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EFFECT OF PLANTING DATES AND RATES ON PRODUCTIVITY AND GRAIN QUALITY PARAMETRES OF LOCAL AND FOREIGN VARIETIES OF WINTER BREAD WHEAT

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Abstract

The most important component for wheat cultivation in the irrigated condition is to determine optimal planting dates and rates. In this article, studied planting dates and rates of 20 foreign and local varieties of winter bread wheat, and their effect on productivity and grain quality indicators in the irrigated conditions of Uzbekistan.

Keywords: *winter bread wheat, variety, planting dates, planting rates, yield, test weight, protein and gluten content, TKW*

Introduction

Winter bread wheat is an important cereal not only in Uzbekistan but in Central Asia region also, the leading crop in terms of planted area, total production. Timely planting date and rate can play very important roles in wheat production in the irrigated conditions of Uzbekistan. If the planting process of winter wheat is not carried out at the optimal time, it will lead to decrease grain productivity. It is well known that early planting can produce more tillers compared to late planting it can lead to increase winter survival rate of winter wheat. Late planting date may a cause to less tillers and less developed root system. This, in turn, takes place in the conditions of long days and high temperatures in the spring months for budding and the formation of the root system. As a result, plant growth and development stops or plants can have least growth and underdeveloped root system. A poorly formed root is usually located in the upper layers of the soil, it cannot use the moisture in the deep layers. As a result, the plant is not sufficiently supplied with moisture, drought resistance and grain yield are sharply reduced (Gulyaev V.G., 1984.). The main objective of this experiment is to study effect of planting date and rates on winter wheat productivity and grain quality parameters.

Materials and methods

The experiment conducted in 2021––2023. 20 foreign and local winter bread wheat varieties studied in the experiment. In this experiment, four planting dates September 15, October 1, October 15 and November 1 used. There were also three planting rates were studied such as 3 mln, 4 mln and 5 mln seeds per hectare. The experimental design was a randomized complete block with four replications. Plot size was 50.4 m^2 (14 × × 3.60 m), distance between rows was 80 cm.

Mineral fertilizers applied at N-180 kg, P-90 kg, K-60 kg/ha. The split nitrogen fertilizer application was done in the experiment. First nitrogen application done prior to seeding at 30 kg/ha. Second nitrogen fertilizer applied in the amount of 100 kg/ha in early spring, and 50 kg/ha at the beginning of the flowering period. Phosphorus and potassium fertilizer application was done prior to seeding at the recommended rates 90 and 60 accordingly (Mominov A., and others. 2018). After each fertilizer application, irrigation was carried out at 800 m^3 of water.

The experiment was carried out in randomized complete block design with four replicates. Data analysis was performed using the Dospekhov (1985) methods.

Studied ahe effect of planting dates on the grain quality parameters of the varieties in the experiment, grain quality analyzes were carried out in laboratory conditions. Kjeldahl method used to determine protein content. The amount of gluten is determined by isolating raw gluten from dough mixed from ground grain and drinking water of a certain hardness, followed by washing it. The quality of gluten is determined by measuring the deformation of a ball of raw gluten under load over a certain period of time, expressed in conventional units of the gluten deformation index (GDI). The lower the GDI, the stronger the gluten; the higher it is, the weaker and more pliable the gluten.

Test weight carried out after the grain sample is cleared of impurities and after determining the moisture content in it. A knife is inserted into the hole of the cylinder, then a falling weight is placed on it. Then the filler is installed, and a filling cylinder is installed on it. The cylinder is filled with grain. After this, it is necessary to open the funnel damper so that the grain is poured into the filler.

Results

The first seeding rate was three mln/ha seeds per hectare was studied in this experiment. The average grain yield ranged between 4.54 (October 1) and 6.22 (September 15) tons per hectare, and the highest grain yield was recorded (6.22 t/ha) with Aziz variety followed by 6.10 t/ha Navbahor (October 1) and Alekseich (September 15), and 6.00 t/ha Vekha, Gurt, Temiryazevka-150 varieties where they planted in September 15. The lowest yield was obtained (4.54 and 4.73 t/ha) from Ultra (October 1), Ahmad, Vana varieties and Videya when they planted in September 15 or 0.3–1.8 t/ha less yield compared to other varieties and other panting and seeding rates. The mean grain yield of other varieties in the experiment was 5.0–5.6 t/ha (Figure 1).

