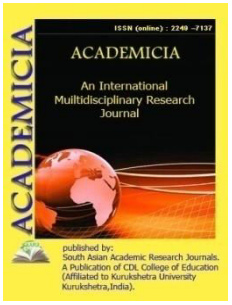
ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)




**DOI: 10.5958/2249-7137.2021.01952.2**

# HIGH-YIELDING VARIETIES AND LINES FOR BREEDING DURUM WHEAT

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## ABSTRACT

*Based on the correlations between the yield and the weight of 1000 durum wheat grains and between the yield and plant height, a positive relationship was established. According to the results of a comprehensive assessment of varieties of advanced yield trial of durum wheat in terms of yield and resistance to yellow rust, the varieties Billurdon, KSI-2014/22, KP-2016/45, KP-2016/49, KP-2016/55, PSI-2017/30 s were selected high rates for these characteristics.*

**KEYWORDS:** *Variety, Lines, Durum Wheat, Rainfed Areas, Plant Height, Yellow Rust, 1000 Grain Weight, Yield.*

## INTRODUCTION

The increase in grain production, which is the guarantor of the country's food security, largely depends on the yield of cultivated varieties that make up its biological basis [5].

It was found that with an increase in yield during selection, adaptive properties (winter resistance, drought resistance, resistance to brown and yellow rust, powdery mildew) and grain and pasta quality indicators improved or remained at the same level [4].

Conducting research on the assessment of breeding material for yield is one of the conditions for increasing the efficiency of the breeding process when creating varieties that combine high economic productivity with increased resistance to biotic factors. He considers the conditions of the year to be the main factor in the harvest [10].

The most stable elements of the yield structure are: 1000 grain weight, plant survival, length and number of spikelets in an ear [7].

The mass of 1000 grains in arid conditions, where low productive tillering prevails, is one of the most important elements of the crop structure [1].

Productive tillering was reported to be closely related to yield (r = 0.77), with little association noted between productive tillering and plant height (r = 0.44); between the length and graininess of an ear (r = 0.63); between the grain size of an ear and the mass of 1000 grains (r = 0.41) [9].

The height of wheat plants, a morphological trait of economic importance, belongs to the category of quantitative ones, the genetic structure of which is rather complex [3]., [2].

Plant height positively correlates with plant productivity r = 0,63 [8].

As noted [6]., A decrease in the yield of winter wheat during drought was associated with a decrease in plant height (by an average of 27%), the number of ears (by an average of 27%), the number of spikelets in an ear (by an average of 26%) and individual grain mass (on average by 22%).

The purpose of our research was to study and select varieties of durum wheat with high yields and resistance to yellow rust in a competitive variety testing in rainfed conditions.

## MATERIALS AND METHODS

The material of our research was the varieties of the competitive variety test of durum wheat of the laboratory of durum wheat breeding and seed production on the rainfed, Scientific research Institute of rainfed Agriculture.

These studies were carried out according to the following methods:

-Methodology for selection and seed production of grain crops, A.O.Omonov et al., Gallaaral 2004.

-Study of the world wheat collection. Methodical instructions. O.D.Gradchaninova, A.A.Filatenko, M.I.Rudenko, Leningrad, 1984.

-Methodology of the State Commission for Variety Testing of Agricultural Crops (1989).

-Mathematical processing of the results obtained was carried out according to B.A.Dospekhov (1985).

## RESEARCH RESULTS

In the dry conditions of Uzbekistan, wheat is affected by yellow rust. Therefore, the creation of varieties resistant to this disease is an important task of wheat breeding.

Our studies have shown that for practical breeding, durum wheat varieties are represented, in which resistance to yellow rust dominates, Table 1.

