Biological Forum – An International Journal **15(4): 840-843(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Efficacy of Foliar Spray of Micronutrients and Fruit Bagging on Physical and Yield Attributes of Guava (*Psidium guajava* L.) cv. Allahabad Safeda

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(Received: 15 February 2023; Revised: 14 March 2023; Accepted: 20 March 2023; Published: 18 April 2023)
(Published by Research Trend)

ABSTRACT: The study was targeted to enhance the physical and visual appearance of rainy season guava which ultimately increasing guava growers' income. The present investigation entitled "Impact of foliar spray of nutrients and fruit bagging on growth yield and quality of guava (*Psidium guajava* L.) cv. Allahabad safeda" was conducted at Horticulture Research Farm-I, Babasaheb Bhimrao Ambedkar University Lucknow (U.P.), during rainy season of 2020-21 and 2021-22. Among the 51 guava trees with even size and vigour were selected and sprayed with various concentrations of different nutrients (Borax @ 0.1% and 0.2%), ($ZnSO_4$ @ 0.2% and 0.4%) with and without borax (1.0%). The results revealed that the fruit physical characters i.e. fruit diameter (6.87cm), fruit length (6.39cm), fruit width (6.28cm), fruit weight (129.33g), fruit volume (128.96cc) were improved significantly with the use of Borax 0.2% + Zn 0.4% (T_9) bagged with Foam bag + Brown paper + Blue polythene followed by fruits sprayed with (Borax 0.2 + Zinc 0.4% + Foam bag + News Paper + Blue Polyethylene bag) (T_{13}) than the other treatments, while lowest was recorded under control.

Keywords: Bagging, Foliar spray, Guava, Physical attributes, Yield.

INTRODUCTION

Guava (*Psidium guajava* L.) "Apple of the tropics" is one of the most encouraging fruit crops of India and is viewed as one of the impeccable healthfully important remunerative crops (Singh *et al.*, 2000). Its wider edapho-climatic adaptability, resistance to biotic and abiotic stresses, precocious and prolific bearing habit, quality fruit with high nutritive value, medicinal attribute, use both as fresh fruit and after processing in various value added products (Karlovsky *et al.*, 2016). Guava flowers twice a year in the agro-climate of north India: once in April or May for crops grown during the rainy season and once in September or October for crops grown during the winter season. In general, rainy season crops produce more fruit than winter crops do (Rathore and Singh 1974; Singh *et al*., 2000a), but the quality and taste of the fruits are not good (Maji *et al*., 2015) and there is more pest and disease infestation during the rainy season than the winter (Rawal and Ullasa 1988). Fruits are of higher quality and fetch high prices throughout the country during the winter (Singh *et al.*, 2000b). But fruits collected during the rainy season are the lowest quality, wateriest, disease and pest-prone of the crop's three fruiting seasons. Ambe Bahar guava fruits have very low storage Excellency. As a result, crop management or bahar treatment techniques frequently reduce or eliminate fruit yield throughout this season. It is a significant barrier to the guava crop's yearly yield. Therefore, good crop management should be used to reduce all of these issues.

In order to assure worker safety, consumer health, and reduced environmental effect, researchers have recently worked to create consumer-friendly methods for controlling pests and illnesses of fruits with a focus on reduced pesticide use (Sharma *et al.*, 2020). Fruit bagging is suitable in organic guava cultivation systems (Neto *et al.*, 2020). Fruit bagging can also improve fruit colour and their appearance (Kim *et al.*, 2008). In recent years, on-the-tree fruit bagging has shown to be a successful strategy (Sharma *et al.*, 2014b). This method involves placing a bag over each fruit or fruit cluster on the tree for a set amount of time. It alters the microenvironment inside a bag, which has positive effects on fruit size and internal fruit quality (Amarante *et al.*, 2002a, b; Joyce *et al.*, 1997; Kitagawa *et al.*, 1992; Li *et al.*, 2008; Sharma *et al.*, 2014b); it also improves the visual appeal of fruits by promoting peel colour and reducing the incidence of pests, diseases, and physiological disorders (Xu *et al.*, 2010; Zhang *et al.*, 2015; Sharma *et al.*, 2016; Sharma *et al*., 2017). In order to produce apples, pears, peaches, grapes, and loquats with better colour and quality, on-the-tree fruit bagging is commercially used in Australia, Japan, and China (Sharma *et al.*, 2014b). But there have also been

reports of detrimental impacts on fruit size, colour and quality (Gawad 2017; Hofman *et al.*, 1997; Sharma *et al.*, 2014b). Therefore, we conducted a study to determine the impact of on-the-tree fruit bagging on the 'Allahabad Safeda' guava crop during the rainy season.

