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# INFLUENCE OF HOT DRY WINDS ON PRODUCTIVITY ELEMENTS OF WHEAT CROP OBSERVED IN SOUTHERN REGIONS OF THE REPUBLIC OF UZBEKISTAN

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**Abstract**

***Sukhov observed in early May and in June in the southern regions of Uzbekistan the flow of hot and dry winds, known as 'garmsel", influencing the growth and development of wheat, that reduces the productive elements. A study was undertaken to determine the effect of the dry winds to the reduction of the thousand kernel weight and followed by the loss of the general grain yield. Therefore, the selection and introduction of wheat varieties tolerant to the climate conditions of the region is an important goal. Selection parameters were grain yield and high 1000-kernel weight, and selected progenies were evaluated in early and late planted time in Kashkadarya province in the year of 2012-2014 years.***

***Keywords – bread wheat, hot dry wind, garmsel, breeding, selection, variety, line, yield.***

## I. INTRODUCTION

Kashkadarya province is located in the south-western part of the Republic of Uzbekistan, and its northern and western parts blocked by mountains. Therefore, to the territory of the Karshi steppe (Bahoristan, Mubarak, Mirishkor, Kasbi, Kasan, Karshi and Nishan) located in the region from the north blows cold wind, and from the west with the Karakum blows great hot air mass. This causes to the sharply continental climate. Summer is hot, long and dry, winter is short and cold, spring is relatively wet. Weather changes by the direction of downwind from the steppe to the mountains. The sum of positive temperatures consists of +4900-5000$^0$C, amount of useful heat is +2519-2980 $^0$C, amount of days without cold is 231-233 days.

In order to study the degree of tolerance of the winter bread wheat varieties and lines to influence of the hot dry winds in 2012-2014 years were conducted research works in the field conditions, in the farmer farm "Kongirot Alpomish" located in Mirishkor district which is considers as a the steppe region of Kashkadarya province.

## II. MATERIALS AND METHODS

Location of the experiment, calculation and analyzes carried out by the method of IPI, mathematical calculations carried out on the methodological manuals of Dospekhov B.A. In order to more faithfully studying of the tolerance to the hot dry winds, planting time postponed and varieties and lines were planted later than optimum time of sowing. At varieties and lines planted in the late sawing dates facilitates evaluation for tolerance to hot dry winds in the heading, flowering and grain filling phases.

**Climate and soil conditions**. Soil of the experimental plots is sierozem (grey desert soil), ground water located at the depth of 2-3 meters. The soil at the experimental site relates to none saline and low saline soils.

 

Global climate change in the last years, and especially increasing of the temperature leads to a lack of water, in consequence of that aggravates negative impact of the hot dry winds.

High temperature and hot air mass (hot dry winds) adversely affects to the formation of the grain filling, in the consequence forms incomplete (schyuplym) grain and reduced the 1000 kernel weight. During grain filling period there observes days, when at the same time increases the air temperature and the wind speed. During 3 yearly experiments, in the grain filling period, air temperature and hot dry wind from time to time sharply increased. And this is reflected in the lines and varieties planted in a steppe condition. As a result, it has impacted on such traits as the 1000 kernel weights, productivity and economic-valuable traits. During the research work phenological and laboratory results were reviewed and analyzed together air temperature.

## III. RESULTS AND DISCUSSION

The most important thing in the breeding is the indicators of the particular genotype or yield performance of the homo- and heterozygotes, as well as other indicators, i.e. their genetic potential. These two factors are dependent on the selection of the best genotype of the hybrids while hybridization [2,3,4]. For the correct application of the theory of genetics in the breeding work needs a comprehensive examination of the complex early forms.

In determining of the varieties and lines on tolerance to the influence of the hot dry winds for the yield trait is considered one of the most important indicators. When compared of the experimental yields conducted in different years there is a significant difference between varieties and lines(Table 1).

