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To Study the Effect of Foliar Spray of Zinc Sulphate and Brassinosteroids on Physiological and Quality Parameters of Guava (*Psidium guajava* L.) cv. Allahabad Safeda

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Guava (*Psidium guajava* L.) is an economically significant fruit crop with diverse applications in the food industry. The foliar application of Zinc Sulphate and Brassinosteroids has a significant impact on the overall growth of guava plants, as it greatly affect the plant productive efficiency by changing

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various parameters of horticultural features such as fruiting potential, and quality of fruit. Major role of zinc sulphate is proper nitrogen metabolism, helps in cell division, and hormonal regulation for maintain proper quality of fruit with increased number of fruit set and reduced fruit drop. Brassinosteroids play a vital role in making plant tolerant against biotic and abiotic stresses. Furthermore, the combined treatment exhibited a positive influence on fruit yield, with an observable increase in the number and size of harvested fruits. Quality parameters, including fruit size, weight, and nutritional content, were also assessed. The foliar spray with Zinc Sulphate and Brassinosteroids contributed to improved fruit quality, as evidenced by enhanced sugar content, vitamin levels, and overall taste.

Keywords: Brassinosteroids; zinc sulphate; guava; fruit quality.

1. INTRODUCTION

In India, the guava (*Psidium guajava* L.) is possibly one of the largest and most thoroughly developed tropical groups. It is an unique source of L-ascorbic, and gelatin, moreover contains a covered package of calcium, and is widely utilized for making jam. Guava is one of the commercially cultivated fruit crops in worldwide and majorly in India it is available in an area of 308 (‘000 ha) with the production of 4582 (‘000 MT) during the year 2020-21 [1]. Guava has four to five times more ascorbic acid than citrus fruits. A strong natural item can be utilized to insufficiently recharge exhausted soil and acid neutralizers. According to Mitra and Bose [2] they concluded that Allahabad, known for its finest guava fruits production in the world. There are multiple blooming seasons in North Indian climates, whereas Assam has two blooming seasons. This regular crop has an enormous likelihood of broadening capability and yield reasonability in Assam. As per (Lal *et al*., 2017), guava is developed on 4.522 thousand hectares in Assam, and it yields 87.195 MT at an efficiency of 19282 kg for each hectare. The plant development controllers play a crucial role in triggering blossoming in many plants. The ovary produces development controllers as a result of fertilization and treatment, leading to the ovary's expansion and the beginning of the production of organic products. However, great natural product sets are prevented by a harsh climate that prevents dust production, treatment, and fertilization, as well as a low auxin level. It's possible that the auxin in the pollen tube and grain is to blame for the fruit's early growth stage. Regardless, the fairly humble amount of residue expected to prepare a bloom may not pass sufficient auxin on to address the early improvement of the natural item.

In addition to increasing the quantity of blossoms, the exogenous utilization of plant development controllers (PGRs) additionally expands the nature of the organic product, builds the tree's fitness to keep the natural product on the tree until development, and eases back the rate at which the organic product drops. For natural item cultivators, the essential issues are the degree of blossoming and fruiting, unwanted regular item upkeep, bothersome yield, and the nature of natural items. In addition to a high concentration of sodium, calcium, magnesium, chloride (saline soil) or exchangeable sodium (alkaline or sodic soil), salt-affected soil also contains an excessive amount of carbonate and bicarbonates. A few areas in Uttar Pradesh have salt-impacted soil, including Sultanpur, Raebareily, Azamgarh, Etawah, and Pratapgarh [3]. Soils with an overabundance of replaceable sodium, a high pH, and horrible genuine properties are known to unfavorably impact the plant's turn of events, yield, designed development, and supplement ingestion. The inaccessibility of particular micronutrients like zinc and iron reduces the negative effects of soil sodicity. Foliar application of distinct micronutrients also increased the growth, yield and quality parameters in guava [4,5,6,7]. The diminished openness of zinc in Sodic soil has been connected to the precipitation of zinc as insoluble hydroxides, carbonates, and phosphate because of the adsorption and fixation of zinc on soil colloids.

