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THE EFFECT OF DIFFERENT PLANTING DATES AND SCHEMES ON THE GROWTH AND GRAIN YIELD OF MAIZE HYBRIDS

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Abstract

The study describes the impact of two planting dates and three sowing rates on the morphological traits and grain yield of maize hybrids Market (Hiva) F1 and Qorasuv 350 AMB when grown as a secondary crop in light gray soil conditions. The findings indicate that the development stages and grain yield of maize are influenced by the sowing rate and planting date.

Keywords: *Sowing date, seeding rate, plant density, plant height, hybrid, scheme, Market (Khiva) F1 and Korasuv 350 AMB.*

Introduction. Maize is considered one of the most valuable and high-yielding crops. It is used for various purposes, such as human food, animal feed, and industrial processing. In Uzbekistan, maize is primarily cultivated for green fodder and grain.

In terms of productivity, maize surpasses other cereal and fodder crops. Currently, the average maize yield in Uzbekistan is 25–30 centners per hectare for grain and 200–250 centners per hectare for green fodder. However, this is 2–2.5 times lower compared to other countries [1].

In recent years, opportunities have been created in Uzbekistan to cultivate secondary crops on fields vacated after winter cereals, allowing for double cropping in a single year. In the central climatic regions, winter wheat is typically harvested between June 10 and 20. If the cultivation practices for secondary crops, such as irrigation, the use of mineral and organic fertilizers, and other agronomic measures, are well-coordinated, it is possible to achieve high-quality and abundant yields from secondary crops [2].

A.S. Khalikov and colleagues developed recommendations for planting intermediate winter crops (rye, oats, legumes, perko, rapeseed) in various soil and climatic conditions of Uzbekistan and then planting silage maize varieties after their harvest. These recommendations indicate that planting multiple crops in a year can yield over 200 feed units per hectare [5].

Materials and methods. The experiments were conducted to study the effects of two planting dates and three sowing rates on the morphological traits and grain yield of maize hybrids Market (Hiva) F1 and Qorasuv 350 AMB, which are registered in the State Register. The study was carried out under light gray soil conditions, using these hybrids as secondary crops.

To develop high-yielding cultivation technology, different planting schemes (70x15 cm, 70x20 cm, and 70x25 cm) were evaluated, with planting carried out on two dates: June 10 and June 30. The effects of these planting dates and sowing rates on the morphological traits and grain yield of maize were analyzed.

Results and discussion. During the experimental years, maize varieties and hybrids were sown following winter barley on June 10 (2022) and June 12 (2023). Fifty percent germination of the sown seeds was observed by June 16, approximately 5–6 days after sowing.

For the first planting date, the growth and development period of the Market (Hiva) F1 hybrid averaged 89 days when sown at a 70x15 cm scheme, 89 days at 70x20 cm, and 86 days at 70x25 cm. For the Qorasuv 350 AMB hybrid, these durations were 98, 96, and 96 days, respectively. When seeds were sown after winter wheat (second planting date), the growth and development period for Market (Hiva) F1 was extended by 1 day (70x25 cm) and 2 days (70x15 cm, 70x20 cm), while for Qorasuv 350 AMB, it increased by 1 day for the 70x20 cm and 70x25 cm schemes.

In the 2023 experiment, maize hybrids were sown after winter barley (first planting date) on June 10, with 50% germination observed across all variants by June 14. The onset of growth phases varied slightly between planting schemes. As plant density increased, the initiation of growth phases was delayed by 1–2 days. When maize was sown after winter wheat (second planting date) on July 1, the delays in growth phases for Market (Hiva) F1 were 1–3 days (tasseling and silking) and 1–4 days (grain ripening). For Qorasuv 350 AMB, these delays were 1–2 days.

In the second planting period, maize seeds were sown on June 30. Emergence of 50% of the seeds was observed on July 9. According to the planting schemes, the Sultan growth stage for the hybrid Market (Hiva) F1 occurred on September 2, and the cob stage on September 4, with grain ripening on October 4. For the Qorasuv 350 AMB hybrid, the Sultan and cob stages appeared 9–10 days later than the Market (Hiva) F1 hybrid, but due to an early frost, grain yield could not be harvested.