**Table 1. Indicators of the productivity**

| № | Varieties and lines | Productivity, t/ha | | | | Difference between standard variety, T/ha |
|---|---|---|---|---|---|---|
| | | 2012 | 2013 | 2014 | Average | |
| 1 | Krasnodar–99 (standard) | 4,3 | 4,5 | 4,8 | 4,5 | 0,0 |
| 2 | Khazrati-bashir | 6,2 | 6,1 | 5,8 | 6,0 | 1,4 |
| 3 | Gozgon | 6,2 | 6,1 | 6,2 | 6,2 | 1,6 |
| 4 | Marvdasht/Soissons//Alvand | 6,7 | 6,4 | 6,5 | 6,5 | 2,0 |
| 5 | Elomon | 5,4 | 6,3 | 5,3 | 5,7 | 1,1 |
| 6 | MIT/TX93V5722//W95-301 | 5,7 | 6,2 | 5,9 | 5,9 | 1,3 |
| 7 | PYN/BAU/3/AGRI/BJY//VEE | 6,3 | 6,5 | 6,1 | 6,3 | 1,7 |
| 8 | F134.71/NAC//ZOMBOR | 6,4 | 6,0 | 6,3 | 6,3 | 1,7 |
| 9 | GA951079-3-5/NC96BGTD3 | 5,7 | 6,1 | 5,7 | 5,8 | 1,3 |
| 10 | ATTILA/2*PASTOR//BULK SELN 00F5-43-11 | 6,6 | 6,4 | 6,6 | 6,5 | 1,9 |
| | **Mean value** | **5,1** | **5,0** | **5,1** | | |
| | **CV $_{05}$** | **2,06** | **1,53** | **1,9** | | |
| | **V** | **2,5** | **1,9** | **2,4** | | |

According to results of 3-yearly experiments average yield in 2012 was 51.2 c/ha, in 2013-5,0 t /ha, in 2014-5,1 tc/ha, the maximum yield in 2012 was 6,8 t/ha, in 2013-6,5 t/ha, in 2014-6,7 t/ha, and the minimum yield in 2012 amounted to 3,4 t/ha, in 2013-3,0 t/ha, in 2014-3,4 t/ha. Results of the analysis of the yield performances by years show that cultivars and lines tolerant to environmental factors by yield performances were stable.

From the results of the experiment can be noted that in standard variety Krasnodar-99 index of the average yield was 4,5 t/ha. During 3 yearly experiment yield performance of the varieties and lines such as Marvdasht /Soissons //Alvand by 20 c/ha, ATTILA/2*PASTOR //BULK SELN00F5-43-11 by 1,9 t/ha, F134.71/NAC//ZOMBOR and PYN/BAU/3/AGRI/BJY//VEE by 1,7 t/ha, and variety Gazgon by 1,6 t/ha were higher than the average yield of standard variety Krasnodar-99 .

 

By the experiment outcome it can be noted that the yield index of the variety Marvdasht/Soissons//Alvand in 2012 was 6,7 t/ha, in 2013 was 6,4 t/ha and in 2014 was 6,5 t/ha, in line ATTILA/2*PASTOR//BULKSELN00F5-43-11 in 2012 amounted 6,6 t/ha, in 2013 was 6,4 t/ha, in 2014 was 6,6 t/ha, in variety F134.71/NAC//Zombor in 2012 amounted 6,4 t/ha, in 2013 was 6,0 t/ha, in 2014 was 6,3t/ha, I variety PYN/BAU/3/AGRI/BJY//VEE in 2012 was 6,3 t/ha, in 2013 was 6,5t/ha, in 2014 was 6,1t/ha and in variety Gozgon in 2012 was 6,2t/ha, in 2013 was 6,1t/ha, in 2014 was 6,2 t/ha that in the results of counting exceed the value of the yield of standard variety.

