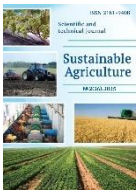
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Effect of Sowing Dates and Schemes on the Formation of Yield Components of Chickpea Varieties in Rainfed Areas

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a r t i c l e i n f o

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a b s t r a c t

The study describes the effect of three sowing times and five planting schemes on the yield components of Malhotra and Lazzat chickpea varieties under the conditions of rainfed lands in the Zarafshan Valley. The yield components analyzed include the number of pods per plant, the number of seeds per plant, and the mass of 1,000 seeds. Based on the data obtained, it was determined that the planting scheme and timing significantly influence the formation of chickpea yield components.

1. INTRODUCTION

Efficient use of rainfed lands in the republic plays a significant role in meeting the population's demand for protein-rich leguminous crops, improving their living standards, and enhancing the economic efficiency of farming households. The farming system used in the rainfed areas of the republic has evolved and improved over a long historical period, adapting to the specific climatic conditions of these lands. The agricultural system and agronomic practices used to grow cereals, legumes, and other rainfed crops in these regions are unique and have no counterparts in other irrigated desert or steppe areas of the world, including neighboring Kyrgyzstan and Kazakhstan. In these regions, the distribution of precipitation is uniform throughout the year. In contrast, the climate in our republic is characterized by seasonal precipitation, with the majority of rainfall occurring in the winter and early spring months.

Chickpea is an annual leguminous crop with a branched stem and deep root system. It is widely grown in dry and semi-dry environments, contributing significantly to meeting human protein demands and enhancing soil fertility and sustainability. Taking into account its importance in maintaining soil productivity and restoring fertility, growing chickpeas on family farms and household plots offers a valuable opportunity to increase household incomes.

Growing chickpeas not only addresses protein-related issues but also contributes to increasing grain production, improving soil fertility, and ensuring the production of environmentally clean products.

The variety and quantity of agricultural products are steadily increasing every year. In fact, the specific features of farming in this type of agriculture, particularly the inclusion of chickpea varieties in crop rotation, not only enhance the variety of products but also improve soil fertility, its cultivation, and the general physical properties of the soil. Studying and scientifically substantiating measures aimed at these improvements is one of the urgent tasks of today.

2. MATERIALS AND METHODS

In our experiments, the effect of sowing time and planting schemes on the yield components of the Malhotra and Lazzat chickpea varieties, registered in the State Register, was studied in the typical gray soils of rainfed lands in the Zarafshan Valley in the period from 2015 to 2017. The main crops were sown in three different terms (February 10, February 20, and March 2) and five planting schemes (60x6 cm, 60x9 cm, 60x12 cm, 60x15 cm, and 60x18 cm) to examine their effects on chickpea yield components.

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In the experiments, chickpea seeds of 1st class quality were used, with germination not less than 95%, moisture content not higher than 14%, and 100% purity. The chickpea seeds were sown at a depth of 3-5 cm in the soil. The experimental field was plowed to a depth of 20-22 cm, and after plowing, the soil was treated with harrowing to prevent moisture loss, then chiseling was carried out before sowing, and plots were divided into smaller sections.

The experimental plots were arranged in four replications and two levels, covering a total area of 8380 m². The plots consisted of four rows, with the central two rows being used for observation and calculation, while the outer two rows served as protective rows. Each variant had a length of 25 meters, a width of 2.4 meters, and an area of 60 m².

For the analysis of the yield structure of chickpea, 25 plants were randomly selected from each experimental variant. Phenological observations and calculations were conducted following the guidelines of the “Methodology for Field Experiments with Cotton” and "Methods for Conducting Field Experiments" (2007), adopted by UzPITI. The phenological observations followed the “Methodology of State Variety Testing of Agricultural Crops” (1989), while the statistical analysis of the results was performed according to B.A. Dospekhov’s methods (1985). The chemical composition of the soil and plants was analyzed based on the "Methodology of Agrochemical Analysis of Soils and Plants" (1977).

3. RESULTS AND ANALYSIS

It is known that one of the main factors determining the productivity of agricultural crops is the formation of yield components and their quantity.

In the initial 2015 experiments, among the first-term sowing variants of the Malhotra chickpea variety, the highest productivity indicators were found in the 5th variant sown in a 60x18 cm scheme. The number of pods per plant was 31.8, the number of seeds per plant was 37.2, and the mass of 1000 seeds was 326.2 grams.

In comparison with the control variant sown in the 60x6 cm scheme, the 5th variant in the 60x18 cm scheme showed an increase of 20.9 pods per plant, 25.1 seeds per plant, and 25.6 grams of 1000 seeds.

When comparing the first and second terms, the 5th variant sown in the 60x18 cm scheme during the first term showed 6.9 more pods per plant, 9.1 more seeds per plant, and 8.0 grams heavier 1000-seed mass compared to the second-term variant sown in the same scheme.

The increase in sowing density led to higher yield components, such as an increase in the number of pods per plant, number of seeds per plant, and 1000-seed mass across other variants as well.

In the third term, the increase in sowing density also affected the yield components, with the number of pods per plant ranging from 3.8 to 15.8 more, the number of seeds per plant ranging from 4.5 to 18.2 more, and the 1000-seed mass ranging from 6.2 to 27.4 grams more compared to the control variant sown in the 60x6 cm scheme.

When analyzing the Lazzat variety, the average number of pods per plant ranged from 15.6 to 35.2, the number of seeds per plant ranged from 19.1 to 41.8, and the mass of 1000 seeds ranged from 158.8 to 166.1 grams in 2015. The highest results were observed in the first decade of February (10.02) in the 60x18 cm scheme, where the number of pods per plant was 47.0, the number of seeds per plant was 57.9, and the mass of 1000 seeds was 172.3 grams. The lowest results were found in the first decade of March (02.03) in the 60x6 cm scheme, where the number of pods per plant was 10.9, the number of seeds per plant was 13.2, and the mass of 1000 seeds was 147.8 grams.

This pattern was maintained in subsequent years of the experiment.

Among the varieties studied, the highest yield was observed in the Lazzat variety, with the number of pods per plant being 47.0, the number of seeds per plant being 57.9, and the 1000-seed mass being 172.3 grams, while the lowest yield was observed in the Malhotra variety with 31.8 pods, 37.2 seeds, and 326.2 grams of 1000-seed mass. The difference in yield component formation between these two varieties was found to be 15.2 more pods, 20.7 more seeds, and 253.9 grams more in the Lazzat variety, and this difference was linked to the seedling retention during the vegetative phase across all sowing variants.

4. CONCLUSION

The experiment revealed that as sowing dates were delayed, a decrease in the number of pods per plant, the number of seeds per plant, and the mass of 1000 seeds was observed in the studied varieties. In the first term, compared to the second term sowing variants, the number of pods per plant decreased by 1.6 to 7.7, the number of seeds per plant by 1.9 to 10.9, and the mass of 1000 seeds by 6.2 to 10.1 grams. Similarly, in the third term, these indicators decreased by 2.1 to 5.6 pods per plant, 2.6 to 7.1 seeds per plant, and 3.4 to 5.2 grams of 1000-seed mass.

The results of the experiments conducted in 2016-2017 also confirmed the trends observed in 2015. The increase in sowing density resulted in higher yield components in all three terms when compared to the 60x60-1 cm control variant. The highest productivity indicators were observed with the increase in sowing density across all sowing dates.

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