The duration of the growth period for maize hybrids varied significantly depending on the tested planting dates and schemes. For instance, the growth period for the Market (Hiva) F1 hybrid was uniform, lasting 87 days when sown at 70x15 cm and 70x20 cm schemes, and 85 days at a 70x25 cm scheme during the first planting period. In the Qorasuv 350 AMB hybrid, the growth periods corresponded to 98, 97, and 96 days, respectively, depending on the planting scheme.

In the second planting period, the growth period for the Qorasuv 350 AMB hybrid was one day longer across all planting schemes compared to the first planting period. In both planting periods, an increase in plant density extended the growth period by 1–2 days. The growth period of the Qorasuv 350 AMB hybrid was observed to be 10–11 days longer than the Market (Hiva) F1 hybrid during the first planting period and 11–13 days longer during the second planting period.

Thus, an increase in plant density extended the growth period by 1–2 days in both planting periods. The growth period for the Qorasuv 350 AMB hybrid was consistently 10–11 days (first planting period) and 11–13 days (second

planting period) longer than that of the Market (Hiva) F1 hybrid. The grain and stalk yields of the tested maize hybrids varied depending on the planting dates and schemes. For instance, when sown after winter barley (first planting period), the average grain yield of the Market (Hiva) F1 hybrid was 46.1 t/ha at the 70x15 cm scheme, 50.9 t/ha at 70x20 cm, and 37.9 t/ha at 70x25 cm. For the Qorasuv 350 AMB hybrid, the corresponding yields were 55.3 t/ha, 59.6 t/ha, and 47.3 t/ha.

In the second planting period, the average grain yields were as follows: for the Market (Hiva) F1 hybrid – 48.1 t/ha (70x15 cm), 52.2 t/ha (70x20 cm), and 38.3 t/ha (70x25 cm); for the Qorasuv 350 AMB hybrid – 59 t/ha, 63.7 t/ha, and 49.2 t/ha, respectively. Based on the analysis of the experimental data, the highest grain yield was achieved with a plant density of 71,000 plants per hectare. The highest grain yield from the maize hybrids was obtained when seeds were sown at a 70x20 cm scheme. For all planting schemes tested, the highest grain yield was recorded for maize sown after winter wheat.

Conclusion. The average grain yield of the maize hybrids sown after winter barley (first planting period) was as follows: for the Market (Hiva) F1 hybrid, 48.1 t/ha at the 70x15 cm scheme, 50.9 t/ha at 70x20 cm, and 41.9 t/ha at 70x25 cm. For the Qorasuv 350 AMB hybrid, the corresponding yields were 55.3 t/ha, 59.6 t/ha, and 47.3 t/ha.

In the second planting period, the average grain yields were as follows: for the Market (Hiva) F1 hybrid, 49.1 t/ha at the 70x15 cm scheme, 52.2 t/ha at 70x20 cm, and 42.3 t/ha at 70x25 cm; for the Qorasuv 350 AMB hybrid, 59 t/ha, 63.7 t/ha, and 49.2 t/ha, respectively.

The net profit from the Market (Hiva) F1 hybrid sown after winter barley (first planting period, variants 1–6) was 952,000 UZS/ha at the 70x15 cm scheme, 1,808,500 UZS/ha at 70x20 cm, and 507,400 UZS/ha at 70x25 cm. For the Qorasuv 350 AMB hybrid, the net profit varied according to the planting schemes: 2,117,400 UZS/ha, 3,243,500 UZS/ha, and 1,390,200 UZS/ha, respectively.

Thus, the increase in plant density and the corresponding rise in yield significantly enhanced net profit per hectare. Notably, the highest net profit was achieved with seeds sown at a 70x20 cm scheme, while the lowest profit was observed at the 70x25 cm scheme.

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