In the study of the correlation between yield and other indicators of the varieties and lines of bread wheat in the experiments conducted during 2012 year determined a significant positive correlation between yield and grain gluten content which was r=0.69, between the grain glassiness r=0.63, between the number of grains per spike r=0.61, between the test value weight r=0.76, between the grain protein content r=0.48, between the spike length r=0.62, between the 1000 kernel weight r=0.72, between the spike weight r=0.53.

In the experiments conducted in 2013 also determined a positive correlation between yield and grain gluten content which was r=0.20, between the grain glassines r=0.55, between the number of grains per spike r=0.51, between the test value weight r=35, between the grain protein content r=51, between the spike length r=0.44, between the 1000 kernel weight r=0.34, between the spike weight r=0.59.

In an experiment conducted in 2014, a positive indicator of correlation between yield and grain gluten was r = 0,58, between the vitreous grain r = 0,57, between the number of grains per ear r = 0,54, between full-scale weight r = 0,63 , between the protein contained in grain r = 0,42, between the long ears r = 0,58, between the weight of 1000 seeds r = 0,73, between the weight of the ear r = 0,59.

In the experiment conducted in 2014 year index of the positive correlation between productivity and grain gluten content was r=0.58, between grain glassiness r=0.57, between grain number per spike was r=0.54, between grain test value r=0.63, between grain protein content r=0.42, between spike length r=0.58, between 1000 kernel weight r=0.73, between spike weight r=0,59.

**Carrying out dispersion analysis of experimental data,** determine CV 05 and

The total number of observations: N = l * n = 36 * 324 = 9

ΣP = ΣV = ΣX = 16547.9 = ΣX / N = 16547,9 / 324 = 51.07

Correction factor: C = (ΣX1) 2: N = (347.9) 2 324 = 373.6435

Total CY = ΣX12-C = (7,72 + 3,82 + 32 + ... + 15.62) -373.64 = 23411.5

Repeat CP = ΣP2: l-C = (34,72 + 31,42 + ... + 452) = 15510.19 36-373,64: 36-373,64 = 57.19519

Options CV = ΣV2: n-C = (37.92 + 8.42 + ... + 140.92): 9 - = 373.64 (149 046: 9) = 16187.12 -373.64

Residual sum squares CZ = CY-CP-CV = 23411,5 - 57,19519 - 16187,12 = 7167,2 (Table 2).

**Table 2. Results of dispersion analysis**

| Dispersion | Sum of squares | DOF | Average squares | $F_Φ$ | $F_{05}$ |
|---|---|---|---|---|---|
| Total | 23412 | 323 | - | - | - |
| Repeat | 57,195 | 8 | 7,15 | 0,28 | - |
| Variances | 16187 | 35 | 462,49 | 18,07 | 1,63 |
| Error | 7167,2 | 280 | 25,60 | | |

Experimental error (e.s.e. = effective standard error).

$S_x=\sqrt{s^2/n}=\sqrt{25,6/9}$=.69 c/ha

s.e.d. = standard error of difference

$S_d=\sqrt{2s^2/n}=\sqrt{(2*25,6)/3}$=2.39 c/ha

 

The least significant difference for the 5% significance level detection in absolute and relative terms (l.s.d. = Least significant differences of means).

$CV_{05}=t_{05}*S_d=1.96*2,39=4,6844$ c/ha

$CV_{0.5}=(t_{05}*S_d/\overline{x})*100=(4,6844/51,1)*100=9,17$ %

The coefficient of variation

$V=(s/\overline{x})*100 = (5.059/51.1)*100=9,9$ %

**1000 kernel weight**. According to the analyzes of the conducted research work observed difference between the traits of the 1000 kernel weight among varieties and lines, as well as and by years (Table 3).

