International Journal of Multidiscipline

TLEP – International Journal of Multidiscipline
(Technology, Language, Education, and Psychology)
ISSN: 2488-9342 (Print) | 2488-9334 (Online)

Open Access | Peer-Reviewed | Monthly Publication | Impact factor: 8.497 / 2025

Cultivation Of High And Quality Grain Crops From Autumn Triticale In Semi-Desert Regions

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Abstract
This article presents a comprehensive analysis of sowing dates, seeding rates, and cultivation technology of the autumn triticale varieties “Svat” under the soil and climatic conditions of the Navoi region. The study examines plant growth and development, viability, productivity, and quality indicators of the yield. In addition, data obtained on optimal sowing dates and seeding rates of autumn triticale seeds are thoroughly analyzed.
Since triticale is a hybrid of wheat and rye, it is considered a crop with higher adaptability compared to both wheat and rye. The protein content of the grain ranges from 12–13%, while straw contains 10–12% protein. The crop is widely used as feed for livestock, and its grain is utilized in the production of bread and animal feed. However, the quality of bread products made from triticale grain is lower than that of wheat flour. Depending on soil and climatic conditions, grain yield ranges from 45–65 centners per hectare, while green biomass yield amounts to 340–450 centners per hectare. To achieve high yields, it is essential that fields are kept free from weeds and various diseases, and that mineral fertilizers are applied in a timely manner and at scientifically recommended rates.
Keywords: triticale, variety, sowing dates, seeding rates, fertilization, mineral fertilizers, yield.

Introduction. Today, triticale is “sown in about 65 countries of the world on more than 5.0 million hectares per year, producing 14-16 million tons of grain per year, and an average of 3.5-4.0 tons of grain per hectare [1].” The countries that grow triticale on large areas include “Poland, Germany, Belarus, Russia and the USA, which produce 87.8 percent of the triticale grain produced in the world [2].” Today, triticale is considered the highest quality feed for livestock and is of great importance in strengthening the high-quality feed base for livestock in order to fully satisfy the needs of the world's population in dairy and meat products throughout the year. In this regard, it is important to determine the optimal planting dates and norms for local and foreign varieties acclimatized to our local conditions in various natural climatic conditions, and to develop and produce scientifically based recommendations for the development of agrotechnical measures in accordance with this. As a result of the fundamental reforms carried out by our Government in recent years to develop livestock farming and strengthen the feed base, many varieties of triticale with high nutritional value and nutritional value have been imported from foreign countries and introduced into the climatic conditions of our Republic, which has resulted in an increase in the share of triticale in irrigated areas by 18.4 thousand hectares, and an average increase in grain yield per hectare by 4.8 centners. The Decree of the President of the Republic of Uzbekistan No. PF-5853 dated October 23, 2019 “On Approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030” sets many tasks for agricultural workers to “satisfy the domestic market demand for dairy and meat products, taking into account the needs of the population, at

[1] https://data.worldbank.org/indicator/AG.YLD.CREL.KG
[2] https://apps.fas.usda.gov/psdonline/circulars/production.pdf

the expense of domestic capabilities and halving the volume of imported products," and strengthening scientific research is of great importance in ensuring the implementation of these tasks. The study includes the effects of sowing dates and rates of winter triticale varieties on seedling density, growth and development, total and productive stem number, leaf surface formation and accumulation of biological dry mass, net photosynthesis productivity, crop structure formation, grain and straw yield, grain quality indicators, and the economic efficiency of agrotechnical measures applied during cultivation in the semi-desert region of Navoi region.

Experimental methods and techniques: Scientific research was carried out in 2023-2024 in the fields of the Novoy Scientific and Experimental Station of the Scientific and Research Institute of Grain and Legume Crops, in arable loamy-meadow soils. The experiment studied the influence of seed sowing dates and criteria on the growth, development and grain yield of the winter triticale variety "Svat". In the experiment, seeds of the winter triticale variety "Swat" were sown at three different planting dates (September 15, October 1, October 15) and three planting rates (4.0 million/ha, 5.0 million/ha, 6.0 million/ha).

The methodological manual "Methods of conducting field experiments" (2007) was used to select experimental sites and place variants, the methodological manual "Methods of State Variety Testing of Agricultural Crops" (Moscow, Kolos, 1964) was used to conduct phenological observation and calculation work on winter triticale, and the methodological manual "Methods of Irrigation Experiments" (Moscow, 1985) by B.A. Dospekhov was used to provide mathematical and statistical processing of the results obtained.

