (96.60) was achieved by Galexy-13 which was followed by Ujala-16 with number of grains spike$^{-1}$of 88.32. Slightest grains spike$^{-1}$ number (48.10) was observed by Sonilika. Similar type of outcomes was explained by Sharma et al. (2016) while as per their description the dissimilar cultivars may have different number of grains on spike and yield due to different adoptability to different climate. Qamar. (2004) and Ubaid. (2007) stated that varieties have significant influence on the number of grains per spike. Still, opposite findings are made by Ahmad et al. (2004) which explained that varieties have non-significant influence over said parameter.

**1000-Grain Weight (gm)**
It is very important character which role is vital as being obtaining high yield and results pertaining 1000-grain weight are presented in Table-4. A substantial effect of 1000-grain data was noticed in dissimilar varieties (52.7 gm) was showed by Galexy-13 and which was followed by Ujala-16 and Bahawalpur-79 showing 1000-grain weight of 50.36 & 50.02 gm separately. Lowest weight (39.90 gm) was reported by Sonilika which shows that this variety have poor grain development. The consoling effects were found in Sharma et al. (2016) experiment in which they explained that one cultivar should higher 1000-grain weight which donated to higher grain yield among different cultivars due to the specific adoptability of cultivars in specific environment.

**Grain Yield (kg ha$^{-1}$)**
Grain yield was remained significant by varieties and represented in Table-4. Maximum grain yield (5227.35 kg ha$^{-1}$) was collected by Galexy-13 which was in order by economic/ grain yield of 4853.76 kg ha$^{-1}$ of Ujala-16. Sonilika accumulated the lowest grain yield of 2541.32 kg ha$^{-1}$. Some researchers reported that various cultivars have the various yield adoptability in various environment, in this link their outcomes are in agreement with our findings.

Table 4 Varietal Influence on Grain WeightSpike$^{-1}$

| Varieties | Grain Weight Spike$^{-1}$ (gm) | Number of Grains spike$^{-1}$ (gm) | 1000-Grain Weight (gm) | Grain Yield (Kgha$^{-1}$) |
|---|---|---|---|---|
| Barani-70 | 3.12 h | 52.73 h | 38.92 g | 3144.39 h |
| Maxi Pak | 3.39 g | 56.13 g | 41.25 f | 3496.26 g |
| Blue Silver | 4.59 d | 73.73 d | 45.25 d | 4328.28 d |
| Bahawalpur-79 | 3.90 f | 59.56 f | 50.02 b | 4121.25 f |
| Galexy-13 | 5.25 a | 96.60 a | 52.74 a | 5227.35 a |
| Sonalika | 2.73 i | 48.10 i | 34.90 h | 2541.32 i |
| Ujala-16 | 5.06 b | 88.32 b | 50.36 b | 4853.76 b |
| Millet-11 | 4.78 c | 82.29 c | 47.36 c | 4589.43 c |
| Dhrabi-11 | 4.34 e | 64.43 e | 43.21 e | 4328.87 e |
| LSDs | 0.13 | 2.45 | 1.19 | 123.45 |

## CONCLUSION

The climate role in agriculture filed is being vital and every cultivar of wheat has its own production climate. An experiment was carried out in which different cultivars were selected to test under agro climatic conditions of Dera Ismail Khan and also to compare the yield potential of different regimes of wheat cultivars. There were 9 varieties under study which were Ujala-16, Millet-11, Dharabi-11, Galexy-13, Barani 70, Maxi Pak, Sonilika, Bahawalpur-79 and Blue silver. It is concluded that wheat varieties Galexy-13 and Ujala-16 are most adoptable and extraordinary yielding varieties of wheat crop in agro climatic environments of Dera Ismail Khan in heat stress conditions at grain formation stage, therefore the above shared wheat varieties are recommending for broad farming in this area.

## REFERENCES

Ahmed, F., Shah, S., Hassan, S., Raziuddin, G., & Muhammad, F. (2004). Evaluation of different wheat genotypes under agro-climatic conditions of Mansehra. *Sarhad Journal of Agriculture*. 4:529-532.

Akbar, H., Ali, A., Shafi, M., Ahmad, B., Bakht, J., & Saeed, H. (2000). Comparative study of agronomic traits of old and new wheat varieties. *Sarhad Journal of Agriculture*. 1:1-5.

Ali, S., Shah, M. A., Hussain, A., Shah, Z., & Munir, I. (2007). Genotypic variation for yield and morphological traits in wheat. *Sarhad Journal of Agriculture*. 33: 943-946.

Anonymous, K. (2017). Agriculture statistics of Pakistan by the Government of Pakistan. Economic Survey of Pakistan, Islamabad, Pakistan. pp. 23.

Asif, M., Mustafa, Z., Asim, M., Kisana, N. S., Mujahid, M. Y., Ahmad, I., & Ahmed, Z. (2003). Stability of wheat genotypes for grain yield under diverse rainfed ecologies of Pakistan. *Asian Journal of Plant Sciences*. 2: 400-402.

Bakhsh, A., Hussain, A., & Khan, A. S. (2003). Genetic studies of plant height, yield and its components in bread wheat. *Sarhad Journal of Agriculture*., 4: 529- 534.

Black, K. (2001). Business statistics for contemporary decision making 7th Edt. John Wiley and sons.

Doulat B., Maqsood, Q., Sikander, K., & Muhammad, K. (2008). Performance of different wheat varieties/linesplanted over various locations in District Diamer Northern areas of Pakistan. *Sarhad Journal of Agriculture*. 4: 625-628.

Gul, H., Saeed, B., Khan, A. Z., Latif, U., Ali, K., Rehman, J., & Rehman, S. (2012). Yield and yield contributing traits of wheat cultivars in relation with planting dates and nitrogen fertilization. *ARPN Journal of Agriculture and Biological Sciences*. 7:386- 395.

Qamar, M., Ullah, S., & Makeen, S. (2004). Genotypic variability among wheat cultivars and effect of planting date on grain straw yield under cropping zone of Northern Areas of Pakistan. *Sarhad Journal of Agriculture*. 20:99-102.

Sharma, R. L., Shalu, A., Rakesh, B., Tushar, M., & Prakash, O. (2016). Yield and yield attributes of wheat as influenced by different seed rates and genotypes in gariyaband district of Chhattisgarh plains. *International Journal of Agricultural Sciences*. 8: 2117-2119.

Shen. Q. Y., Xu, Z. B., Zhang, N. W., & Wang, C. L. (1997). Genetic correlation and principal component analysis of main agronomic traits of spring wheat genotypes in Ningxia. *Journal of Agriculture and Forestry Sciences and Technology*. 4:7-10.

Ubaid, D., Udin, R., Mohammad, T., Ullah, H., & Ali, S. (2007). Characterization of wheat genotypes for yield and yield associated traits against terminal wheat. *Sarhad Journal of Agriculture*. 23:947- 954.

Whiteman, P.T.S. 1985. Mountain Oases. A Tech. Rep. Agric. Studies. Deptt. Agric. Integrated Rural Dev., FAO/UNDP. Gilgit.