The significance of the spring durum wheat variety in the formation of yield and grain quality in the Southern Chernozems 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 requirement is 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.

1. Introduction

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. Various varieties of spring durum wheat were sown [1-5]. 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 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 [4-10]. Calculation of the seeding rate is carried out according to the formula:

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

where

- \( HB \) - weight rate of seeding of seeds, kg/ha;
- \( PG \) is the index of the numerical norm, million germinating seeds per hectare;
- \( M_{1000} \) - weight of 1000 grains, grams;
- \( PG \) - sowing capacity, %.

\[ PG = H \times V \]

where:

- \( 100 \)
- \( H \) - 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). 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 [11-16].

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

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 [17-24].

The predecessor of spring durum wheat was winter wheat.

In the autumn period, they carried out moldboard tillage to a depth of 25-27 cm. In the third decade of April, when the physical maturity of the soil approached, 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 and Discussion

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 seeds emerged from experience. for 1 sq. m, i.e. field germination rate was 89.2%. Quite good field germination is associated with relatively favorable weather conditions, which developed during the sowing - germination period. The highest field germination capacity 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 greatest number of plants for harvesting, 384 and 383 pcs/m², was preserved in the varieties Triada and Bezenchukskaya krepost, and therefore their overall survival rate is higher.

| Variety                     | Number of seeded. germinating seeds pcs./1 sq. m | 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 (counter.)           | 450                                           | 390                                 | 321                                           | 86,7                 | 82,3          | 71,3              |
| Triada                      | 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 farm 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 krepost.

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

3. The yield of spring durum wheat was very low, averaging 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.

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