MATERIALS AND METHODS

The experiments were conducted during rainy season of 2020-21 and 2021-22 at Horticulture Research Farm-I, Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Lucknow (U.P.) India. The experimental site is situated at 80° 92´'East longitude and 26° 76´' North latitude and 123 meter above MSL (Mean Sea Level). The climate of Lucknow is characterized by sub-tropical with hot, dry summer and cool winters. The soil of experimental orchard is sandy loam and slightly alkaline in nature with soil pH 8.2, 85.46 kg ha-^{1} available nitrogen, 16.62 kg ha-1 and 142.07 kg ha-^{1} available potash. For this study, 51 eighteen-year-old uniform guava plants were taken at a distance of 6 × 6 metres apart. The suggested package of methods for guava nutrient application and other orchard management measures were followed. In the month of February 2019, the fruit were bagged with different bagging materials (foam bags, polyethylene bags and paper bags). Fruit bagging was done after twenty days after fruit setting when the fruits attained ber like size. The bags had small cut at lower corner for proper aeration, gaseous and exchange. The experiment was set up in a Randomized Block Design with three replications. Per plot, one plant was used as a unit. Seventeen treatments in to viz., **T$_1$** (Control), **T$_2$** (Borax 0.1% + Foam bag + white Paper + White Polythene bag), **T$_3$** (Borax 0.2% + Foam bag + white Paper + White Polythene bag), **T$_4$** (Zinc 0.2% + Foam bag + white Paper + White Polythene bag), **T$_5$** (Zinc 0.4% + Foam bag + white Paper + White Polythene bag), **T$_6$** (Borax 0.1 + Zinc 0.2% + Foam bag + Brown Paper + yellow Polyethylene bag) , **T$_7$** (Borax 0.1 + Zinc 0.4% + Foam bag + Brown Paper + yellow Polyethylene bag), **T$_8$** (Borax 0.2 + Zinc 0.2% + Foam bag + Brown Paper + yellow Polyethylene bag), **T$_9$** (Borax 0.2 + Zinc 0.4% + Foam bag + Brown Paper + yellow Polyethylene bag), **T$_{10}$** (Borax 0.1 + Zinc 0.2% + Foam bag + News Paper + Blue Polyethylene bag), **T$_{11}$** (Borax 0.1 + Zinc 0.4% + Foam bag + News Paper + Blue Polyethylene bag), **T$_{12}$** (Borax 0.2 + Zinc 0.2% + Foam bag + News Paper + Blue Polyethylene bag), **T$_{13}$** (Borax 0.2 + Zinc 0.4% + Foam bag + News Paper + Blue Polyethylene bag), **T$_{14}$** (Borax 0.1 + Zinc 0.2% + Foam bag + Butter Paper +Green Polyethylene bag), **T$_{15}$** (Borax 0.1 + Zinc 0.4% + Foam bag + Butter Paper +Green Polyethylene bag), **T$_{16}$** (Borax 0.2 + Zinc 0.2% + Foam bag + Butter Paper +Green Polyethylene bag), **T$_{16}$** (Borax 0.2 + Zinc 0.4% + Foam bag + Butter Paper +Green Polyethylene bag).. The fruits were collected at mature stage from all treatments as well as control for determination of physical and biochemical parameters. There are following observations were recorded on the basis various parameters i.e., fruit diameter (cm), fruit length (cm), fruit width (cm), fruit weight (g), fruit volume (cc) of ten randomly selected fruits per replication was measured with the help of a digital vernier calipers and length was expressed in centimetres. The statistical data were analysed obtained in different set of experiments were calculated as suggested by Panse and Sukhatme (1985).

RESULT AND DISCUSSION

Fruits subjected to different bagging treatments showed significant variation in fruit size and weight. The fruit diameters size in terms of length was higher in fruits bagged with polyethylene of different colours followed by different colours paper bags. Though the difference in fruit diameter, length, width, weight, and volume of fruit. Yield per hectare higher in non-woven bags as compared to control fruits

The volume of fruits harvested from T$_9$ (Borax 0.2 + Zinc 0.4% + Foam bag + Brown Paper + yellow Polyethylene bag) was significantly higher than all other treatments with maximum fruit weight of 6.88 cm., fruit length 6.39 cm, width 6.28 cm., fruit weight 129.33 g, volume of fruit is 128.96 respectively which treated with yellow polyethylene. In terms of yield per unit are 85.16 kg per tree and 188.50 quintals per hectare under same treatments (Table 1). Rahman *et al.* (2017) reported similar increase in weight of bagged guava fruits with white polythene and proposed that it might be due to the protection of fruit from ultra violet rays; as a result, the cell division in the fruits increased and proper availability of photosynthates to the fruits on the plant was ensured. Among the various treatments, non-woven bags of different colours recorded significantly higher scores in terms of appearance, smoothness, glossiness, taste, flavour, colour, aroma and texture as compared to other bagging treatments. However, in case of control fruits the palatability rating was not recorded owing to complete damage of fruits due to fruit fly. The study supported by Jhakhar & Pathak (2014), and fruit bagging. Enhancing quality of mango (*Mangifera indica*) fruits cv. Amarpali with pre-harvest foliar spray. Fruit bagging improve fruit quality of guava Abbasi *et al.* (2014); Mitra *et al.* (2008); Nagaraja (2016). Also supported bagging by Mondal *et al.* (2008); Debnath and Mitra (2008); pomegranate Sarkomi *et al.* (2019). Narrow related study done by Hendarto *et al.* (2022) reported the fruit quality of "Kristal" guava that was grown on lowland and highland with different bagging treatments. Fruit weight and diameter was significantly higher when guava trees were grown on lowland compared to those grown on highland.

