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Foliar Application of Boron and Magnesium on Growth and Quality of Guava (*Psidium guajava L.*) Teh. Babai

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Abstract: ***Foliar application of B and Mg on fruit quality and yield of guava (Psidium guajava), an experiment was carried out Babai. Applying foliar treatment of B and Mg focused guava's development and production. the solutions of B as Boric acid and Mg as $MgSO_4$ were prepared in different concentrations and sprayed. The experiment consisted of 4 combinations of treatments 1 micro and 1 macronutrient which were applied two and three times except a spray of plain tap water as control. From various combinations of B + Mg maximum fruit volume (178.3ml), fruit weight (180gm), and number of leaves increased per shoot (9.5) were recorded with combined application of 0.6% of $MgSO_4$ + 0.3% of H_3BO_3. The study indicated that the combined application of micro and macro - nutrients enhanced fruit quality as well as overall production.***

Keywords: Foliar, Boric acid, Psidium guajava, Boron, Magnesium

1. Introduction

Guava is the 4th most important commercial fruit of India among mango, banana, and citrus fruits. Guava is a rich source of phosphorus, calcium, and pectin. In the last few years, Guava cultivation has gained acceptance because of its nutritional value and processed products like jelly juice, etc. Micro and macronutrients have a huge contribution to plants and these micro and macronutrients are applied through soil or foliar spray. Foliar application is more effective than soil application. B is a heavy nonmetal micronutrient, it is absorbed by plants in the form of H_3BO_3. Translocation of sugar, reproduction of the plant, and germination of pollen - grain all are important for plant growth and it's regulated by B micro - nutrients (Meena et al 2008). B affects cell wall, structure, cell elongation. Magnesium is an essential macronutrient vital for various physiological processes in plants, including growth, development, and quality enhancement of plants (Xu J. et al., 2021). The importance of nutrient - based foliar spray achieving higher yield and better quality of fruit. In India the guava tree flowers thrice in a year that is February, July - August, and October - November. Fruit matures during winter in November to January which is better in quality, taste, and vitamin C content.

2. Materials and Methods

An experiment was conducted in the regional area of Babai, 5 plants of 6 years old were selected for treatment, which was repeated three times a year. Before foliar spraying, soil and plant samples were taken and these samples were tested on the following basis. Boron in the soil sample was tested using azomethine H reagent (Jackson, 1958). And magnesium was also tested (Mehlich, 1953) and these nutrients were also tested in the plant samples. Boron in plant samples was determined by Azomethine H and mg by titration method. (Sarkar et al, 2014,). Based on these tests, treatment combinations were made for the treatment of plants. The treatment included T_0 as a control. The control treatments were also the primary treatments, T_1 (0.4% Mg+0.2%B), T_2 (0.4%Mg+0.3%B), T_3 (0.6% Mg+0.2%B), and T_4 (0.6% Mg+0.3%B) are all combinations of B and Mg. Prepare a solution of $MgSO_4$+ H_3BO_3 and add 0.1% Sandovit solution, spray the solution on the upper and lower parts of the plant. Treatments were applied at three different periods, before flowering, before full bloom and before the onset of fruit set. Various parameters such as the no. of leaves per branch, leaf area, fruit weight, and volume were mentioned in Table 1. The quality of fruits was determined based on various parameters of fruits. First of all the TSS of the fruit was determined with the help of a refractometer (Kusumiyati, 2020). Acidity % was determined by acid - base titration method (Nielsen, 2014) and total sugar % was determined by titration method using Fehling solution A and B. Ascorbic acid content was determined by DCPIP method (Sadasivam and Balasubraminan, 1987). Chemical parameters were observed and mentioned in Table 2.

By these methods, the quality of fruits was determined and the yield was determined by how many fruits were produced on each tree after foliar application. On the basis of all this data, the best treatment combination was determined.

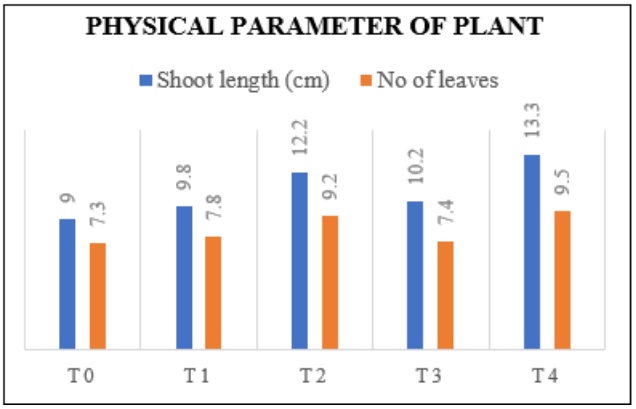
3. Observation

Table 1: Foliar application of Boron and Magnesium on Physical parameters of guava

