Research on the selection of barley (*Hordeum vulgare*) for irrigated lands of the Republic of Uzbekistan

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Abstract. In this article, 200 samples of barley varieties were studied on the irrigated lands of the Samarkand region, their comprehensive assessment was carried out and samples of high yield, productive, early ripening, resistance to dormancy, adverse environmental factors, and diseases were selected. Key words: Barley, variety, collection hybrid, disease, line, pattern, resistance, generation, selection, productivity, crossbreeding.

1 Introduction

Cereals are considered one of the most important crops in global agriculture, with 904 million tons of crops grown annually. The main part of the arable land for grain crops is allocated for autumn and spring wheat. Of these 2020, 61% of the sown areas of grain crops were allocated to wheat, which amounts to 28 million hectares. Barley occupies second place in the grain crop area, accounting for 18%.

23% of the world's barley is used for food, 10% for the brewing industry, and 67% for livestock feed. In 2021-2022, 160.9 million tons of grain were harvested; a total of 145.9 million tons of barley were grown worldwide this year [1-4].

As a result of global climate change and rapid population growth, the demand for pearl barley products and nutritious livestock feed has increased in recent years. One of the most important problems is the selection of primary sources of barley that are resistant to environmental stress factors due to global weather changes in the world. Some progress has been made in this direction in the world, and today scientific research on the creation of varieties of winter barley with valuable economic characteristics and resistance to external environmental factors is considered important.

In our republic, 180 thousand tons of barley are grown annually, only 5% of the harvest is used in the brewing industry, 8% in the cereal and food industries, and the remaining 87% is used as livestock feed. However, due to the low quality indicators of the grown barley crop, it is observed that the bulk of the crop is used for livestock farming. Sudden global climate change is currently leading to the fact that the temperature of the air and grain of barley during the ripening period rises to 35-38 °C, as a result of which the quality of the grain does not meet government standards. Currently, one of the main tasks is the creation of new source

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materials and varieties that are resistant to external stressors of barley (yield, early maturity, drought, dormancy) and whose quality indicators fully comply with state standards. Also in 2017-2021, the tasks of creating and introducing into production new breeding varieties of agricultural crops that are resistant to diseases and pests, adapted to local and environmental conditions, specified in paragraph 3.3 of the Action Strategy in five priority areas of development, were solved. development of the Republic of Uzbekistan [5-8].

Decrees of the President of the Republic of Uzbekistan No. PF-5853 “On approval of the Agricultural Development Strategy of the Republic of Uzbekistan for 2020-2030”, “On the election of the Republic of Uzbekistan” and “Laws on seed production”, Decree of the President of the Republic of Uzbekistan dated December 29, 2015 - No. 2460 “This study serves, to a certain extent, to implement the tasks defined in the decision on measures for further reform and development of agriculture in 2016-2020 and other regulatory documents related to this activity.

2 Materials and methods

Researches were conducted in 2021-2023 in the experimental field of the scientific seed farm "Farboma select" located in the territory of Zarafshon MMTP, Jomboy district, Samarkand region. For the purpose of the research, 200 barley collection variety samples brought from the Gallaorol scientific-experimental station were studied by the international centers for barley breeding ICARDA and CIMMYT and ITI of Plant Science and ITI of Cereals and Legumes. The area of the collection nursery is 1 m² for each sample, 300 seeds per 1 m² were planted in 2 replicates in October. After every 10 samples, the zoned Ikhtiyor variety was planted as a standard variety.

Observations, calculations and analyzes in research work were determined according to the "Methods of conducting field experiments" (UzPITI, 2007), phenological observations and biometric analyzes according to the method of the State Commission for Testing Agricultural Crops Varieties (1989). Mathematical analysis was done according to the method developed by B.A. Dospekhov (1985), disease resistance was evaluated according to the scale (%) developed by the International Center for Agricultural Research in Dry Areas (1996)

Fig. 1. Preparation of tomato seedlings in an experimental greenhouse and hydroponic cultivation
The results and discussion

Creation of early and fruitful varieties of barley is one of the important tasks facing the breeders. The duration of the plant growth period is determined by the natural variability of the variety and also depends on the growing conditions. In order to create early, productive and resistant varieties of barley, it is of particular importance to comprehensively study the Jakhan collection, in-depth analysis of newly brought collection samples from the centers of origin of barley. Using breeding methods, it is necessary to correctly select the initial sources to create early, productive, resistant to dormancy and disease varieties of barley.

