The influence of sowing rates of winter wheat varieties planted in Bukhara region on seed viability and actual seedling thickness

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Abstract. One of the main criteria of economic stability is the effective use of available resources and opportunities by every agricultural enterprise operating in the conditions of the market economy. One of the main requirements of today's farming is to collect the planned amount of seedlings and grow a high yield with the economical use of seed material, crop area, especially irrigation water. Based on this goal, a field experiment was conducted under the soil-climatic conditions of Bukhara province on the topic "Effect of seedling thickness of autumn wheat cultivars on the processes of water exchange in plants". In the experiment, when the seeding rate was increased from 4.5 million/ha to 6.5 million/ha in "Grom", "Alekseevich", and "Kelajak" varieties of winter wheat, the field fertility of seeds decreased to 1.5-3.2%. The seedling thickness of the plants was studied in early spring and at the end of the season, and a certain decrease in the number of plants was observed during the winter season and the spring growth period.

1 Introduction

Currently, farmers and farms and clusters are engaged in the cultivation of agricultural products in our country.

It is natural that a farmer or a farmer who aims to make the best use of every square meter of the cultivated area allocated to him should try to use every kilogram of seed, fertilizer, water, and fuel lubricants as effectively as possible. Especially in the conditions of current water scarcity, the effective use of every drop of water, the organization of watering plants based on their condition and demand is a very urgent issue. In this regard, of course, they rely on the recommendations of scientists and experts in the field.

Therefore, studying the optimal seedling thickness for autumn wheat varieties cultivated in the meadow alluvial soils of the Bukhara region, and determining the effect of this seedling thickness on the processes of water exchange during the growth and development of the plant, on productivity, crop quality and economic efficiency, is one of the issues of great importance in the grain industry.

Based on this, winter wheat varieties suitable for the soil-climatic conditions of Bukhara region and the planting standards of these varieties were determined in order to study the

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effect of their field fertility, stem thickness, plant growth and development, water exchange processes in plants on productivity, crop quality and economic efficiency in 2020-2022. field experience was conducted in. In order to study the influence of planting rate of winter wheat on the characteristics of plant productivity, especially on field fertility, several experiments were conducted and their results were published in various scientific articles.

2 Main part

S.S. Sokodelov (1983) conducted scientific research on winter wheat varieties "Dneprovskaya-775", "Dneprovskaya-846", "Odesskaya-51" at the Sinilnikov experimental station in Northern Ukraine, studied their planting rate, planting period and fertilization rates. It was observed in the experiment that the rate of germination of seeds decreased with the increase of planting rate. More specifically, the seeds started to germinate, but failed to germinate. S.S. Sokodelov explains the reason for this with the lack of soil moisture corresponding to each seed.[1,4]. University of Belgrade scientists Veselinka Zecevic, Jelena Boskovic, Desimir Knezevich and Danica Mikanovic conducted scientific research on the winter wheat plant in the territory of Serbia, in order to determine the effect of seed rate on grain quality of winter wheat varieties, four winter wheat genotypes ("Ana Morava", "Vizia", "L- 3027" and "Perla"). ") at the Small Cereal Research Center in Kragujevac, Serbia, after 3 years at two seeding rates (SR1). = 500 and SR2 = 650 germinating seeds m2) weight of 1000 grains green mass and crude gluten content in different wheat genotypes were studied. Significant differences in quality components were found between the studied planting standards. The highest values of all studied quality parameters were observed in the SR2 variant at the seeding rate of 650 m-2. The highest gluten content (33.76%) was observed in the variant "Perla" SR2, which gave the best results for this cultivar. Analysis of variance for 1000-grain weight showed highly significant differences among cultivars, planting rates, and growing seasons, but all their interactions were non-significant. For all studied genotypes, the best quality was observed in the CP2 variant with 650 seeds, m^2.