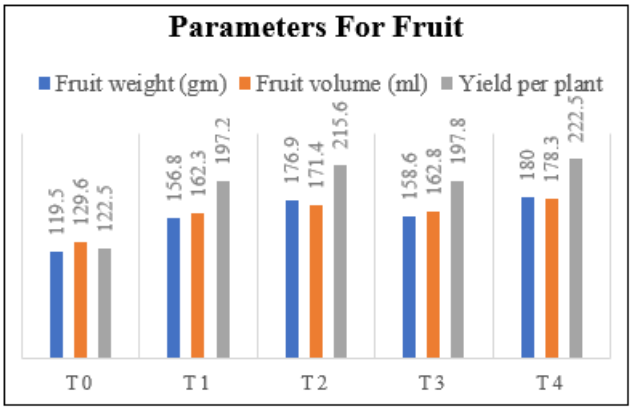
	Shoot length (cm)	No of leaves	Leaf area (cm^2)	Fruit weight (gm)	Fruit volume	Yield per plant
T_0	9.0	7.3	152.3	119.5	129.6	122.5
T_1	9.8	7.8	158.9	156.8	162.3	197.2
T_2	12.2	9.2	177.3	176.9	171.4	215.6
T_3	10.2	7.4	159.4	158.6	162.8	197.8
T_4	13.3	9.5	179.6	180.0	178.3	222.5

Table 2: Foliar application of Boron and Magnesium on Chemical parameter of guava

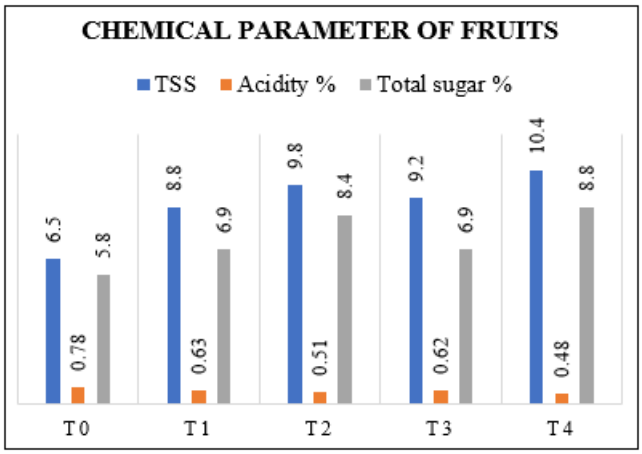
	TSS	Acidity %	Ascorbic Acid Content (mg/100g)	Total sugar %
T_0	6.5	0.78	148.6	5.8
T_1	8.8	0.63	164.3	6.9
T_2	9.8	0.51	169.4	8.4
T_3	9.2	0.62	164.6	6.9
T_4	10.4	0.48	173.2	8.8



Graph 1: Physical Parameters of Plant



Graph 2: Physical Parameter of Fruits



Graph 3: Chemical Parameter of Fruits

4. Result and Discussion

The results of the tests conducted are shown in Table 1 and Table 2, which show that the maximum shoot length is 13.3 cm, fruit weight 180.0gm, fruit volume 178.3cm3, yield per plant 222.5 in treatment T4 (0.6% Mg+0.3%B). Increased value in volume of guava fruit, fruit weight and yield may be that micronutrients appear to have an indirect role in the processing of cell division and cell elongation due to which size, weight and volume would have improved (Arora and singh 1972). The minimum acidity % was recorded in T4 (0.6% Mg+0.3%B). Decreased acidity % due to Boron, is agrees with the observation of Rajput and Chand, 1976. maximum value of plant growth was recorded in T4 (0.6% Mg+0.3%B), this study showed that Mg is better for both growth (vegetative and fruit) and yield attributes may be due to the stimulatory effect of Mg on plant metabolism (Devlin 1996).

Foliar Application and Ecosystem Preservation:
Foliar application is the process of applying nutrients directly to the leaves of plants. This method is very useful in the agriculture sector, horticulture to overcome the deficiency of nutrients in trees and to protect trees from diseases and insects. Foliar application is not directly related to the preservation of the ecosystem but it works as a sustainable agricultural practice which means that without polluting the environment, and without depleting any natural resources, without disrupting the ecosystem and biodiversity. Can produce adequate yield in a specific crop.

In foliar application, dilute solutions of the nutrients that are deficient are made and applied directly to the plants. Due to this, if the solution flows into the surrounding water bodies, the risk of pollution is greatly reduced due to the minute amount of chemicals in that water system.

Foliar application is an integrated pest management strategy that emphasizes on biological control, and management of crop rotation based on nutrient combination technology. The foliar application also conserves beneficial insects and other organisms present in the soil.

In foliar application, nutrients are applied directly to the leaves. Foliar application can be a good supplement to soil fertilizer management, replacing the use of synthetic fertilizers. Due to this, the soil can be healthy and biodiversity can be maintained.

5. Conclusion

The application of nutrient - based foliar sprays can significantly contribute to achieving higher yields and better fruit quality in guava cultivation. By ensuring the optimal supply of essential nutrients such as boron and magnesium, growers can enhance the growth, development, and nutritional value of guava fruits, particularly during the winter harvest season.

The combined application of magnesium and boron (0.6% Mg + 0.3% B) proved to be highly beneficial for guava cultivation, resulting in improved fruit quality, increased yield, reduced acidity, and enhanced plant growth. These findings underscore the importance of micronutrient management in optimizing agricultural productivity and fruit quality in guava cultivation.

Foliar application serves as a sustainable method to address nutrient deficiencies, protect plants from diseases and insects, and promote healthy crop growth while minimizing environmental impact. By adopting foliar application techniques, farmers can achieve adequate yields while preserving the integrity of the ecosystem.

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