THE IMPORTANCE OF THE VARIETY OF SPRING HARD WHEAT IN THE FORMATION OF YIELD AND QUALITY OF GRAIN IN THE SOUTHERN CHERNOZEM OF THE ORENBURG REGION

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Abstract. Wheat is a plastic crop and therefore occupies a huge area, spreading in the north to the cold pole (Verkhoyansk), and in the south to the border of cultivation of cultivated plants. In some regions of Azerbaijan, it is sown in fields below sea level, and in Peru, it rises in the mountains up to 4000 m. Cultivation of wheat on a huge territory is possible due to the high adaptive properties of the culture, its resistance to frost and drought. Almost half of the bread composition is represented by carbohydrates, in which starch takes the main place (up to 80%). Under the influence of enzymes, it is broken down to simple sugars that the body needs. The total digestibility of bread carbohydrates reaches 90-92%. The protein substances of bread are of the utmost importance, thanks to which a third of a person's daily needs are often covered in our diet. Bread is the main source of supply for the body with vitamins B1, B2, PP. It is rich in phosphorus, potassium, magnesium, sulfur.

Keywords: spring wheat, productivity, grain crops, optimal harvest time, grain quality.

1. Experiment scheme, observation and research technique

Our scientific work was carried out at the Department of Agrotechnology, Botany and Plant Breeding of the Orenburg State Agrarian University in 2019 on a training and experimental field. We have laid down a one-factor experience [1, 5-9]. Various varieties of spring durum wheat were sown. Experience scheme:

1. Marina (control);
2. Triad;
3. Bezenchukskaya jubilee;
4. Bezenchuk fortress.

The experiment was carried out in three replications, the accounting plot area was 60 sq. m. The soil of the experimental site is southern chernozem, medium-thick, calcareous, heavy loamy with a humus content of 4.4%, mobile phosphorus - 4.5%, nitrate nitrogen - 1.35, exchangeable potassium - 35 mg per 100 g of soil. The reaction of the soil solution is slightly alkaline (pH = 7.8).

The seeding weight rates were calculated taking into account the sowing qualities of the seeds taken from the certificate of the seed condition. The index of the numerical seeding rate was adopted...
as 4.0 million germinating seeds per hectare. Calculation of the seeding rate is carried out according to the formula:

\[ HB = \frac{A \times M_{1000} \times 100}{\Pi G} \]

\( HB \) – weight seeding rate of seeds, kg / ha;
\( A \) – numerical norm index, million germinating seeds per hectare;
\( M_{1000} \) – weight of 1000 grains, grams;
\( \Pi G \) – sowing suitability, %.

\[ \Pi G = \frac{\Pi}{100} \]

\( \Pi \) – seed purity, %;
\( B \) – seed germination, %.

The seeding rate at 4.5 million / ha was equal to 160 kg / ha.

In the experiment, the following phenological phases of development were noted: shoots, tillering, stemming, earing, flowering, milky ripeness, waxy ripeness and full ripeness. The date when 10% of the plants had signs of this phase was taken as the beginning of the phase, and at least 75% were taken as the complete onset. P.P. Vavilov (1979) [2-4, 8-13].

Field germination was calculated by dividing the number of emerging plants by 1 sq. m on the number of sown germinating seeds and expressed as a percentage.

Before harvesting by counting and dividing the number of preserved plants by 1 sq. m, the number of emerging seedlings was determined by the safety of plants.

The biological yield and the structure of the yield was determined by selection, counting and analysis of plants from 1 sq. m taken before cleaning.

Determination of gluten, its quantity and quality. Gluten is a protein substance of wheat grain, which is obtained by washing the dough in water. The optimal ratio of gluten in the grain gives a good bread. Gluten contains two forms of proteins: gliadin and glutenin.

Determination of natural weight. Grain is poured into the cylinder from the bucket in an even stream, without jolts, up to a line inside the cylinder, indicating the capacity of the filler. The knife is quickly, without shaking the device, removed from the slot and after the load and grain fall into the measure, the knife is again inserted into the slot with the same precautions. Individual grains, which at the end of the movement of the knife will fall between the knife blade and the edges of the gap, are cut with a knife. The measure together with the filler is removed from the nest, overturned, holding the knife and filler, and the excess grain remaining on the knife is poured [1,2, 14-20].