One of the major phytohormone is brassinosteroids, it is a group that regulatesthe process of growth and development of plants like- fruit ripening, cell elongation and enlargement, reproduction, senescence and tolerance response to various abiotic and biotic stresses [8,9]. Brassinosteroids also offers excellent potential for the enhancement of quality and productivity of fruit crops [10]. These are natural, non-toxic, and bio-safe phytohormone that can be effectively used for horticultural crops for their better growth, quality and yield [11].

1.1 Role of Zinc Sulphate

Zinc (Zn) is also necessary for important metabolic processes like respiration, photosynthesis, and the absorption of some important nutrients. Zinc assumes a significant part in catalysts enactment too. The productivity of such a sort of component is improved when it is utilized in a mix with different components like N and K [12]. The unfavorable impact of sodicity on biomass creation is a property of osmotic as well as impacts of the particles on the physiological and biochemical capability of the cell. Sodic soils contain isolated clay materials, which clog soil pores so that infiltration and aeration of the root zone is hindered [13]. Zinc is the final element in the first transition series that plants need. Based on dry matter, the normal concentration of zinc in plants is between 20 and 30 kg ha-1. Zinc deficiency is especially harmful to beans and corn. Zinc is frequently recognized by particular visual side effects, which happen most often in the leaves.

1.2 Effect of Zinc Sulphate

A 0.4% zinc spray significantly improved the growth, yield, and quality of guava fruits by elongating the terminal shoot, increasing the number of leaves, and decreasing leaf area per shoot (Arora *et al.,* 1970). After lengthy spell of intensity, when plants start new development with the beginning of downpours, there is incredible need of supplements for lush development. The limit of any major or minor component could really take a look at the development and could influence the other physiological and biochemical cycles inside the plants. Trees recovered from chlorosis, initiate efficient growth, and became more active [14].

1.3 Role of Brassinosteroids

A class of steroid hormones called brassinosteroids is necessary for the growth and development of plants. It advances the cell expansion and division, as well as reproduction [15]. Brassinosteroids are available in a wide assortment of animal groups, from lower plants to higher ones. They are steroidal plant chemicals engaged in the excitement of plant development and advancement. Brassinosteroids might recommend areas of strength for the job of cultivating crops. It was shown by a decline in the number of male blossoms in the beginning phases of development and advancement of female bloom commencement in the primary tail.

1.4 Effect of Brassinosteroids

Brassinosteroids, increase adaptation to diverse environmental stresses such as light, low or high temperature, drought, salt stress, heavy metal stress, herbicidal injury, and pathogen attack [16]. The interactions between brassinosteroids and phytohormones can synergistically regulate and integrate various growth-related processes [17]. The exogenous application of brassinosteroids enhances the photosynthetic rate [18,19]. Brassinosteroid-induced growth has been linked to an increase in natural product photosynthesis, as well as an increase in RNA and DNA content, protein combination, and polymerase activity [20].

The yield prompted by brassinosteroids has been connected with progress the proficiency of photosynthesis cycle of the splashed trees. The utilizations of phytohormones like brassinosteroids with submicromolar focuses animate different physiological and biochemical reactions in different framework, from straightforward cells to entire plants [21,22]. In addition, seedless cucumber fruits comparable to those of pollinated flowers were produced when brassinosteroids were applied to unpollinated flowers [23-25].

2. CONCLUSION

The foliar use of zinc sulfate and brassinosteroids, separately and in combination, exhibit significant constructive outcomes on the development, yield, and quality attributes of Guava cv. Allahabad Safeda. These discoveries offer important practices into an effective cultivation for guava development, giving an idea to the executives' techniques in business plantations to improve efficiency and natural product quality. Inspite of this, there should be a better understanding of the fundamental mechanisms of action of exogenously applied brassinosteroids and zinc sulphate at a particular growth stage of growth, which should be applied to get maximum assistance of these hormones to ameliorate plant growth and development which as a result certainly promote the efficient use in crop production and improvement.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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