Preliminary agrochemical characteristics of the experimental area.

Soil layer, cm	Humus content, %	Total forms, %			Concentration of mobile forms, mg/kg.		
		N	P	K	$N\text{-}NO_3$	P_2O_5	K_2O
0-30	0.8 8 9	0.0 82	0.1 14	1, 40	10.1	24.0	174
30-50	0.6 35	0.0 63	0.0 93	1, 18	5.4	16.3	148

According to the data obtained, at the beginning of the implementation period (2023-2024), the humus content in the 0-30 cm layer of the experimental field soil was 0.889%, total nitrogen was 0.082%, phosphorus was 0.114%, and potassium was 1.40%. In the 30-50 cm layer of the soil, the humus content was 0.635%, total nitrogen was 0.063%, phosphorus was 0.093%, and potassium was 1.18%.

When analyzing the active forms of nutrients, it was found that the 0-30 cm layer of soil contained 10.1 kg/mg of nitrate, 24.0 kg/mg of mobile phosphorus, and 174 kg/mg of exchangeable potassium, while the 30-50 cm layer of soil contained 5.4 kg/mg of nitrate, 16.3 kg/mg of mobile phosphorus, and 148 kg/mg of exchangeable potassium.

In the feeding of winter triticale, urea (46%), ammonium nitrate (N–34%), superphosphate (P_2O_5 –20%) and potassium salt (K_2O–40%) were used as nitrogen fertilizers. In the experiment, 100% of phosphorus and potassium fertilizers were applied in the fall, under plowing. Nitrogen fertilizers were divided into two, the 1st feeding was applied during the accumulation period, and the 2 nd feeding was applied during the tillering period.

Practical results of the study : In the autumn "Swat" variety of triticale, high results in terms of the number of sprouted seedlings were observed in the variants whose seeds were sown on September 15,

and it was observed that the seeds showed a higher result of 2.4-4.2 units/m 2 compared to the variants sown on October 1. it was noted that the seeds showed a higher result compared to the options planted on September 15, up to 1.8-4.8 units/m^2 , compared to the options planted on October 15 ; It was also noted that planting seeds on September 15 compared to planting seeds on October 1 and October 15, during the ripening phase of triticale plants, the height of the stem is 6.6-12.6 cm, the leaf area is 1288.9-4108.3 m^2 /ha, and the accumulation of dry mass is higher up to 6.98-20.06 ts/ha; In the winter triticale plant, sowing seeds of the "Swat" variety on September 15 led to an increase in the total number of stems at all sowing rates, with the highest number observed in variants planted on October 1-15, up to 6.3-60.6 seeds/m^2 , while high results in terms of the number of productive stems were recorded in variants planted on October 1, with the highest number observed in variants planted on September 15 and October 15, up to 3.7-25.5 seeds/m^2 ; Sowing the seeds of autumn triticale varieties on October 15 ensured that the length of one spike was up to 0.4-0.9 cm, and the weight of 1000 grains was 1.2-3.6 g higher than the sowing of seeds on September 15 and October 1. It was determined that compared to planting on October 15, the number of grains in one ear is up to 1.0-2.7 grains, and the grain weight is up to 1.8-22.3 g/l; In terms of grain yield, triticale seeds were found in options planted at the rate of 6.0 million viable seeds per hectare on October 15, and the grain yield was higher by 0.7-16.8 t/ha compared to other options, but high economic profitability was observed in options planted at the rate of 4.0 million viable seeds per hectare on October 1, compared to other options It was noted that it was high from 4.6 to 38.5 percent.

According to the obtained results, when the seeds of the autumn triticale variety "Swat" were planted at the rate of 4.0-5.0-6.0 million germinating seeds per hectare in the period of September 15, it was found that the average grain yield was 72.1-70.5-62.4 ts/ha in the 1-2-3 options, while the seeds in the period of October 1 The grain yield of 4-5-6 options planted at the rate of 4.0-5.0-6.0 million fertile seeds per hectare was 74.7-76.8-78.5 t/ha, and the grain yield of the 7-8-9 options planted at the rate of 4.0-5.0-6.0 million fertile seeds per hectare during the period of October 15 was analyzed. It was observed that it was 69.4-77.2-79.2 ts/ha.

