THE IMPORTANCE OF PLANTING TIME IN INCREASING ROOT MASS OF SWEET CORN

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Annotation. Sweet corn (*Zea mays* L. saccharata) is an important vegetable crop with high nutritional and economic value. The formation and development of the root system play a major role in determining plant growth, nutrient uptake, water utilization, resistance to environmental stresses, and final productivity. Planting time is one of the key agrotechnical factors influencing root development because it determines the temperature, moisture, and other environmental conditions during seed germination and subsequent plant growth. This article discusses the importance of planting time in increasing the root mass of sweet corn and explains the relationship between soil temperature, moisture availability, root growth, and plant development. Early planting under unfavorable soil temperature conditions may delay germination and restrict root development, while excessively late planting can expose plants to high temperatures and moisture deficiency.

Keywords: sweet corn, planting time, root mass, root system, soil temperature, soil moisture, plant growth, yield, agrotechnology.

Introduction. Sweet corn is widely cultivated as a vegetable crop because of its pleasant taste, high carbohydrate content, vitamins, minerals, and relatively short growing period. The productivity and quality of sweet corn are determined by genetic characteristics as well as environmental and agrotechnical factors. Among these factors, planting time has a particularly important role because it affects the environmental conditions under which seeds germinate and plants establish their root and above-ground systems. The root system is the primary organ responsible for absorbing water and mineral nutrients from the soil. A well-developed root system

provides plants with better access to soil moisture and nutrients and increases their ability to tolerate temporary environmental stresses. In sweet corn, intensive root development during the early stages of vegetation is especially important because it supports rapid leaf formation and subsequent accumulation of assimilates.

Materials and Methods. The study was based on an analysis of the biological characteristics of sweet corn and the influence of different planting periods on root development. The research approach considered the relationship between planting date, soil temperature, soil moisture, duration of seed germination, and accumulation of root biomass.

Sweet corn plants were considered under different planting periods corresponding to early spring, optimal spring, and relatively late planting conditions. During the vegetation period, the development of the root system was evaluated at different plant growth stages.

The main indicators considered were:

- duration of seed germination;
- seedling emergence rate;
- root length;
- number of developed lateral roots;
- fresh root mass;
- dry root mass;
- root-to-shoot growth relationship;
- general plant vigor.

Root samples can be collected by carefully excavating individual plants together with the surrounding soil. The roots are washed with water to remove soil particles and then separated from the above-ground part. Fresh root mass is determined immediately after sampling. For determination of dry biomass, root samples are dried to a constant weight and subsequently weighed.

Soil temperature and moisture are important environmental indicators when evaluating the effect of planting time. The obtained observations are compared among planting periods to determine the conditions that contribute to intensive root formation.

Discussion. Effect of planting time on root development

Planting time has a direct influence on the initial development of sweet corn roots. Following sowing, the seed requires adequate moisture and temperature for rapid germination. The speed and uniformity of emergence subsequently determine the beginning of active root development.

When sweet corn is planted during a period with favorable soil temperature and sufficient moisture, the seed germinates more rapidly. Seedlings establish their primary roots quickly, followed by the formation of lateral and nodal roots. As the root system expands, the plant obtains access to a larger volume of soil, which improves water and nutrient uptake.

Planting too early can have the opposite effect. Low soil temperatures slow physiological processes associated with germination and root growth. Under such conditions, seedlings may emerge unevenly and remain weak for a longer period. Delayed root development can subsequently limit nutrient uptake and reduce the plant's ability to utilize favorable conditions later in the growing season.

Late planting can also negatively influence root biomass. Although warm soil promotes rapid germination, excessively high temperatures combined with reduced soil moisture may restrict root elongation and branching. In addition, high evaporative demand increases water consumption, creating conditions in which the young root system must develop under greater moisture stress.

Relationship between soil temperature and root mass

Soil temperature is one of the most important factors determining the early growth of sweet corn. The metabolic activity of germinating seeds and young roots

depends strongly on temperature. Under moderate and favorable temperatures, root cells actively divide and elongate, resulting in greater root length and biomass.

An appropriate planting period therefore provides a balance between temperature and moisture. This balance is more important than temperature alone because high temperatures cannot compensate for inadequate soil moisture.

The formation of a large root mass is generally associated with a greater capacity to absorb nutrients and water. Plants with stronger root systems are better able to maintain active leaf growth and photosynthetic activity. Consequently, the effect of planting date on root biomass may also indirectly influence the development of the above-ground plant and final ear formation.

Influence of soil moisture. Soil moisture is particularly important during the germination and early vegetative stages. Adequate moisture ensures the absorption of water by seeds and supports cell expansion during root growth.

Under irrigated conditions, maintaining appropriate soil moisture can reduce the negative effects of unfavorable weather conditions. However, excessive soil moisture may also limit root respiration by reducing soil aeration. Therefore, the most favorable conditions for root development are created when the soil contains sufficient moisture while maintaining adequate air exchange.

The interaction between planting date and irrigation is particularly important in repeated sweet corn production. Crops planted during warmer periods require more careful irrigation management because evaporation and plant water consumption increase.

Conclusion. Planting time is an important agrotechnical factor determining the formation and accumulation of root mass in sweet corn. The development of the root system depends strongly on the combination of soil temperature, moisture, aeration, and the duration of favorable growing conditions.

Planting under excessively cold conditions can delay germination and restrict early root development, whereas very late planting may expose plants to high temperatures and moisture stress. In contrast, planting during an agronomically favorable period promotes rapid emergence, active root elongation, formation of lateral and nodal roots, and accumulation of root biomass.

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