**Table 3. 1000 kernel weight of varieties and lines**

| № | Varieties and lines | Kernel weight, g | | | | Difference between standard variety, g |
|---|---|---|---|---|---|---|
| | | 2012 year | 2013 year | 2014 year | Average | |
| 1 | Krasnodar–99 (standard) | 36,0 | 35,1 | 36,4 | 35,8 | 0,0 |
| 2 | Khazrati Bashir | 37,4 | 38,8 | 37,9 | 38,0 | 2,2 |
| 3 | Gozgon | 40,6 | 41,1 | 39,8 | 40,5 | 4,7 |
| 4 | Marvdasht/Soissons//Alvand | 41,9 | 40,4 | 41,7 | 41,3 | 5,5 |
| 5 | Elomon | 41,6 | 37,7 | 36,7 | 38,7 | 2,9 |
| 6 | MIT/TX93V5722//W95-301 | 41,5 | 41,0 | 39,4 | 40,6 | 4,8 |
| 7 | PYN/BAU/3/AGRI/BJY//VEE | 39,3 | 40,4 | 37,3 | 39,0 | 3,2 |
| 8 | F134.71/NAC//ZOMBOR | 42,2 | 41,1 | 40,8 | 41,4 | 5,6 |
| 9 | GA951079-3-5/NC96BGTD3 | 40,2 | 41,0 | 39,7 | 40,3 | 4,5 |
| 10 | ATTILA/2*PASTOR//BULK SELN 00F5-43-11 | 42,1 | 42,3 | 41,7 | 42,0 | 6,2 |
| | **Mean value** | **36,2** | **36,4** | **35,9** | | |
| | **$CV_{05}$** | **1,0072** | **0,9082** | **1,5372** | | |
| | **V** | **1,7** | **1,5** | **2,6** | | |

By the result we can see that in standard variety average 1000 kernel weight was 35.8 grams, in line ATTILA/2*PASTOR // BULKSELN00F5-43-11 this index was higher by 6.2 grams, in variety F134.71/NAC//ZOMBOR by 5.6 g, in Marvdasht/Soissons//Alvand by 5.5 grams, variety Farovon by 4.8 grams, Gozgon by 4.7 g, PYN/BAU//BONITO by 4.4 grams . Average index of 1000 kernel weight in 2012 year was 36.2 g, maximum index was 42.8 grams, minimum index was 28.6 grams, in 2013 year average index was 36.4 g, maximum index was 42.8 g, and the minimum index was 30.6 grams, in 2014 year this index was 35.9 g, 42.5 g, 28.8 g relatively. The reason for low 1000 kernel weight that during grain filling period there observes high temperature and impact of existing from time to time dry hot winds which affects to the development of the grain, physiological and biochemical processes.

In studying of the correlation indicator of 1000 kernel weight with the other indicators in 2012 year determined high correlative relationship between the yield by r= 0,72, between grain gluten content by r= 0,65, between grain test value by r=0,69. By the result of the experiment of the 2013 year determined high correlative relationship between the 1000 kernel weight and grain glassiness by r=0.63, between the grain protein content by r=0.63. In 2014 year determined high correlative relationship between the 1000 kernel weight and productivity by r=0,73, between grain gluten content r=0,54, between the spike weight by r=0,45.

According to the results of the analysis identified among 36 tested varieties and lines with the index of the minimum difference between the number of grains per spike was 3.0 g/l, and the maximum difference between the index of grain test value was 59.8 g/l.

 

Also reveled that index of the grain test value in the following varieties and lines F134.71/NAC//ZOMBOR, Gozgon, Marvdasht/Soissons//Alvand, GA951079-3-5/NC96BGTD3, MIT/TX93V5722//W95-301, TX98D3447/TX99D4657, ATTILA/2*PASTOR//BULK SELN 00F5-43-11 exceeded this indicator than the other tested varieties and lines.

## IV. CONCLUSIONS

In conclusion, by the 3 yearly research works selected varieties and lines with high productivity compared with the control variety. Varieties and lines with the high 1000 kernel weight and productivity in the hot air mass (hot dry winds) had been presented for the subsequent breeding works.

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