Three planting dates (September 20 (SD1), October 1 (SD2), and October 10 (SD3)) and three planting dates. A three-year field trial was conducted with SR67.5, SR90 and SR112.5). According to the results obtained, planting dates and seeding rates affect grain yield due to the development of seedlings until winter, and also affect soil water consumption at different stages of growth. According to the obtained results, sowing dates and seeding rates affect the grain yield due to the development of seedlings until winter, and also affected the water consumption of the soil in different periods of growth. The best productivity was achieved by selecting the planting date (October 1) together with the planting rate of 90 kg/ha. Based on these results, they recommended moving the current planting date from September 22 or 23 to October 1.

Russian scientists Potapova G. N., Ivanova M. S. Scientific studies were conducted in the Middle Ural region in order to study the influence of planting dates and standards on the winter resistance of winter wheat and the yield of winter cereals. In the experiment, the Kazanskaya 560 variety of winter wheat was planted and tested with different planting dates of August 5, 15, 25 and planting rates of 4, 5, 6, 7, 8 million bushels/ha. According to the results of the experiments, it was noted that the highest winter resistance of plants was observed in the variant planted on August 25, and the highest yield was observed in the variant planted with seeds of 7-8 million bushels/ha. A group of scientists under the leadership of J. Lloveras carried out scientific research on Mediterranean varieties of winter soft wheat in the soil climate of Spain's Erbo Valley in 1999-2000 and 2000-2001, and planted 150, 175, 250, 300, 400 and 500 germinated seeds per 1m2 of land. planted and tried. According to the results of research, the highest yield was observed in variants planted with 400 and 500 viable seeds per $1m^2$.

According to Tompkins D. K, in Canadian conditions, winter soft wheat varieties have been tested with "zero" tillage and different levels of agrotechnical measures, using different planting standards. In the experiments, the highest productivity was observed in the variants planted with seeds from 58 kg to 148 kg under the conditions of various agrotechnical measures, the increase of the gross yield with the increase of the thickness of the plants, and the increase of the weight of 1000 grains with the decrease of the thickness of the plant seedlings was observed.

According to Easson D. L., White E. M., Pickles S. J., scientific studies were conducted on winter wheat varieties Apollo, Hornet, Longbow and Norman in the conditions of Northern Ireland, and planting standards were tested by planting 50, 100, 200, 400, 800 and 1600 viable seeds per 1 m2. According to the results of the research, the highest productivity was observed in the option of planting 50 and 100 seeds per 1 m2, and the weight of 1000 seeds was high in the options with low sowing rates, and decreased to 42.7 grams in high planting rates of 56-53.5 grams.

The group of authors led by Spink J. H. carried out research on winter wheat varieties Cadenza, Haven, Suasson and Iskra in Great Britain and tested them in three different sowing periods and six different sowing rates (20, 40, 80, 160, 320 and 640 germinating seeds m2). According to the results of the experiment, the highest results were observed when there were 63 plants per 1m2 for the period in September, 93 plants per 1m2 for the period planted in October, and 139 plants per $1m^2$ for the period planted in November.

As can be seen from the above information, with the change of soil climate conditions and the change of wheat plant varieties, it is necessary to make some changes to the norms of planting plants. Based on the above data, the different soils and climatic conditions in Spain, Canada, Serbia, the United Kingdom and China, the biological characteristics of the cultivated varieties and the agrotechnical measures used are different from each other, causing the most optimal planting standards to change at different levels.

In the conditions of our Bukhara region, the introduction of new varieties of winter wheat and their introduction into production requires conducting scientific research to determine the optimal seedling thickness for each new variety. For this reason, we previously used varieties of winter wheat such as "Skifyanka", "Knyajna", "Kupava", "Polovchanka" at 4-4.5; We tried planting at the rate of 5-5.5 and 6-6.5 million bushels/ha and published the results in journals and scientific conferences. Accordingly, in the soil and climatic conditions of Bukhara region, with an increase in the planting rate of winter wheat varieties from 4-4.5 million bushels/ha to 6-6.5 million bushels/ha, there was a certain decrease in the level of plant fertility and winter resistance.