**TABLE 1.YELLOW RUST AND 1000 KERNEL WEIGHT OF VARIETIES AND LINES OF ADVANCED YIELD TRIAL OF DURUM WHEAT IN RAINFED AREAS (GALLAARAL 2018-2020 YY.)**

| № | Name of varieties and lines | Yellow rust, (%) | | | 1000 kernel weight, (g) | | | | Difference to standard, (±) (g) |
|---|---|---|---|---|---|---|---|---|---|
| | | 2018 y. | 2019 y. | 2020 y. | 2018 y. | 2019 y. | 2020 y. | average | |
| 1 | Leukurum-3(st) | 10 | 20 | 20 | 42,0 | 40,0 | 39,2 | **40,4** | ± |
| 2 | Javohir | 10 | 20 | 15 | 42,0 | 41,0 | 41,2 | **41,0** | 0,6 |
| 3 | Marvarid | 15 | 40 | 40 | 40,0 | 39,0 | 40,8 | **39,9** | -0,5 |
| 4 | Yoqut-2014 | 10 | 10 | 10 | 39,4 | 40,0 | 40,0 | **39,8** | -0,6 |
| 5 | Billurdon | 5 | 10 | 5 | 40,0 | 41,0 | 40,8 | **40,6** | 0,2 |
| 6 | 454612 | 5 | 20 | 5 | 40,8 | 40,0 | 40,0 | **40,2** | -0,2 |
| 7 | KSI-2014/22 | 0 | 5 | 5 | 42,4 | 42,0 | 42,8 | **42,4** | 2,0 |
| 8 | PSI-2013/20 | 0 | 10 | 5 | 42,0 | 40,8 | 40,8 | **41,2** | 0,8 |
| 9 | KP-2013/52 | 5 | 5 | 10 | 36,4 | 36,0 | 35,6 | **36,0** | -4,4 |
| 10 | KSI-2014/20 | 10 | 10 | 20 | 40,4 | 40,0 | 40,8 | **40,4** | ± |
| 11 | PSI-2016/8 | 5 | 5 | 10 | 40,0 | 40,0 | 40,0 | **40,0** | -0,4 |
| 12 | KP-2016/45 | 5 | 5 | 5 | 42,6 | 41,0 | 41,6 | **41,7** | 1,3 |
| 13 | KP-2016/49 | 5 | 5 | 5 | 42,0 | 43,0 | 43,2 | **42,7** | 2,3 |
| 14 | KP-2016/55 | 5 | 20 | 5 | 43,2 | 40,8 | 45,6 | **43,2** | 2,8 |
| 15 | PSI-2017/30 | 5 | 5 | 5 | 38,8 | 40,0 | 38,4 | **39,0** | -1,4 |
| 16 | KP-2017/17 | 0 | 20 | 20 | 40,2 | 40,0 | 40,0 | **40,1** | -0,3 |
| 17 | KP-2017/19 | 5 | 30 | 30 | 40,4 | 39,0 | 43,6 | **41,0** | 0,6 |
| 18 | PSI-2018/26 | - | 10 | 10 | - | 44,0 | 44,8 | **44,4** | 4,0 |
| 19 | PSI-2018/30 | - | 20 | 10 | - | 40,0 | 42,0 | **41,0** | 0,6 |
| 20 | KP-2018/69 | - | 10 | 5 | - | 40,0 | 40,8 | **40,4** | ± |
| 21 | PSI-2019/20 | - | - | 5 | - | - | 43,2 | **43,2** | 2,8 |
| 22 | PSI-2019/30 | - | - | 10 | - | - | 42,0 | **42,0** | 1,6 |
| 23 | KP-2019/7 | - | - | 20 | - | - | 42,0 | **42,0** | 1,6 |
| 24 | KP-2019/51 | - | - | 20 | - | - | 42,0 | **42,0** | 1,6 |
| 25 | KP-2019/52 | - | - | 20 | - | - | 42,0 | **42,0** | 1,6 |
| 26 | KP-2019/57 | - | - | 5 | - | - | 42,4 | **42,4** | 2,0 |
| 27 | KP-2019/75 | - | - | 10 | - | - | 43,2 | **43,2** | 2,8 |
| | **r =** | | | | | | | **0,44** | |

The data in the table show that high yellow rust infestation occurs in years with a large amount of precipitation, so in 2019 - 2020. (483.4 mm - 391.0 mm) the percentage of yellow rust damage in durum wheat ranged from 5 to 40 for varieties, and in dry 2018 (241.0 mm) - from 0 to 15.