For the creation of early, productive and resistant varieties of barley, it is of particular importance to study raw materials with genetically rich genotypes, to analyze in-depth collection samples from the centers of origin of barley. Using breeding methods, it is necessary to correctly select the initial sources to create early, productive, resistant to dormancy and disease varieties of barley.

Productivity is the most important characteristic of this variety and is the main factor in solving selection problems. Productivity is the most important feature in determining productivity, and they are inextricably linked. Certain elements depend on heredity in proportion to the productivity characteristic and it can change through small changes (head length, number of grains in the head, mass of 1000 grains) and external environmental factors and productive growth can change over the years, depending on the growing conditions of the plant. Barley yield is determined by indicators such as the number of productive stalks, the number of grains in an ear, and the mass of 1000 grains. These indicators also depend on soil climatic conditions and agrotechnology of cultivation.

Productive tillering has a positive effect on the number of grains obtained per plant and significantly increases yield in irrigated land (Rajaram et al 1996).

Among the studied samples, the most productive variety samples were selected according to the main characteristics of productivity, productive clustering, number of grains in a spike, grain weight in a spike, mass of 1000 grains. The participation of its elements in the formation of productivity in different samples was different. In the early samples, the productivity was formed due to the productivity of spikes, and in the evening samples, it was formed due to the productive clump. Spike length, number of grains per spike, and spike weight were determined by photographing growth from tillering to heading. Grain size depends on the length of the grain collection period.

Table 1. Yield and productive varieties of varieties (Jomboy 2022)

<table>
<thead>
<tr>
<th>№</th>
<th>sample name or catalog number.</th>
<th>Productive accumulation, grain</th>
<th>The number of grains on the spike, piece</th>
<th>Grain weight in a spike, gr</th>
<th>Weight of 1000 grains, gr</th>
<th>Productivity g/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bolgali St</td>
<td>3,3</td>
<td>43,2</td>
<td>1,1</td>
<td>39,8</td>
<td>478</td>
</tr>
<tr>
<td>2</td>
<td>K-561063</td>
<td>3,6</td>
<td>47,5</td>
<td>1,5</td>
<td>42,1</td>
<td>583</td>
</tr>
<tr>
<td>3</td>
<td>Zafar</td>
<td>3,4</td>
<td>45,8</td>
<td>1,2</td>
<td>40,3</td>
<td>502</td>
</tr>
<tr>
<td>4</td>
<td>Mirzachul</td>
<td>3,7</td>
<td>46,2</td>
<td>1,4</td>
<td>41,8</td>
<td>610</td>
</tr>
<tr>
<td>5</td>
<td>K-22845</td>
<td>4,1</td>
<td>46,9</td>
<td>1,6</td>
<td>43,5</td>
<td>618</td>
</tr>
<tr>
<td>6</td>
<td>Ikhtiyor</td>
<td>3,8</td>
<td>45,6</td>
<td>1,5</td>
<td>42,2</td>
<td>560</td>
</tr>
<tr>
<td>7</td>
<td>K-19985</td>
<td>4,4</td>
<td>44,3</td>
<td>1,6</td>
<td>42,6</td>
<td>625</td>
</tr>
<tr>
<td>8</td>
<td>Temur</td>
<td>3,9</td>
<td>47,1</td>
<td>1,5</td>
<td>41,0</td>
<td>614</td>
</tr>
<tr>
<td>9</td>
<td>K-92320</td>
<td>3,7</td>
<td>48,5</td>
<td>1,6</td>
<td>43,2</td>
<td>600</td>
</tr>
<tr>
<td>10</td>
<td>K-566244</td>
<td>4,2</td>
<td>46,4</td>
<td>1,5</td>
<td>42,4</td>
<td>633</td>
</tr>
</tbody>
</table>
One of the important indicators determining the productivity of the barley crop is the productive flowering of the plant. It was identified by the number of stalks that produced spikes.

