JUST AGRICULTURE
multidisciplinary e-Newsletter

Zinc Deficiency Predisposes Guava Crops to Fatio Disease: A Study on Symptomatology

Reetika Sharma[1] and Rakesh Kumar[2]
[1]Research Scholar, SKUAST-Jammu
[2]Associate Professor, Division of Fruit Science, SKUAST-Jammu

ARTICLE ID: 101

Introduction

Through agriculture and the products that result from it, soil is connected to the health of humans and other creatures. Crop plants obtain the necessary nutrients for growth and development, mostly from the soil. Lack of phyto-available nutrients in soils has a negative impact on crop output, nutrient content of agricultural products, and ultimately, human and animal health. Numerous researchers from around the world have noted micronutrient deficiencies in various soils under cultivation, in addition to deficiencies of the macronutrients nitrogen (N), phosphorus (P), and potassium (K). These deficiencies include zinc (Zn), boron (B), iron (Fe), copper (Cu), manganese (Mn), and sulphur (S). Increased cropping intensity, high-yielding cultivars of various crops, increased use of NPK fertilisers with zero to very low micronutrient contents, minimal to no application of organic manures, and improved soil and plant analysis technologies are the main causes of the appearance of micronutrient deficiencies in various soils. Due to variations in soils, climatic conditions, crops, and agricultural management options, the proportion of micronutrient and phosphorus deficits varies throughout different regions of a country, such as districts and states. Crops grown on soils deficient in micronutrients have low micronutrient concentrations. Due to micronutrient deficiency, eating foods derived from such crops is bad for both human and animal health. But effective management of micronutrients specifically, soil and foliar application of micronutrients in various soil-crop situations could help alleviate micronutrient deficiency in soils and crops, improve crop production and crop quality, and lower micronutrient malnutrition in humans, animals, and other organisms. On average, 7.90, 28.6, and 14.7% of soils had acute, latent, and inadequate levels of zinc, respectively. While only 12.7%, 14.8%, and 21.3% of soils had adequate or high levels of accessible zinc, respectively. Goa (23.5%), Karnataka (11.4%), Madhya Pradesh (20.3%), Rajasthan (22.6%),

JUST AGRICULTURE
multidisciplinary e-Newsletter

Odisha (13.5%), Bihar (9.10%), and Maharashtra (9.90%) had the highest percentages of soils that were severely deficient in readily available Zn. In the following states: Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Telangana, and Uttar Pradesh, more than 50% of soils have deficiencies in accessible Zn, including acute, latent, and residual deficiencies.

Economically significant fruit crops are grown all over the world, including the guava (*Psidium guajava*). It is prized for its mouthwatering flavour, nutritive value, and variety of culinary applications. The guava plant, like many other fruit crops, is vulnerable to a variety of nutritional deficiencies that may have a negative impact on its development, well-being, and fruit output. Zinc is one such critical nutrient that is involved in a number of physiological processes in the plant. The industrial process depends heavily on micronutrients, and their lack lowers output. Guava plants exhibit micronutrient deficiencies as well, which may be the cause of their lower yield and inferior quality. Recent years have seen a significant increase in the importance of foliar feeding of nutrients to fruit trees, which is relatively cost-effective and obviously a great strategy to avoid difficulties with nutrient availability and supplement the fertilisers to the soil. While micronutrients like zinc, boron, copper, and iron have a specialised function in the growth and development of plants, quality produce, and nutrient intake, macronutrients like nitrogen, phosphorus, and potassium play a crucial role in encouraging the plant vigour and productivity. According to reports, chickens require the trace element Zn for a variety of biological processes. Zn has been shown to have a significant role as a cofactor for more than 300 enzymes, including the critical ones, in the metabolic system, making it one of the vital microminerals known as antioxidants with multiple functions. Nutrient shortages have posed problems for guava cultivation, with zinc deficiency standing out as a key issue. Several physiological processes in plants, such as the production of chlorophyll and the activation of crucial enzymes, depend on zinc. As a result, zinc-deficient guava plants are more prone to ailments like Fatio, which has specific signs on the branches and leaves.

Symptomatology of Fatio Disease

Guava crops that suffer from the Fatio disease show a distinctive pattern of symptom development. Red dots first appear on the leaves, a sign of disturbed photosynthetic pigments and subsequent chlorophyll breakdown. Desiccation, a process that causes damaged leaves to

JUST AGRICULTURE
multidisciplinary e-Newsletter

prematurely dry out and eventually abscise, occurs as the disorder worsens. In addition, the damaged trees' limbs show signs of crack formation, a symptom of structural instability. The branch dieback that could result from this event would have a significant negative impact on the overall health and productivity of guava crops.

Potential Mechanisms Underlying Fatio Disease

There may be a connection between low zinc levels and the occurrence of Fatio disease in guava crops. Zinc affects the effectiveness of photosynthetic processes by acting as a cofactor for enzymes involved in the manufacture of chlorophyll. Lack of sufficient zinc reduces chlorophyll levels, which makes it harder for plants to use sun energy to produce carbohydrates. As a result, decreased photosynthetic activity lowers guava trees' general health and makes them more vulnerable to other stresses, such as the infections linked to Fatio illness.

Mitigation and Management Strategies

The occurrence of Fatio disease in guava crops must be effectively managed in order to be reduced. Regular soil analysis is essential to determine zinc concentration and to enable the application of suitable fertilisation techniques to address any imbalances. Foliar spraying of zinc-based fertilisers is a focused strategy to meet immediate nutritional needs. Additionally, optimising irrigation methods and raising soil quality all around help increase nutrient uptake and lower the incidence of Fatio condition in guava crops.

As an innovative source of organic zinc, Nano Zn-Fitogenik combines phytogenic components with zinc nanoparticles. These nanoparticles, which are promising feed additions for cattle, include phytogenic chemicals made from plant extracts. Guava leaf extract (*Psidium guajava*), one of the plant extracts with promise for green nanoparticle manufacturing, is notable. It is widely known that guava leaf extract includes a significant amount of phenolic chemicals, which are recognised for a variety of biological functions. In comparison to ethanol and methanol extraction methods, water-based extraction produced the maximum phenolic content throughout the guava leaf extraction procedure. Guava leaf extract's effectiveness in the creation of green nanoparticles is attributed to the large variety of phenolic chemicals that are present in it. Zinc supplementation in cattle feed can be achieved sustainably and organically by combining phytogenic components from guava leaf extract with nano-sized zinc particles. This improves nutrient absorption and general health.

JUST AGRICULTURE
multidisciplinary e-Newsletter

In summary, reducing the occurrence of Fatio illness requires effective control of zinc deficiency in guava crops. Utilising nano Zn-Fitogenik, which contains phytogenic compounds from guava leaf extract and nanoscale zinc particles, holds promise as an organic and sustainable feed additive for livestock, providing necessary zinc supplementation with potential advantages for animal health and productivity.

Conclusion

Fatio disease has become a serious hazard to guava crops, especially in areas where zinc shortage is common. It is crucial to comprehend how the availability of zinc, chlorophyll production, and plant health interact for efficient treatment of this illness. Guava producers can protect their crops against Fatio disease and assure continuous productivity and yield quality by improving zinc sufficiency and using ethical farming methods. The development of more thorough strategies to properly address this agronomic challenge will be facilitated by further investigation into the complex relationships between zinc metabolism and Fatio disease.