The 1000 kernel weight was for durum wheat varieties in 2018 from 38.8 g (PSI-2017/30) to 43.2 g (KP-2016/55), for the standard 42.0 g (Leukurum-3 ), in 2019 - from 36.0 (KP-2013/52) to 43.0 (KP-2016/49), for the standard 40.0 g (Leukurum-3), in 2020. - from 35.6 g. (KP-2013/52) to 45.6 g. (KP-2016/55), for the standard 40.4 g (Leukurum-3).

In the durum wheat varieties studied by us, the plant height on average for varieties ranged from 100.3 cm (PSI-2016/8) to 127.2 cm (KP-2016/45), depending on the conditions of the year, (Table 2).

**TABLE 2 PLANT HEIGHT, PRODUCTIVITY OF VARIETIES AND LINES OF ADVANCED YIELD TRIAL OF DURUM WHEAT IN RAIN FED AREAS (GALLAARAL 2018-2020 YY.)**

| № | Name of varieties and lines | Plant height, (cm) | | | | Yield, (c/ha) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2018 г. | 019 г. | 2020 г. | verage | 2018 г. | 019 г. | 2020 г. | avera ge | ce to standar d, (±) |
| 1 | Leukurum-3(st) | 83,4 | 121,0 | 112,8 | 105,7 | 6,0 | 17,3 | 20,4 | **14,6** | ± |
| 2 | Javohir | 86,6 | 126,8 | 115,2 | 109,5 | 6,5 | 17,6 | 20,9 | **15,0** | 0,4 |
| 3 | Marvarid | 86,4 | 129,2 | 119,2 | 111,6 | 6,0 | 16,8 | 18,5 | **13,8** | -0,8 |
| 4 | Yoqut-2014 | 79,0 | 127,6 | 116,2 | 107,6 | 7,3 | 18,7 | 22,1 | **16,0** | 1,4 |
| 5 | Billurdon | 76,4 | 127,6 | 119,0 | 107,7 | 7,5 | 18,8 | 22,5 | **16,3** | 1,7 |
| 6 | 454612 | 84,2 | 129,8 | 118,6 | 110,8 | 6,6 | 18,1 | 20,6 | **15,1** | 0,5 |
| 7 | KSI-2014/22 | 89,6 | 128,2 | 122,0 | 113,2 | 8,4 | 18,2 | 23,4 | **16,7** | 2,1 |
| 8 | PSI-2013/20 | 89,2 | 125,8 | 116,2 | 110,4 | 6,5 | 19,2 | 19,8 | **15,2** | 0,6 |
| 9 | KP-2013/52 | 92,2 | 139,2 | 121,0 | 117,5 | 7,0 | 18,1 | 19,9 | **15,0** | 0,4 |
| 10 | KSI-2014/20 | 78,4 | 126,2 | 120,2 | 108,3 | 7,3 | 17,8 | 19,6 | **14,9** | 0,3 |
| 11 | PSI-2016/8 | 73,4 | 115,2 | 112,4 | 100,3 | 6,5 | 17,7 | 22,2 | **15,5** | 0,9 |
| 12 | KP-2016/45 | 95,2 | 158,4 | 128,0 | 127,2 | 7,6 | 19,5 | 23,6 | **16,9** | 2,3 |
| 13 | KP-2016/49 | 90,0 | 127,4 | 110,2 | 109,2 | 7,8 | 17,6 | 23,5 | **16,3** | 1,7 |
| 14 | KP-2016/55 | 75,6 | 127,2 | 116,6 | 106,5 | 6,6 | 18,7 | 23,6 | **16,3** | 1,7 |
| 15 | PSI-2017/30 | 77,6 | 122,6 | 112,8 | 104,3 | 6,5 | 18,3 | 24,1 | **16,3** | 1,7 |
| 16 | KP-2017/17 | 86,0 | 134,2 | 119,4 | 113,2 | 6,9 | 19,0 | 19,8 | **15,2** | 0,6 |
| 17 | KP-2017/19 | 83,0 | 142,2 | 130,0 | 118,4 | 7,0 | 16,5 | 23,1 | **15,5** | 0,9 |
| 18 | PSI-2018/26 | - | 129,2 | 119,6 | 124,4 | - | 17,5 | 23,4 | **20,5** | 5,9 |
| 19 | PSI-2018/30 | - | 134,2 | 112,8 | 123,5 | - | 19,6 | 22,0 | **20,8** | 6,2 |
| 20 | KP-2018/69 | - | 128,8 | 111,4 | 120,1 | - | 18,1 | 22,2 | **20,2** | 5,6 |
| 21 | PSI-2019/20 | - | - | 117,0 | 117,0 | - | - | 23,4 | **23,4** | 8,8 |
| 22 | PSI-2019/30 | - | - | 119,2 | 119,2 | - | - | 23,7 | **23,7** | 9,1 |
| 23 | KP-2019/7 | - | - | 119,2 | 119,2 | - | - | 22,9 | **22,9** | 8,3 |
| 24 | KP-2019/51 | - | - | 126,2 | 126,2 | - | - | 23,4 | **23,4** | 8,8 |
| 25 | KP-2019/52 | - | - | 118,6 | 118,6 | - | - | 19,1 | **19,1** | 4,5 |
| 26 | KP-2019/57 | - | - | 120,2 | 120,2 | - | - | 24,8 | **24,8** | 10,2 |
| 27 | KP-2019/75 | - | - | 120,4 | 120,4 | - | - | 23,5 | **23,5** | 8,9 |
| | **$НСР_{05}$ = ц/га** | | | | **r=0,16** | **0,53** | **0,84** | **0,89** | | |