The predecessor of spring durum wheat was winter wheat.

In the autumn period, the soil was dumped to a depth of 25-27 cm. In the third decade of April, when the soil was physically ripe, the moisture was covered in two tracks with harrows BZSS - 1.0. Presowing cultivation was carried out on May 21 with a KPS-4 cultivator to a depth of 5 - 6 cm.

Cultivators loosen the soil without wrapping the layer and cut weeds.

2. Results of the research

Field germination has a significant impact on the formation of such elements of the crop as the density of seedlings and plants preserved for harvesting, the number of fruiting stems.

In 2019, out of 450 sown germinating seeds of various varieties of durum wheat, an average of 401 seedlings emerged. for 1 sq. m., i.e. field germination rate was 89.2%. Quite good field germination is associated with the relatively favorable weather conditions that developed during the sowing - germination period. The highest field germination of 91.1% was observed in the varieties Bezenchukskaya yubileynaya and Bezenchukskaya fortress (Table 1).

The number of preserved plants for harvesting was quite high, and the average for the varieties was 366 pcs. for 1 sq. m. This is due to the fact that in July precipitation fell much more than average annual norms. The largest number of plants for harvesting 384 and 383 pcs / m² preserved in the varieties Triada and Bezenchukskaya fortress, and therefore their overall survival rate is higher.
Table 1. Field germination, safety and overall survival of spring durum wheat in 2019

| Variety                  | Number of seeded germinating seeds pcs. / 1 sq. m | The number has risen plants per 1 sq. m | Number saved plant for cleaning pcs / per 1 sq. m | Field germination, % | Save plants, % | Overall survival,% |
|--------------------------|---------------------------------------------------|----------------------------------------|--------------------------------------------------|----------------------|----------------|------------------|
| Marina (control)         | 450                                               | 390                                    | 321                                              | 86,7                 | 82,3           | 71,3             |
| Triad                    | 450                                               | 395                                    | 384                                              | 87,8                 | 97,2           | 85,3             |
| Bezenchukskaya jubilee   | 450                                               | 410                                    | 375                                              | 91,1                 | 91,5           | 83,3             |
| Bezenchuk fortress       | 450                                               | 410                                    | 383                                              | 91,1                 | 93,4           | 85,1             |

The safety of plants in our experiments changed in the same way as the overall survival rate.

3. Conclusions

Scientific research carried out in 2019 in the conditions of the educational and experimental economy of the Orenburg State Agrarian University made it possible to draw the following preliminary conclusions.

1. Field germination of durum wheat varieties on average for the experience was 89.2%. The highest field germination rate of 91.1% was observed in the varieties Bezenchukskaya yubileynaya and Bezenchukskaya fortress. The highest overall survival rate of 85.3 and 85.1% was observed in the varieties Triada and Bezenchukskaya krpost.

2. The largest number of productive stems 375 pcs / m² formed on the Bezenchukskaya jubilee variety. Productive tillering according to the variants of the experiment varied from 0.93 to 1.0 units. It was the highest on the varieties Marina and Bezenchukskaya Jubilee.

3. The yield of spring durum wheat was very low, which averaged 4.9 c / ha. The highest yield of 6.2 c / ha was formed by the Triada variety, and the smallest 3.2 c / ha - by the Marina variety.

4. The content of raw gluten of spring durum wheat varieties on average in the experience was high, which amounted to 42.3%. The largest amount of gluten, 44.8%, was formed by the Bezenchukskaya Yubileynaya variety, and the smallest, 39.8%, by the Triada variety. The gluten quality group is second on all variants. The natural weight of the grain varied from 620 to 675 g / l.

5. In our research in 2019, when cultivating various varieties of spring durum wheat, a loss was obtained, except for the variant with the Triada variety. When cultivating the Triada variety, we received a profit that amounted to 703.37 rubles, the highest return on costs for products was 1.0 rubles, the level of profitability was 0.11%.

Based on the foregoing, in the central zone of the Orenburg region, we propose to cultivate the Triada spring durum wheat variety in production, which provides the highest yield with the best economic indicators.

