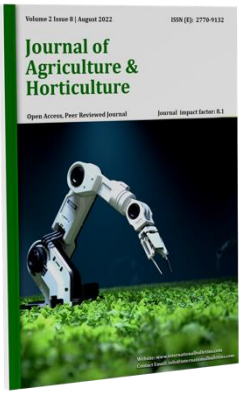

SELECTION OF FAST-GROWING (DEVELOPING) SOURCES IN PERENNIAL

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Annotation.

The article presents the results of experiments on studying the adaptability of collection samples of perennial wheat in the soil-climate conditions of Uzbekistan to climate change, valuable economic traits, the root system during the growth period, grain productivity and greenmass in the period until late autumn.

Key words: perennial wheat, grain, green mass, heat, root, productivity, varieties and samples, fodder, plant, rust disease, soil, climate, institution.

A decrease in the yield of agricultural crops is observed under the stresses by diseases, pests and other reasons.

As a result of the global climate change observed in recent years, the effect of precipitation and heat is causing losses in the yield of agricultural crops.

According to the information of the international experts' group of the World Bank, the temperature in Uzbekistan has risen to 0.3^0S in the next 10 years, and by 2030 it is expected to rise by 1 - 1.4^0S. Today's observed average warming of 1.5^0S will cause major problems for agriculture, even for establishing grazing pastures.

Perennial wheat is a multi-purpose crop with potential for several reasons. In agriculture, along with perennial wheat grain and forage, it is considered a crop that reduces erosion and improves soil-water quality [2; pp. 1638-1639]. Breeders have created sources of perennial wheat by crossing annual wheat *Triticum aestivum* with perennial grasses (intermedium of wild grass and wheat) *Thinopyrum spp.*, and other species. The perennial nature of the crop means that it will re-grow, allowing for re-harvesting and harvesting of at least the green biomass for several years after grain formation, ensuring perennial harvests. Perennial wheat is not GMO (genetically modified organism). The perennial wheat lines produced so far are not uniform. Scientists from Kansas State University and the Land Institute are working on improved lines of perennial wheat sources.

For several years, Michigan State University (MSU) researchers have evaluated grain yield performance in existing lines. The most promising lines have been created during many years at W.K.Kellogg Biological Station. In an experimental field at Charles Sturt, University in Australia, researchers tested perennial wheat lines and found high-yielding sources. A group of researchers observed that the potential of perennial sources created in Michigan is high [1; pp. 68-89]. Undoubtedly, on the basis of the establishment of perennial wheat breeding, it is

necessary to offer new varieties with perennial features that are strong from the economic point of view.

An experiment started in 2009 under field conditions proved that the cultivation of perennial cereal crops leads to an improvement in the movement of water in the soil, in particular, by preventing the gravitational leaching of beneficial minerals in the soil, it has decreased the loss of the existing nutrient elements and preserved them more in the soil, by which improved economic efficiency. [3; pp. 735-744]. After four years of growing this grain in Michigan, researchers discovered several production problems. They observed plant's poor re-growth after grain harvest. In 2010 - 2012, in hot and dry conditions, the growth of perennial wheat was restored in very few plants [4; pp. 41-44].

Preliminary research with perennial wheat in Michigan shows that it has the potential to provide farmers with a completely new, environmentally friendly, fine grain and forage-producing new variety. Scientific research on perennial wheat selection is not sufficiently consistent. By continuing breeding experiments and studies for further development of re-growth traits and increased productivity, there is also a need to make wheat stem stronger for forage purpose [5; pp. 5-7].

The peculiarity of perennial wheat samples is that, in June, after wheat grain is harvested, the plant sprouts again and fully blooms 2-3 times up to October-November, allowing it to be used as green biomass in animal husbandry.

Conducting scientific research on perennial wheat in Uzbekistan can have a number of advantages: - in increasing the stability of dryland agricultural systems. By minimizing tillage, ensuring the deeper development of the root system over the years, preventing soil erosion, stabilizing soil micro-organisms - increasing soil organic matter and productivity, improving resource efficiency, and increasing the soil moisture potential.

In recent years, in cooperation with the International Maize and Wheat Improvement Center (CIMMYT), the Kansas University of the United States, and US Land Institute, and the Omsk State University of Russia, scientific research is being conducted to create new varieties of perennial wheat. In the experiments, in contrast to the perennial forms used in Russia's Omsk University, the perennial (*Th. intermedium*, *Th. junceiforme* and *Th. ponticum*) grassess were used. Currently, perennial forms with 42 chromosomes have been created. Compared to one-year wheat, the disadvantages of these forms are 30-60% lower grain yield, 15-25% lower weight of 1000 grains, and 10-15% lower protein and gluten content.

In the experimental fields of the Research Institute of Plant Genetic Resources, the top lines of perennial wheat samples have been selected suitable for the natural soil-climatic conditions of our Republic, with higher root bio-mass, rapid re-growth characters after harvesting for grain. Also, during the study of varieties and lines of perennial wheat, samples were selected that could be used as a pasture for livestock to graze, in the period until late autumn after the grain harvest.

According to the results obtained on the basis of the study of perennial wheat samples, from the total of 43 studied samples, after harvesting for grain, 7 samples with perennial characteristics were selected in the 1st year of research.

According to the results of the research, in relation to the number of plants present in the samples, after the harvest for grain, the growth period, the weight of the green biomass produced, were analyzed.

The results of the study showed that WHEATAGROPYRON PONTICUM PARTIAL AMPHIPLOID8, WHEATAGROPYRON PONTICUM PARTIAL AMPHIPLOID1 had the characteristic of accumulating green biomass up to 2 times until November, MADSEN//CHINESE SPRING/PI5317181, MADSEN//CHINESE SPRING/PI5317182,

Table 1.