According to the tabular data, it can be seen that the height of durum wheat plants also depended on the amount of precipitation. In dry 2018, the height of durum wheat plants ranged from 73.4 cm (PSI-2016/8) to 95.2 cm (KP-2016/45), for the standard 83.4 cm (Lekurum-3); in favorable 2019 - from 115.2 cm (PSI-2016/8) to 158.4 cm (KP-2016/45), for the standard 121.0 cm (Leukurum-3) and in 2020 - from 110 , 2 cm (KP-2016/49) to 130.0 cm (NP-2017/19), at the standard 112.8 cm (Leukurum-3).

The high yield of durum wheat varieties in 2019 was from 16.5 c / ha (KP-2017/19) to 19.5 c / ha (KP-2016/45), the standard of 17.3 c / ha (Leukurum- 3), in 2020 - from 18.5 c / ha (Marvarid) to 24.1 c / ha (PSI-2017/30), for the standard 20.4 c / ha (Leukurum-3). A low yield of durum wheat was observed in the dry 2018 and it ranged from 6.0 c / ha (Marvarid) to 8.4 c / ha (KSI-2014/22), for the standard 6.0 c / ha (Leukurum-3 ).

**CONCLUSIONS.** Based on the studies, the influence of meteorological conditions on the susceptibility to yellow rust, plant height, 1000 grain weight and durum wheat yield was noted.

When studying the correlations between the yield and the weight of 1000 durum wheat grains, a positive relationship was established (r = 0.44) and between the yield and plant height (r = 0.16).

Selected varieties of advanced yield trial of durum wheat with high yields and resistance to yellow rust Billurdon (16.3 c / ha, degree of susceptibility 5-10), KSI-2014/22 (16.7 c / ha, degree of susceptibility 0-5) , KP-2016/45 (16.9 c / ha, degree of infestation 5), KP-2016/49 (16.3 c / ha, degree of infestation 5), KP-2016/55 (16.3 c / ha, the degree of susceptibility is 5-20), PSI-2017/30 (16.3 c / ha, degree of susceptibility is 5).

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