References

[1] Agroclimatic resources of the Orenburg region. – L.: Hydrometeoizdat, 1971.
[2] Alekseev A.A., Protopopov F.F., Yakovleva O.V., Bratkovskaya L.B., Glinushkin A.P., Matorin D.N. Influence of mercury salts on light curves of fluorescence of microalgae// Natural and technical sciences. 2020. № 11 (149). p. 61-63.
[3] Baikasenov, R.K. Productivity of spring soft wheat varieties at different seeding rates / R.K. Baikasenov // Materials of the conference of young scientists and specialists of the Orenburg region. OSU Bulletin, 2010, №4. – p. 28.
[4] Besaliev, I.N. Productivity of durum wheat varieties against the background of various types of basic tillage in the Orenburg Cis-Urals / I.N. Besaliev, M.F. Tukhvatullin // Izvestia OGAU.
Vavilov, P.P. Plant growing / P.P. Vavilov, V.V. Gritsenko, V.S. Kuznetsoy. – M.: Ear, 1979. – 524 p.

Glinushkin A.P., Ovsyankina A.V., Kiseleva M.I., Kolomiets T.M. Distribution of fungi of the genus Fusarium link. on grain crops // Russian agricultural science. 2018. № 2. p. 19-25.

Kislov A.V., Glinushkin A.P., Kascheev A.V. Agro-ecological foundations for increasing the sustainability of agriculture in the steppe zone // Achievements of science and technology of the agro-industrial complex. 2018. T. 32. № 7. p. 9-13.

Kovalenko Yu.N. Assessment of the conditions for the development of the agri-food complex of the Voronezh region / Yu.N. Kovalenko, A.V. Ulezko, T.V. Savchenko // Voronezh State Agrarian University Bulletin. -2018. -No 2 (57). -p. 140-150.

Kovtun, V.I. Breeding high quality winter wheat varieties for the south of Russia / Kovtun, V.I. // Grain farming, 2003, №6. – p. 5 – 7.

Kryuchkov, A.G. The response of various varieties of spring soft wheat to soil cultivation techniques in the Orenburg Cis-Urals A.G. Kryuchkov, T.S. Baeva // Izvestia OGAU. (35). 2012.

Lebedik, A.I. Fundamentals of Agronomy. Textbook for rural prof.-tech. schools / Lebedik, A.I.. - M., «Higher. school», 1971. – 288 p.

Matorin D.N., Timofeev N.P., Glinushkin A.P., Bratkovskaya L.B., Zayadan B.K. Investigation of the effect of fungal infection bipolaris sorokoniana on the light reactions of wheat photosynthesis using the fluorescent method // Moscow University Bulletin. Series 16: Biology. 2018. T. 73. № 4. p. 247-253.

Medlyaeva Z.P. Organization of production at an agro-industrial complex / Z.P. Medelyaeva, K.S. Ternovykh, L.V. Dankova and others - Voronezh, 2014. –314 p.

Nalyukhin A.N., Khamitova S.M., Glinushkin A.P., Avdeev Yu.M., Snetilova V.S., Laktionov Yu.V., Surov V.V., Belozerov D.A. Changes in the metagenome of the prokaryotic community as an indicator of the fertility of arable soddy-podzolic soils upon application of fertilizers // Soil science. 2018. № 3. p. 331-337.

Novikov, V.A. Production of high-quality material is the basis for the efficiency of grain farming in the Orenburg region / V.A. Novikov, L.A. Mukhitov // Izvestia OGAU. 2 (46).2014. – 24 – 26 p.

Popov, N.A. Agricultural Economics: Textbook / Popov, N.A. – M.: Business and Service Publishing House, 2001. – 368 p.

Posypanov, G.S. Plant growing / Posypanov, G.S.. - M.: Ear, 2007. – 612 p.

Sokolov M.S., Semenov A.M., Spiridonov Yu.Ya., Toropova E.Yu., Glinushkin A.P. Healthy soil is a condition for the sustainability and development of argot and sociospheres (problem-analytical review) // Bulletin of the Russian Academy of Sciences. Biological series. 2020. № 1. p. 12-21.

Sokolov M.S., Semenov A.M., Spiridonov Yu.Ya., Toropova E.Yu., Glinushkin A.P. Healthy soil is a condition for the sustainability and development of agro-sociospheres // Materials science issues. 2020. № 1. p. 12.

Sokolova G.D., Glinushkin A.P. Mechanisms of resistance to fungicides of a phytopathogenic fungus fusarium graminearum // Mycology and phytopathology. 2020. T. 54. № 6. p. 391-403.