Figure 1. *Effect of planting date and 3 mln seeding rate on productivity of winter bread wheat varieties.*

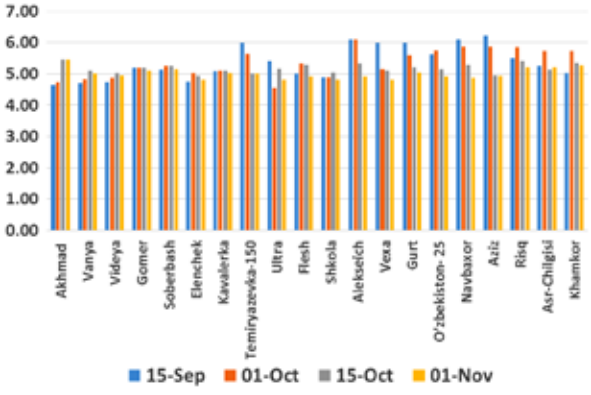
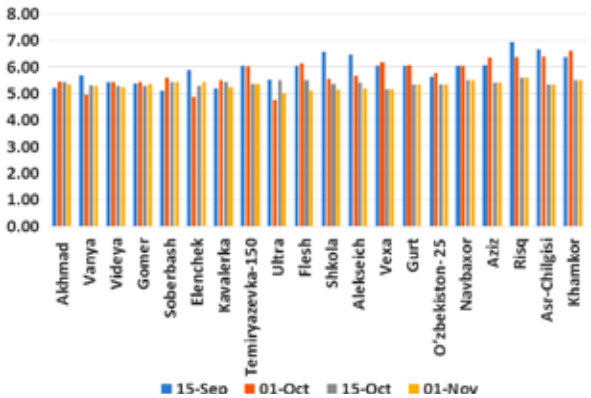


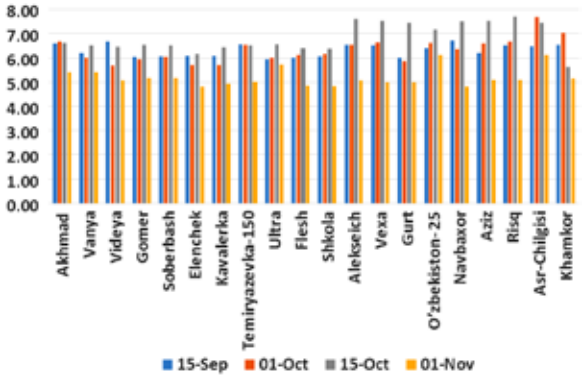
Figure 2. *Effect of planting date and 4 mln seeding rate on productivity of winter bread wheat varieties.*



Similar results were found in four mln seeding rate with four different planting dates in this experiment (Figure 2). The significant effect was also noticed on Risq variety (6.94 t/ha) in September 15 planting date. Winter wheat varieties productivity under October 1 planting date was numerically higher than other planting dates. The lowest yield obtained from Ultra, Elenchek, and Vanya varieties and are as follows: 4.77, 4.87 and 4.97 t/ha respectively. This can be explained as the October 1 planting date positively affect grain yield of Aziz, Risq, Asr-Chilgisi, Khamkor varieties (Figure 2).

In the third seeding rate, which is five million seeds per hectare, the mean grain yield ranged between 5.92 and 7.70 t/ha that is much more higher compared to 3 mln and 4 mln seeding rates. It is noted that the highest yield was recorded with Risq variety 7.70 t/ha in the planting date of October 15 while variety Asr Chilgisi had highest grain yield (7.67 t/ha) with planting date in October 1. There were several varieties that had higher yield in October 15 planting date, 7.61, 7.52, 7.51, 7.50, 7.43, 7.15 t/ha in the Asr-Chilgisi, Alekseich, Vexa, Aziz, Gurt and Navbaxor varieties respectively. The lowest yield was found 4.86 and 4.84 t/ha in the planting date of November 1 with Flesh and Shkola varieties respectively.

Figure 3. *Effect of planting date and 5 mln seeding rate on productivity of winter bread wheat varieties*



Kumar et al., (1994) reported that planting dates are important to determine grain quality. Full packages of grain quality parameters analyzed in this experiment. The highest grain quality parameters were determined in the varieties planted on October 15. The test weight ranged from 740 till 946 gr/l. The highest test weight recorded (946 gr/l) in Uzbekistan-25 variety, 942 gr/l in Ahmad variety, 926 gr/l in Risq variety, 924 gr/l in Alekseich variety (Figure 4).