Currently, new varieties of winter wheat such as "Grom", "Alekseevich", and "Kelajak" are entering the Bukhara region. The purpose of our scientific research is to select among these winter wheat varieties suitable for the soil-climatic conditions of Bukhara region and to study the most optimal seedling thickness for growing a high and quality harvest from them.

Based on this, scientific research work was carried out for three years. In the experiment, 4 varieties of winter wheat, "Kroshka", "Grom", "Alekseevich", and "Kelajak", were planted at a seedling thickness of 4-5-6 million bushels/ha. "Kroshka" variety was taken as a model variety. The area of each unit was 50 m^2, and the total experimental area was 800 m^2.

Table 1. The planting rate of agricultural crop

Variant	**Varieties**	**Seedling thickness**
1	Kroshka	4 -4.5 mln/ha
2	Grom	4 -4.5 mln/ha

3	Alekseevich	4 -4.5 mln/ha
4	Kelajak	4 -4.5 mln/ha
5	Kroshka	5-5.5 million/ha
6	Grom	5-5.5 million/ha
7	Alekseevich	5-5.5 million/ha
8	Kelajak	5-5.5 million/ha
9	Kroshka	6 - 6.5 mln/ha
10	Grom	6 - 6.5 mln/ha
11	Alekseevich	6 - 6.5 mln/ha
12	Kelajak	6 - 6.5 mln/ha

The planting rate of any agricultural crop is the main factor affecting the seedling thickness, which is one of the main parameters that determine its yield.

It is known that not all germinated seeds planted in the field will germinate. Their field fertility is affected by seed quality, soil conditions, humidity and climatic conditions.

The rate of sowing seeds is also one of the factors affecting the level of field fertility of seeds, and as the rate increases, the level of field fertility of seeds decreases. In this case, even if the seeds begin to germinate, they will die before reaching the surface of the soil. The reason for this is the lack of soil moisture corresponding to each seed and another reason for the seeds not being able to fully germinate is that in the seeds with a shorter coleoptile length, the plant cannot overcome the soil resistance and the grass cannot germinate.[1,3,5]

In the model "Kroshka" variety, in the first year of the experiment, 4.0590 million seeds were germinated in the version where 4.5 million seeds were planted per ha, and the field fertility was 90.2%. In the case of planting 5.5 million seeds, 5.0655 million seeds germinated and the field fertility was 92.1%, in the case of 6.5 million seeds, 5.8040 million seeds germinated and the field fertility was 89.3%. In the second year of the experiment, the field fertility according to the standards was 89.4%; 88.3%; and 87.8%, and in the third year of the experiment it was the same 92.1%, 91.6%, 89.9%. The average field fertility level for all three years of the experiment was 90.56%-90.66%-89.0%, respectively, and the field fertility level decreased with the increase of planting rate (Table 2).

In the "Kelajak" variety, in the first year of the experiment, 4.3150 million seeds germinated in the variant with 4.5 million seeds, and the field fertility reached 95.9%, in the variants with 5.5 and 6.5 million seeds/ha, 5.2030 million and 6.0515 million seeds were planted. The field germination rate after seed germination was 94.6 and 93.1%. A similar situation was repeated in the 2nd and 3rd years of the experiment, and the average field fertility of this variety for three years was 93.7-92.5-90.5% according to the standards (Table 2).

Field fertility in "Alekseevich" and "Grom" varieties is slightly lower than in "Kelajak" variety. Field fertility in "Alekseevich" variety was equal to 91.7-91.2-90.1%, and in "Grom" variety was equal to 92.2-91.1-89.3% in three years.