As can be seen from the data of Table-1, the highest indicator of the productive stem was observed in the sample of K-19985 variety, in this sample, the stem was 4.4, and the model was distinguished by the fact that it had 1.1 more productive stems compared to the Bolgali variety. The highest productive accumulation was found in such samples as Mirzachol, K-22845, Temur, K-566244. According to the results of the experiment, it was recommended to use selected barley samples with a high index of productive growth as a starting source in the selection process.

Fig. 1. The samples of the varieties

One of the most important indicators for determining the yield of grain crops is the number of grains in the ear. In barley samples, the number of grains in the ear is greatly affected by the sharp rise in air temperature at the end of May and beginning of June. In this case, under the influence of high air temperature, grains are not formed in the spikes. The number of grains in the spike is important for obtaining a high yield of barley. In the experiment, it was found that the grain number indicator changes very little in comparison with other elements of the crop under the unfavorable influence of the external environment.

The number of grains in the ear is important in selection for productivity and is the main factor for high yield (fig.1). Samples of the K-561063, Mirzachol, K-22845, Temur, K-92320 varieties according to the number of grains in the ear, grain weight in the ear K-561063, Mirzachol, K-22845, K-92320 varieties samples, the following samples with a high index in terms of 1000 grain weight K-22845, Ikhtiyo, K-19985 are considered valuable starting material. In the studied samples, the mass of grain obtained from 1m2 area was from 478 to 633 grams. The high grain mass was observed in the samples of the following varieties: Mirzachol (610 g), K-22845 (618 g), K-19985 (625 g), Temur (614 g), K-566244 (633 g). .

As a result of research;
- the gradation of early ripening of barley variety samples was as follows: germination-heading was determined as very early 157-160 days, early 161-164, mid-early 165-168 days,
mid-late 169-172 days, late 173-177 days. Samples with early indicators: INBYT-HI-13, 15, 35, 49; 1stGSBSN-7, 10, 11, 12; IBON-HI-1, 6, 23, 24; IBON-W-11, 15, 21; 3rdGSBYT-4, 6 - primary diseases of barley: dark-brown spotting (helmintosporiosis), rhynchosporiosis, powdery mildew, striped spotting, net spotting disease in the irrigated fields, it was noted that 10-50% of the variety samples were affected by the disease. Kondrat, Temur, Mirzachol, Bolgali, Khanaqokh, Ikhtiyor, NM-55, NM-79 in the irrigated fields from the variety samples.

- in irrigated fields, winter resistance was evaluated with average (51-70%), very high (over 90%) indicators. The following Kondrat, Novosadsky 520, Kyzilkurgan, Mezon, Mirzachol, Ikhtiyor, NM-53, NM-93, Mavlono, which have a high level of winter hardiness (71-90%) and close to it (±10%)

- classification of samples according to plant height as below average (71-80 cm), medium height (81-95 cm), above average (96-110 cm), tall (111-125 cm) and very tall (126-140 cm) according to, it was rated with high (7 points) and very high (9 points) endurance with the characteristic of resistance to lying down. Resistant to lying down 1stGSBSN-17, 20, 28, 36, 44; IBON-W-11, 15, 21; IBON-HI-1, 6, 23, 24, 25; INBYT-HI-13, 15, 35, 49; 3rd GSBYT-2, 4, 6, 27, 32.127.

The number of grains in the ear is important in selection for productivity and is the main factor for high yield. Samples of the K-561063, Mirzachol, K-22845, Temur, K-92320 varieties according to the number of grains in the ear, grain weight in the ear K-561063, Mirzachol, K-22845, K-92320 varieties samples, the following samples with a high index in terms of 1000 grain weight K-22845, Ikhtiyor, K-19985 are considered valuable starting material. In the studied samples, the mass of grain obtained from 1m² area was from 478 to 633 grams. The high grain mass was observed in the samples of the following varieties: Mirzachol (610 g), K-22845 (618 g), K-19985 (625 g), Temur (614 g), K-566244 (633 g), and was selected.

4 Conclusion

As a result of the research, during the study of the samples of the collection, it was found that 9 samples are more productive and productive than the standard Bolgali variety. During the study of the collection variety samples, compared to the standard Ikhtiyor variety, the above isolated variety samples were selected as a starting source for selection in the creation of productive barley varieties and recommended to be used as starting material for scientific institutions engaged in barley selection.

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