Green mass evaluation of samples (2017-2018). (0,90 м²)

№	Lines (samples)	Number of plants, available	The 1st harvest for green mass				The 2nd harvest for green mass				The 3rd harvest for green mass			
			Number of re-grown plants	Re-growth, %	Dates of the 1st harvest	weight of green mass (fresh), gr	Number of re-ggrown plants	Re-growth, %	Dates of the 2nd harvest	weight of green mass (fresh), gr	Number of re-grown plants	Re-growth, %	Dtaes of the 3rd harvest	weight of green mass (fresh), gr
1	WHEAT-AGROPYRON PONTICUM PARTIAL AMPHIPLOID8	20	4	40	14.07.18	26.72	4	20	16.08.18	13.41	-	-	-	-
2	MADSEN//CHINESE SPRING/PI53-17181	17	5	26	11.07.18	18.3	5	26.3	14.08.18	17.25	2	11	3.10.18	9.21
3	WHEAT-AGROPYRON PONTICUM PARTIAL AMPHIPLOID1	24	6	21.1	14.07.18	14.4	4	17.5	15.08.18	9.7	-	-	-	-
4	PI573182/BFC24//BFC2N/3/PI440048/4/-(TAM110/PI401201//JAG & 2137)/5/(PI636500/PI414667//PI4146-67/3/(PI573182/PI314190//BFC1FF))1	19	2	11	14.07.18	11.20	1	6.2	13.08.18	4.42	1	6.4	6,10.18	4.57
5	WHEAT-AGROPYRON PONTICUM PARTIAL AMPHIPLOID2	15	4	25.4	14.07.18	22.4	6	40.2	16.08.18	33.5	4	24.5	3.10.18	26.5
6	T.DURUM/AG.ELONGATUM	22	9	44.5	13.07.18	52.4	11	50.2	16.08.18	58.6	10	47.2	1.10.18	60.4
7	Thynopirum intermidium	23	23	100	11.07.18	98.8	23	100	12.08.18	106.7	23	100	27.09.18	124.6

PI573182/ BFC24//BFC2N/3/PI440048/4/(TAM110/PI401201//JAG & 2137)/5/(PI6365-00/PI414667//PI414667/3/(PI573182/PI314190//BFC1FF))1, WHEAT AGROPYRON PONTICUM PARTIAL AMPHIPLOID3, T.DURUM/AG.ELONGATUM, TH.INTERMEDIUM lines were found to have green biomass accumulation 3 times until November. In relation to the number of plants, the highest rate of germination was determined in the sample of Th.intermedium. From this sample, it was observed that regrowth was maintained up to 100% during 3 harvests in summer and autumn until November. In contrast to Thinopyrum intermedium samples, the samples which showed perennial characteristics after harvesting for grain in the 1st year of the study, the perennial characteristics decreased by the 2nd year, which led to a decrease in economic efficiency. The sample of Th.intermedium has maintained its perennial character for 7 years, from 2016 to 2023, when the research began. When analyzing the quantitative characteristics of the samples during the period of green biomass collection, in the sample of Thinopyrum intermedium mentioned above, in 0.9 m2 area (**Table 1**), green biomass was 98.8 grams in 1st harvest, and respectively, in terms of hectare, this indicator was 1097 kg, and in 3rd harvests it was 3666, it was equal to almost 4 kg. When the yield of green mass in the sample of Th. intermedium was studied over the years, it was 6423.5 kg in the second year of research, 8567.9 kg in the 3rd year, and by the 4th year the yield was partially reduced (6261 kg). During the research, only Th.intermedium sample with high green mass productivity was selected.

Currently, in the conditions of our country, the types of crops adapted to the type of pasture, such as perennial Atriplex undulata, astragalus, which yield an average of 15-25 centners per hectare, are widely used in the establishment of pastures. Under these conditions, the importance of increasing the economic efficiency as a result of placement of the sample of perennial wheat Th. intermedium, suitable for the type of pasture, in dry areas is considered high. During the research, it was found that there is an opportunity to further improve the amount of green mass collection by developing agrotechnical measures.

During the research, the development of the root system in the soil layer of the perennial wheat, Th. intermedium sample, was studied as a comparison to the annual wheat plant. According to the results, the total length of the root in a 1-year wheat plant is 1.8 meters cm (April-May), the main part is 18-22 cm (85 percent), and by the second year, the main part of the root in the sample of perennial wheat Th.intermedium is 65-75 cm (84-94 percent), and the total length was 210-235 cm (November). Of course, such a rooted plant is resistant to heat, drought and cold, and it has the ability to absorb the given mineral fertilizers up to 100%.

Table 2.

Evaluation of economic indicators of samples, 2017-2022.

№	Sample names	Rust disease, %		Root length, m		Plant height, cm
		yellow	leaf rust	generality	the main part	
1	Bezostaya 1	30	20	1.7	0.18	88
2	Th.intermedium	0	0	2.1	0.90	130
3	Khisorak	10MR	10MR	1.8	0.21	82
4	Vassa	30S	40S	1.6	0.19	92
5	Asr	60S	50S	1.8	0.18	87
6	Antanina	40S	50S	1.6	0.20	90

Plants with a strong root system are also important in preventing erosion and degradation. Also, it was found that the sample of perennial wheat Th. intermedium, selected during the

research, was not affected by rust diseases and pests that cause great damage in the region for 7 years (**Table 2**).

In conclusion, it can be noted that it is of great importance to involve perennial wheat additional sources in research, to select sources with high economic efficiency that meet the type of pasture, to increase the productivity of areas prone to soil erosion and degradation, and to prepare feed for livestock and poultry farms.

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