Figure 4. *Effect of planting date on test weight of winter bread wheat varieties in the irrigated conditions*

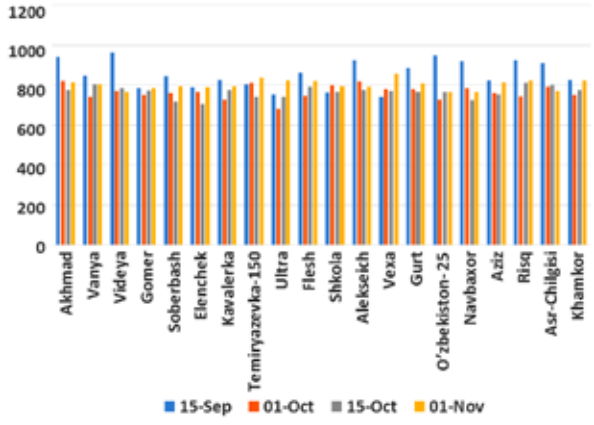
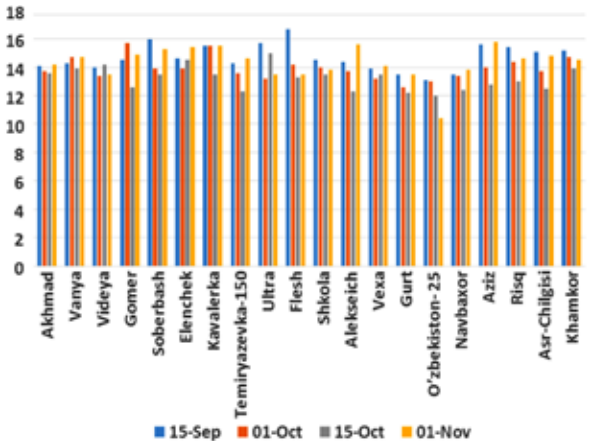


Figure 5. *Effect of planting date on protein content of winter bread wheat varieties in the irrigated conditions*



The average content of protein in the grain fluctuated from 13.5% till 16.7% (Figure 5), and the highest protein content in the experiment was recorded with planting date September 15. The highest protein content was obtained from the varieties Flesh (16.7%), Soberbash (16%), Ultra (15.7%), Aziz (15.6%), and Kavalerka (15.5%).

The highest gluten content was recorded (31.4%) with Aziz variety followed by Navbahor variety 29.8%, Ahmad and Elenchek

29.5%, Uzbekistan-25 and Vanya 29.4% varieties (Figure 6).

The TKW changed between four planting dates, 36.0–44.5g (September 15), 38.4–45.6 g (October 1), 39.5–44.8g (October 15) and 38.5–42.8 g (November 1). The highest TKW recorded with October 1 and October 15 (Figure 7).

Figure 6. *Effect of planting date on glutent content of winter bread wheat varieties in the irrigated conditions*

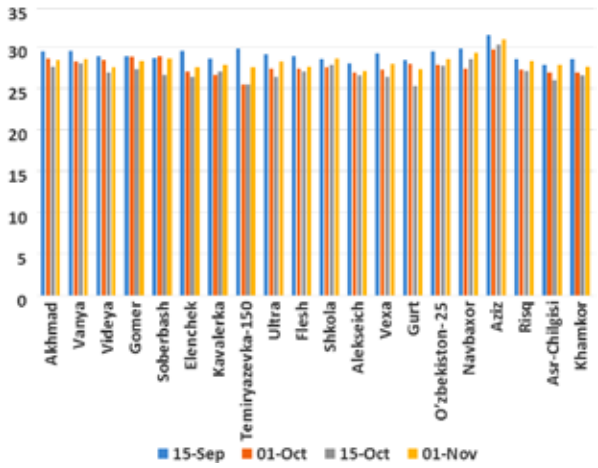
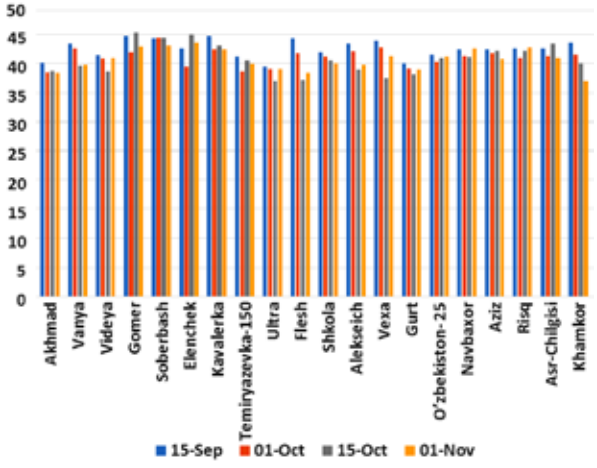


Figure 7. *Effect of planting date on TKW of winter bread wheat varieties in the irrigated conditions*



Conclusi1ons

Early seeding results in too many fall tillers, which may compete with each other, become diseased, and deplete soil moisture so that grain yields are low. Late seeding gives plants little time to develop tillers, resulting in an inadequate numbers of spikes (heads) for high yields the following spring.

Yield of winter bread wheat varieties increased with 5 mln planting rates compared to 3 mln and 4 mln seeds/ha.

Empirical evidence shows that foreign and local varieties can give highest winter bread wheat yield where planting date is October 15.

We clearly realize that grain quality parameters will be essential along with grain productivity in the irrigated conditions.

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