"Kelajak" variety, as the authors of the variety noted, is one of the most resistant varieties prone to salinity and unfavorable soil conditions, it began to show itself during the

germination process. In this variety, the field fertility of seeds is standard according to the standards and compared to the other two varieties, it is 3.1-2.0-1.5% at the seedling thickness of 4-4.5 million plants, 1.9-1.3-1.4% per 5-5.5 million plants, 6-6.45 million plants. .tup.ga was on average 1.5-0.4-1.2% higher.

Table 2. Effect of sowing rates on field fertility of winter wheat seeds

Years	**Planting standard is mln. tup\ga**	**Field germination of winter wheat seeds (%)**			
		Kroshka	**Kelajak**	**Alekseevich**	**Grom**
1 year	4-4,5 mln	90.2	95.9	92.6	92.3
	5-5,5 mln	92.1	94.6	91.8	91.4
	6-6,5 mln	89.3	93.1	91.2	89.2
2 year	4-4,5 mln	89.4	91.6	90.9	91.5
	5-5,5 mln	88.3	90.5	90.3	90.4
	6-6,5 mln	87.8	89.1	89.3	88.3
3 year	4-4,5 mln	92.1	93.6	91.8	92.8
	5-5,5 mln	91.6	92.5	91.5	91.6
	6-6,5 mln	89.9	89.4	89.8	90.4
Average in 3 years	4-4,5 mln	90.5	93.7	91.7	92.2
	5-5,5 mln	90.6	92.5	91.2	91.1
	6-6,5 mln	89.0	90.5	90.1	89.3

Analyzing the research results presented in the article, the following conclusions can be drawn:

In general, in terms of field germination of seeds, all three tested varieties showed their superiority compared to the standard variety, but the "Kelajak" variety showed a better result than other varieties. The reason for this is that when the weight of 1000 grains was measured before planting in the "Kroshka", "Grom", "Alekseevich" varieties, their weight was on average 40 grams, and in the "Kelajak" variety, the grains were slightly larger, ie 45 grams. This situation does not affect the processes of germination and initial growth of plants.

When the planting rate of all varieties was increased from 4.5 million/ha to 6.5 million/ha, the field fertility of seeds decreased to 1.5-3.2%.

The damage level of plants during the winter and the preservation of the natural unfavorable vegetation period during the spring vegetation was 3.753 mln.tup/ha and represented 93.7% compared to the number of plants that had wintered.

The lowest result was observed in the variant where 6,500 mln.tup/ha of the Alekseevich variety was planted, the field germination of seeds was 5,856, the successful wintering of existing plants was 90.1%, 5,177 mln.tup/ha was 88.4%, the vegetation period of the plants 4,597 were saved until the end, equal to 88.8%.

Table 3. Effect of sowing rates on actual seedling thickness of winter wheat

YEARS	Planned small The thickness is million t/ha	In fact Several million bushels/ha (autumn)	Field quality (%)	Seedlings grown in the field number million packs/ha	Winter hardiness (% of the actual number of seedlings in autumn)	The number of seedlings remaining at the end of the season, mln. pcs/ha	(% of the number of seedlings in early spring)
"Kroshka " grade							
2020	4-4,5 mln	4.059	90.2	3.673	90.5	3.342	91.0
	5-5,5 mln	5.065	92.1	4.563	90.1	4.134	90.6
	6-6,5 mln	5.804	89.3	5.206	89.7	4.607	88.5
2021	4-4,5 mln	4.023	89.4	3.693	91.8	3.408	92.3
	5-5,5 mln	4.885	88.3	4.475	90.6	4.099	91.6
	6-6,5 mln	5.707	87.8	5.136	90.0	4.633	90.2
2022	4-4,5 mln	4.144	92.1	3.833	92.5	3.503	91.4
	5-5,5 mln	5.038	91.6	4.640	92.1	4.227	91.1
	6-6,5 mln	5.843	89.9	5.317	91.0	4.764	89.6
3 years	4-4,5 mln	4.072	90.5	3.730	91.6	3.413	91.5
	5-5,5 mln	4.983	90.6	4.529	90.9	4126	91.1
	6-6,5 mln	5.785	89.0	5.218	90.2	4.665	89.4
"Kelajak" grade							
2020	4-4,5 mln	4.315	95.9	4.147	96.1	3.923	94.6
	5-5,5 mln	5.203	94.6	4.917	94.5	4.627	94.1
	6-6,5 mln	5.051	93.1	5.524	91.3	4.999	90.5
2021	4-4,5 mln	4.122	91.6	3.817	92.6	3.492	91.5
	5-5,5 mln	4.977	90.5	4.574	91.9	4.144	90.6
	6-6,5 mln	5.791	89.1	5.223	90.2	4.659	89.2
2022	4-4,5 mln	4.212	93.6	4.060	96.4	3.865	95.2
	5-5,5 mln	5.087	92.5	4.873	95.8	4.615	94.7