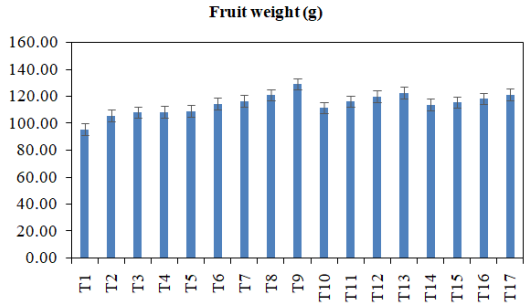

Fig. 1. Effect of foliar spray of micronutrients and pre harvest fruit bagging on fruit weight (g) of guava.

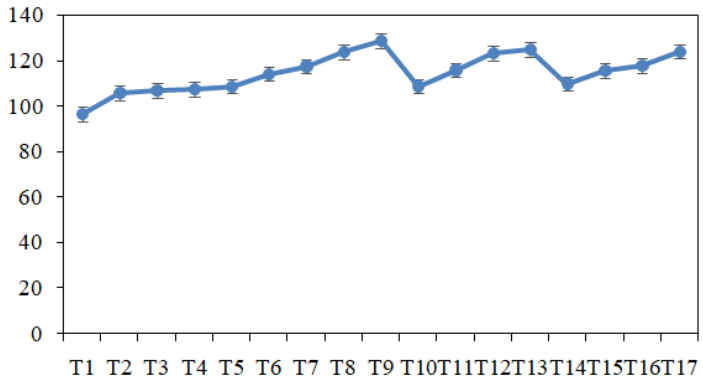

Fig. 2. Effect of foliar spray of micronutrients and pre harvest fruit bagging on fruit volume (cc) of guava.

Table 1: Effect of foliar spray of micronutrients and pre harvest fruit bagging in guava.

Treatment	Fruit Diameter(cm)	Fruit length (cm)	Fruit width (cm)	Fruit yield (Kg/tree)	Fruit yield (q/ha)
T_1	6.21	5.64	5.49	51.31	120.38
T_2	6.61	6.08	6.00	54.32	127.04
T_3	6.62	6.12	6.04	60.35	136.80
T_4	6.65	6.14	6.04	66.86	152.90
T_5	6.65	6.14	6.06	69.33	157.00
T_6	6.70	6.20	6.09	72.35	161.98
T7	6.77	6.25	6.14	73.71	167.34
T8	6.83	6.30	6.17	78.16	174.00
T9	6.88	6.39	6.28	85.16	188.50
T10	6.66	6.16	6.07	70.12	158.45
T11	6.75	6.24	6.13	73.03	164.00
T12	6.79	6.28	6.16	75.90	171.95
T13	6.86	6.34	6.19	81.27	183.40
T14	6.67	6.19	6.09	72.10	161.45
T15	6.70	6.23	6.11	72.49	162.95
T16	6.78	6.26	6.15	74.68	168.30
T17	6.85	6.33	6.18	79.87	179.25
C.D.	0.09	0.10	0.10	1.16	2.16
SE(m)	0.26	0.28	0.28	3.35	6.25

CONCLUSIONS

Based on the information provided, it can be concluded that foliar spray of borax at a concentration of 0.2% and zinc at a concentration of 0.4% resulted in a significant response in guava plants. Additionally, when fruits were protected using foam bags, followed by yellow polyethylene bags and then brown paper bags, better physical parameters of the guava fruits were observed. Therefore, it is suggested that guava growers consider employing the foliar spray of borax and zinc at the specified concentrations and use foam bags, followed by yellow polyethylene bags and brown paper bags for fruit bagging. These practices may lead to improved fruit quality and overall yield for guava crops.

Acknowledgement. This work was acknowledged by department of Horticulture, SAST, BBAU Lucknow.

Conflict of Interest. We all authors hereby declare that we do not have any conflict interests.

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How to cite this article: Vipnesh Singh, R.S. Verma, Shatrunjay Yadav, Devi Darshan, Rajesh Kumar Meena and Dharmraj Meena (2023). Efficacy of Foliar Spray of Micronutrients and Fruit Bagging on Physical and Yield Attributes of Guava (*Psidium guajava* L.*)* cv. Allahabad Safeda. *Biological Forum – An International Journal*, *15*(4): 840-843.