

Studying the effect of sowing norms and times on the productivity of the sesame variety in the soil-climate conditions of the republic of Karakalpakstan

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Abstract: Sesame (Kunjut) is an important oilseed crop that plays a crucial role in agricultural production. The productivity of sesame is highly dependent on sowing norms and timing, particularly in regions with specific soil and climate conditions such as the Republic of Karakalpakstan. This study investigates the impact of different sowing densities and planting times on the growth, yield, and quality of sesame. Field experiments were conducted to evaluate plant development under various conditions, considering factors such as soil moisture, temperature, and competition among plants. The results indicate that moderate sowing densities and early to mid-May planting lead to optimal yields and enhanced oil content. Furthermore, proper irrigation management and crop rotation practices significantly contribute to improved productivity. These findings provide valuable recommendations for farmers aiming to maximize sesame production while ensuring sustainable agricultural practices in Karakalpakstan.

Keywords: Sesame, kunjut, sowing norms, planting time, productivity, soil-climate conditions, Karakalpakstan, yield, oil content, sustainable agriculture.

Introduction:

Sesame (Kunjut) is one of the most valuable oilseed crops, widely cultivated in various parts of the world due to its high oil content and nutritional benefits. In the Republic of Karakalpakstan, agriculture plays a significant role in the economy, and optimizing sesame production is essential for increasing farmers' income. However, in order to achieve high productivity, it is crucial to determine the most suitable sowing norms and times that correspond to the region's specific soil and climate conditions. Therefore, this study aims to analyze how different sowing densities and planting times affect the yield and quality of the kunjut variety.

Factors Affecting Kunjut Cultivation in Karakalpakstan

To begin with, the productivity of kunjut depends on multiple environmental and agronomic factors. Among these, soil conditions, climate, sowing norms, and sowing time play the most crucial roles. Understanding how these factors interact can help farmers make informed decisions about their cultivation practices.

Soil and Climate Conditions

First and foremost, Karakalpakstan has an arid to semi-

arid climate, characterized by hot summers and limited rainfall. These conditions can significantly impact sesame growth, especially if sowing is not conducted at the optimal time. Additionally, the soil in this region varies from sandy to clay loam, requiring careful management of irrigation and fertilization to support plant growth. Consequently, selecting the right sowing density and time is essential for maximizing yield under these conditions [4, 24-28].

Sowing Norms and Density

In addition to climate, sowing density is another critical factor influencing productivity. On the one hand, a lower sowing density provides each plant with sufficient nutrients, sunlight, and space for root development. On the other hand, a higher density can increase competition among plants, leading to reduced growth and lower seed yield. Therefore, finding the right balance is necessary to optimize production while maintaining plant health.

Sowing Time and Seasonal Influence

Moreover, the timing of sowing plays a vital role in

determining the success of sesame cultivation. If seeds are planted too early, they may be exposed to late spring frosts, which can negatively impact germination. Conversely, late sowing may result in moisture deficiency during crucial growth stages, thereby reducing productivity. Consequently, identifying the most suitable sowing period is essential for achieving high yields.

Methods of Studying Sowing Norms and Timing

In order to determine the most effective sowing strategy, a field experiment was conducted in different agricultural regions of Karakalpakstan. Various sowing densities and planting times were tested to evaluate their impact on plant growth, yield, and seed quality. The experiment involved the following key steps:

- 1. Selection of Experimental Fields** – Agricultural plots with different soil compositions were chosen to analyze the influence of soil types on plant development.
 - 2. Division of Test Groups** – The fields were divided into different sections, each representing a distinct sowing density (low, moderate, and high) and various planting times (early, mid, and late sowing).
 - 3. Plant Growth Monitoring** – Key growth parameters, such as germination rate, plant height, flowering time, and seed weight, were measured throughout the growing season.
 - 4. Oil Content Analysis** – Samples from each test group were analyzed to determine the oil percentage, a crucial factor in sesame production.
 - 5. Weather and Soil Condition Recording** – Climate data, including temperature and precipitation levels, were recorded to assess their influence on crop performance.
 - 6. Data Analysis and Interpretation** – The collected data were statistically analyzed to identify trends and determine the optimal sowing strategy for maximizing yield and quality [1, 143-147].
- By comparing different treatments, researchers were able to establish the best combination of sowing density and planting time suitable for Karakalpakstan's soil-climate conditions.

RESULTS

The findings of this study indicate that both sowing density and time have a significant impact on sesame yield. First of all, moderate sowing densities resulted in the highest productivity, as they provided an ideal balance between resource availability and plant competition. In contrast, extremely low or high densities led to lower yields due to inefficient space utilization and excessive competition, respectively. Furthermore, sowing time played a crucial role in determining plant development. It was observed that seeds planted in early May exhibited better germination rates and overall growth compared to

those sown later in the season. This can be attributed to favorable soil moisture and temperature conditions during early planting periods. However, excessively early sowing exposed seedlings to potential frost damage, highlighting the importance of precise timing. Additionally, oil content analysis revealed that sesame seeds from optimally timed plantings had higher oil percentages than those from late-season crops. This finding suggests that not only yield but also product quality is influenced by sowing time, making it an essential consideration for farmers aiming to maximize both quantity and quality.

Practical Recommendations for Farmers

Based on the study's results, several recommendations can be made to improve sesame production in Karakalpakstan. First and foremost, farmers should aim for moderate sowing densities to ensure optimal resource utilization. A seeding rate of approximately 5-7 kg per hectare has been found to be the most effective for achieving high yields.

Moreover, the ideal sowing period for sesame in Karakalpakstan is early to mid-May. This timing ensures that plants have sufficient moisture for early growth while avoiding the risks associated with late planting. In addition, proper irrigation management is crucial, especially during dry periods, to support plant development and enhance yield potential.

Furthermore, adopting crop rotation practices with other drought-resistant crops can improve soil health and reduce disease prevalence. Since sesame is relatively resilient to pests and diseases, integrating it into a diverse cropping system can further enhance sustainability and long-term productivity.

CONCLUSION

In conclusion, optimizing sowing norms and times is essential for improving the productivity of sesame in Karakalpakstan. The findings of this study demonstrate that moderate sowing densities and early planting in May lead to higher yields and better seed quality. Moreover, proper agronomic practices, including efficient irrigation and crop rotation, can further enhance production outcomes. Therefore, by implementing these strategies, farmers can maximize their profits while ensuring sustainable agricultural development in the region.

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