	6-6,5 mln	5.811	89.4	5.362	92.1	4.884	91.3
3 years	4-4,5 mln	**4.216**	**93.7**	**4.005**	**95.0**	**3.753**	**93.7**
	5-5,5 mln	**5.087**	**92.5**	**4.782**	**94.0**	**4.452**	**93.1**
	6-6,5 mln	**5.882**	**90.5**	**5.364**	**91.2**	**4.844**	**90.3**
"Alekseevich" grade							
2020	4-4,5 mln	4.153	92.3	3.783	91.1	3.454	91.3
	5-5,5 mln	5.049	91.8	4.594	91.0	4.185	91.1
	6-6,5 mln	5.928	91.2	5.282	89.1	4.769	90.3
2021	4-4,5 mln	4.090	90.9	3.722	91.0	3.376	90.7
	5-5,5 mln	4.966	90.3	4.469	90.0	4.026	90.1
	6-6,5 mln	5.804	89.3	5.148	88.7	4.592	89.2
2022	4-4,5 mln	4.131	91.8	3.751	90.8	3.387	90.3
	5-5,5 mln	5.032	91.5	4.539	90.2	4.058	89.4
	6-6,5 mln	5.837	89.8	5.107	87.5	4.443	87.0
3 years	4-4,5 mln	4.261	91.7	3.877	91.0	3.520	90.8
	5-5,5 mln	5.016	91.2	4.534	90.4	4.089	90.2
	6-6,5 mln	3.856	90.1	5.177	88.4	4.597	88.8
"Grom" grade							
2020	4-4,5 mln	4.153	92.3	3.796	91.4	3.447	90.8
	5-5,5 mln	5.027	91.4	4.499	90.7	4.053	90.1
	6-6,5 mln	5.798	89.2	45.189	89.5	4.597	88.6
2021	4-4,5 mln	4.177	91.5	3.787	92.0	3.484	92.0
	5-5,5 mln	4.972	90.4	4.534	91.2	4.144	91.4
	6-6,5 mln	5.739	88.3	5.148	89.7	4.643	90.2
2022	4-4,5 mln	4.176	92.8	3.863	92.5	3.546	91.8
	5-5,5 mln	5.038	91.6	4.635	92.0	4.213	90.9
	6-6,5 mln	5.876	90.4	5.376	91.5	4.844	90.1
3 years	4-4,5 mln	4.149	92.2	3.813	91.9	3.489	91.5

	5-5,5 mln	5.010	91.1	4.574	91.3	4.148	90.7
	6-6,5 mln	5.804	89.3	5.235	90.2	4.690	89.6

3 Results

From the results of the studies presented in the table, it can be seen that under the conditions of the Bukhara region, the changes in the seedlings of winter wheat plants, the process of wintering and the death of seedlings in the spring growing season, depending on the thickness of the seedlings, are somewhat different.

The reason for this is to show that the soil and climatic conditions of the place, i.e. soil fertility, moisture level, duration and duration of the winter period in the regions, absence and thickness of snow cover, minimum and maximum temperatures, resistance of cultivated varieties and degree of adaptation to conditions this region are different.

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