THE EFFECT OF PLANT DENSITY ON THE YIELD OF SWEET CORN

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Annotation. Sweet corn (*Zea mays* L. saccharata) is an important vegetable crop valued for its high nutritional quality, relatively short growing period, and increasing demand in fresh and processed food markets. Among the agronomic factors affecting sweet corn productivity, plant density plays a particularly important role because it determines the spatial distribution of plants and their access to light, water, mineral nutrients, and soil resources. This article examines the influence of plant density on the growth, yield formation, and quality characteristics of sweet corn. A literature-based analytical approach was used to evaluate the relationship between plant population and individual plant productivity. The analysis indicates that increasing plant density can enhance yield per unit area up to an optimum level; however, excessive density intensifies competition among plants and may reduce ear size, individual ear weight, kernel development, and marketable yield. Conversely, excessively low density can improve the development of individual plants but may result in inefficient utilization of the production area.

Keywords: sweet corn, *Zea mays saccharata*, plant density, plant population, yield, ear weight, ear size, crop productivity, vegetable maize, crop management.

Introduction. Sweet corn (*Zea mays* L. saccharata) is an economically valuable vegetable crop cultivated for fresh consumption, processing, and various food products. Unlike grain maize, sweet corn is harvested at the milk stage, when the kernels contain high concentrations of soluble sugars and possess desirable sensory characteristics. The crop has a relatively short production cycle, which makes it suitable for intensive vegetable production and, in favorable climatic conditions, for repeated cropping systems.

The productivity of sweet corn depends on the interaction of genetic characteristics and environmental and agronomic factors. Cultivar selection, planting date, soil fertility, irrigation, mineral nutrition, weed control, and plant density all influence crop development and final yield.

Plant density is particularly important because it determines the number of plants occupying a given area. Increasing the number of plants per hectare can potentially increase total ear production per unit area. However, each plant has a limited amount of space and available resources. When plant density becomes excessive, competition for sunlight, water, nutrients, and root-zone space becomes stronger.

Materials and Methods. This study was prepared using a scientific literature-based analytical approach focusing on the relationship between sweet corn plant density and yield formation.

The principal factor considered was plant density, expressed as the number of plants per unit of cultivated area. Plant density can be modified through changes in row spacing and intra-row plant spacing.

The following growth and productivity indicators were considered for evaluating the effect of plant density:

- plant height;
- number of leaves per plant;
- leaf area;
- stem development;
- ear formation;
- ear length;
- ear diameter;
- number of kernels per ear;
- individual ear weight;
- proportion of marketable ears;

- total yield per unit area;
- marketable yield.

The theoretical relationship between plant density and yield can be represented as:

Total yield = plant population × average yield per plant.

This relationship demonstrates why increasing plant density does not automatically result in proportional yield increases. If plant population increases while the productivity of each plant declines substantially, total yield may eventually reach a plateau or decrease.

Discussion. Plant density strongly influences the spatial environment in which sweet corn plants develop. At low density, plants generally have greater access to sunlight and soil resources. Their leaves can occupy a larger spatial area, and individual plants may develop stronger stems and more extensive root systems.

As plant density increases, competition for available resources becomes stronger. Neighboring plants begin to intercept a greater proportion of available solar radiation, while their root systems occupy overlapping soil zones.

One of the most important consequences of dense planting is modification of the crop canopy. A sufficiently dense canopy can improve light interception at the field level, which may increase total photosynthetic productivity. However, excessive density can cause mutual shading, particularly within the lower and middle portions of the canopy.

The optimum density is therefore associated with a canopy structure capable of capturing available radiation efficiently without creating excessive competition among individual plants. **Table 1. General relationship between plant density and sweet corn productivity**

Plant density	**Competition level**	**Individual plant development**	**Ear characteristics**	**Expected field productivity**

Low	Low	Strong	Larger ears	Moderate
Moderate	Balanced	Good	Uniform, well-developed ears	High
High	Increased	Restricted	Smaller individual ears may occur	High to moderate
Excessively high	Very high	Strongly restricted	Reduced size and quality	May decline

Conclusion. Plant density is a major agronomic factor influencing the productivity and quality of sweet corn. Increasing plant population can improve the utilization of cultivated land and increase the number of ears per unit area. However, excessive density intensifies competition for light, water, nutrients, and soil space, which may reduce individual plant productivity and negatively affect ear size and marketability.

The highest plant population should therefore not automatically be considered the most productive option. An optimum density must provide an appropriate balance between the number of plants per hectare and the productivity of individual plants.

The response of sweet corn to plant density is influenced by cultivar characteristics, soil fertility, irrigation regime, planting date, climatic conditions, and the intended use of the harvested product. For this reason, locally adapted field experiments are necessary to determine the most suitable density for a particular production system. Optimizing plant density together with balanced fertilization, adequate irrigation, appropriate planting dates, and effective crop protection can improve resource-use efficiency and contribute to stable production of high-quality sweet corn.

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