When the obtained grain yield was studied in terms of seed sowing standards, the highest yield was recorded in option 4, where seeds were sown on October 1, and seeds were sown on September 15 and October 15, at the rate of 4.0 million viable seeds per hectare. 2.6 t/ha to 5.2 t/ha additional grain yield compared to variants. According to the options planted at the rate of 5.0 million viable seeds per hectare, high grain yield was observed in option 8, where the seeds were sown in the period of October 15, and the seeds were 0.4 ts/ha to 6.7 ts/ha higher than the options planted at the rate of 5.0 million units of fertile seeds per hectare in the periods of September 15 and October 1. The high results of the options planted at the rate of 6.0 million fertile seeds per hectare were also determined in the option where the seeds were sown on October 15, and it was noted that the seeds were 0.7 t/ha to 16.8 t/ha higher than the options planted at the rate of 6.0 million fertile seeds per hectare in the periods of September 15 and October 1.

Conclusions: Based on the results of the study conducted to determine the optimal sowing dates and seed consumption rates for the period of sowing of winter triticale "Svat" variety in the conditions of gray-meadow soils in the semi-desert region of Navoi region, the following conclusions can be drawn:

1. Due to the moderate light, heat, and humidity of the winter triticale "Svat" variety when sowing on September 15, the seeds were sown at a rate of 4.0 million seeds per hectare, up to 2.4-6.0 seeds/m^2 when sowing at a rate of 5.0 million seeds per hectare, up to 3.5-9.0 seeds/m 2 when sowing at a rate of 6.0 million seeds per hectare , up to 4.2-12.6 seeds/m^2 when sowing at a rate of 6.0 million seeds per hectare. is observed to be high.

2. At the end of the period of planting autumn triticale seeds on October 1, the actual seedling thickness will be up to 2.2-4.8 pieces/m^2 compared to the options planted at the rate of 4.0 million viable seeds per hectare on September 15 and October 15 , and up to 3.5-4.6 units/m^2 compared to the options planted at the expense of 5.0 million viable seeds . It provides 1.8-5.1 units/m^2 higher than the options planted at the expense of 6.0 million viable seeds .

3. Sowing of autumn triticale seeds on October 15 has an effect on the duration of the growing period of the variety, and it is observed that compared to sowing of seeds on September 15, it is reduced to 23-24 days, compared to October 1, to 11-12 days.

4. The planting of autumn triticale seeds on September 15 has an effect on the stem height of the variety, reaching the ripening phase, the seeds are 8.5-12.6 cm compared to sowing at the rate of 4.0 million viable seeds per hectare in the period of October 1-15, 7.1-9.8 cm compared to planting at the expense of 5.0 million viable seeds, 6.0 million viable seeds it is observed that it is 6.6-8.7 cm higher compared to sowing at the expense of seeds.

5. The sowing of autumn triticale seeds in the period of September 15 will increase the total number of stalks to 6.3-40.2 units/m ^{2} compared to sowing at the rate of 4.0 million viable seeds per hectare in the period of October 1-15, up to 38.1-60.6 units/m ^{2} compared to the sowing of 5.0 million viable seeds per hectare , at the expense of 6.0 million viable seeds It is suggested that it will be 15.5-41.7 units/m^2 higher than the one planted, while the sowing of seeds on October 1 is 8.2-25.5 units/m^2 compared to the sowing of seeds on September 15 and October 15 at the rate of 4.0 million fertile seeds per hectare , compared to the sowing of 5.0 million fertile seeds 3.7-9.9 up to 8.4-25.1 pcs / m ^{2} compared to the one planted with 6.0 million pieces of fertile seeds .

6. High grain yield in autumn triticale was recorded in the variants sown at the rate of 6.0 million viable seeds per hectare on October 15, and the grain yield was higher by 0.7 t/ha to 16.8 t/ha compared to the options where the seeds were sown at the rate of 4.0-5.0-6.0 million viable seeds per hectare on September 15 and October 1. ensured that.

7. In the conditions of the soil and climate of the semi-desert region of Navoi region, it is recommended to plant autumn triticale at the rate of 4.0 million seeds per hectare when planted in the second decade of September, 4.0 million seeds per hectare when planted in the first decade of October, and 5.0 million seeds per hectare when planted in the second decade of October.

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