

Fertigation Conflict in the Production of Banana

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In banana farming, fertilization-the process of applying nutrients through irrigation systems has shown to be a very effective nutrient management strategy. This paper offers a thorough analysis of fertigation techniques used in banana farming, outlining its advantages, difficulties, and recommended practices. In addition to discussing the several types of fertilizers that can be used, irrigation systems that are appropriate for fertigation, application techniques, timing, and the effects of fertigation on banana production, quality, and environmental sustainability, it also covers the many facets of fertigation. The review also addresses potential future developments and future research avenues to improve fertigation techniques for environmentally friendly banana farming.

The banana (*Musa spp.*) is one of the most significant fruit crops in the world, prized for its economic importance, adaptability, and nutritional worth. Fertigation provides a precise and regulated way of supplying nutrients directly to the root zone, which is crucial for optimizing banana yields and quality. Fertigation makes it possible to apply water-soluble fertilizers on schedule using irrigation systems, which maximizes nutrient uptake by banana plants and reduces nutrient losses. This review investigates how fertigation helps banana crops satisfy their nutritional needs and how it might improve farming productivity and sustainability.

Nutrient Requirements of Banana Plants

At various phases of growth, banana plants require different nutrients; the three most important nutrients are nitrogen (N) phosphorus (P) and potassium (K). While nitrogen encourages vegetative growth and general plant vigor, potassium is necessary for fruit development and quality. Early growth stages and the formation of roots depend

heavily on phosphorus. Furthermore, banana plants require micronutrients including zinc, calcium, and magnesium for a number of physiological functions. Fertigation enables accurate control of the quantities of nutrients in irrigation water, guaranteeing banana plants the best possible nutrient absorption during the growth season.

Types of Fertilizers Used in Fertigation

Fertigation can make use of a broad variety of water-soluble fertilizers, including phosphorus- and nitrogen-based fertilizers like monoammonium phosphate and diammonium phosphate, potassium-based fertilizers like potassium nitrate and potassium sulfate, and nitrogen-based fertilizers like urea, ammonium nitrate, and calcium nitrate. Furthermore, particular nutrient shortages in banana plants can be addressed by adding micronutrient fertilizers to fertigation solutions. The crop growth stage, nutritional needs, and soil quality all influence the fertilizer decision.

Fertigation Systems and Application Methods

In banana farming, fertigation can be accomplished using a variety of irrigation techniques, including as drip irrigation, sprinkler irrigation, and micro-sprinkler irrigation. Because drip irrigation is so effective at delivering exact amounts of water and nutrients straight to the root zone, it is the most widely used method for fertigation in banana plants. Depending on the irrigation system and nutrient management plan used, fertigation can be administered via continuous injection, periodic injection, or fertigation tanks.

Benefits of Fertigation in Banana Cultivation

In banana farming, drip irrigation, sprinkler irrigation, and micro-sprinkler irrigation are some of the irrigation technologies that may be utilized for fertigation. Because of its effectiveness, consistency,

and capacity to provide exact amounts of water and nutrients straight to the root zone, drip irrigation is the most often used method for fertigation in banana plants. Depending on the irrigation system and nutrient management approach used, fertigation can be done by fertigation tanks, periodic injection, or continuous injection.

Importance of Fertigation in Banana

- Generally, plantain crops require excessive chemical fertilizers, for which farmers are giving threat by digging pits around plantains and using drip irrigation method. Since the plantain crop is long-necked, fertilizer has to be given from time to time.
- If the chemical fertilizers are given at the right time and in the right amount with drip system, one can get very good production and income along with saving of fertilizer.



Fig. 1: Fertigation in Banana Plantation

Challenges and Best Management Practices

Fertigation has many advantages, but there are drawbacks as well. These include the potential for irrigation emitter clogging, variations in water quality, and changes in nutrient availability. Adopting best management practices such as routine irrigation and nutrient level monitoring, irrigation system maintenance, high-quality fertilizer selection, and fertigation schedule adjustments based on crop needs and environmental conditions—is crucial to overcoming these obstacles.

Impact of Fertigation on Banana Yield, Quality and Environmental Sustainability

The benefits of fertigation on banana productivity, fruit quality, and environmental sustainability have been shown in several research. Comparing fertilized banana crops to conventionally fertilized ones, the former show lower frequency of nutrient-related problems, superior flavor and texture, greater fruit size, and higher yields. Fertigation also minimizes greenhouse gas emissions from fertilizer application, soil deterioration, and groundwater pollution by reducing nutrient losses to the environment.

Future Prospects and Research Directions

Due to the rising demand for premium bananas and the necessity for sustainable agricultural techniques, fertigation is projected to be used more often in banana farming in the upcoming years. In the future, research should concentrate on developing nutrient management strategies to address particular nutrient deficiencies and crop requirements, optimizing fertigation protocols for various banana cultivars, soil types, and environmental conditions, and assessing the long-term effects of fertigation on soil health, biodiversity, and ecosystem services.

Conclusion

Fertigation is a very effective fertilizer management approach that has several advantages for growing bananas, such as better crop production and quality, lower environmental impact, and enhanced nutrient usage efficiency. Fertigation supports maximum nutrient uptake by banana plants, leading to healthier, more productive harvests by precisely delivering water and nutrients to the root zone. To overcome obstacles and optimize fertigation's advantages, however, rigorous planning, oversight, and administration are necessary for its successful implementation. In order to encourage the adoption of fertigation techniques and improve sustainability in banana farming, more research and extension work are required.

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