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RESEARCH ARTICLE

ENHANCE THE QUALITY OF CV LUKHNOW 49 GUAVA WITH MICRO NUTRIENTS IN WINTER SEASON

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ABSTRACT

An experiment entitled "Enhance the guava quality with nutrients in winter season " was carried out at the Department of Fruit Science, Guru Kashi University, Talwandi Sabo (Bathinda).The experiment comprising total 15 treatments viz. T_1- Control, T_2- $CaNO_3$ @ 1%, T_3- $ZnSO_4$ @ 0.5%, T_4- $MgSO_4$ @ 0.5%, T_5- Borax @ 0.2%, T_6- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%, T_7- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%, T_8- $CaNO_3$ @ 1% +Borax @ 0.2%, T_9- $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%, T_{10}- $ZnSO_4$ @ 0.5% + Borax @ 0.2%, T_{11}- $MgSO_4$ @ 0.5% + Borax @ 0.2%, and T_{12}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%, T_{13}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2% and T_{14}- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2% and T_{15}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%. Experiment was carried out in complete randomized design with three replications. Results showed that foliar application of $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2% at par with $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2% and $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2% and recorded higher values of fruit set, fruit length and width, fruit volume, specific gravity, number of fruits, fruit weight, fruit yield and TSS as compared to Control, $CaNO_3$ @ 1%, $ZnSO_4$ @ 0.5%, $MgSO_4$ @ 0.5%, Borax @ 0.2%, $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%, $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%, $CaNO_3$ @ 1% +Borax @ 0.2%, $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%, $ZnSO_4$ @ 0.5% + Borax @ 0.2%, $MgSO_4$ @ 0.5% + Borax @ 0.2%, and $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%.

INTRODUCTION

The guava (*Psidiumguajava* L.*)* the apple of tropics is one of the important fruit crops of India. Though it is native to tropical America its cultivation has expanded to all tropical countries and become especially important in India (Samson, 1980). It belongs to the natural order Myrtal and the botanical family Myrtaceae. Trees of guava are very hardy and can be grown on a wide range of soil and climatic conditions. Guava is considered as an "Poor man's apple" or "Apple of tropics" owing to its availability for a longer duration of time in the year at very moderate price, also its nutritive value are comparable with that of apple, particularly in respect of vitamin C, minerals and pectin. Guava is cultivated commercially in south Asian countries, the Hawaiian Islands, Cuba and India (Mitra and Sanyal, 2004). In India guava is mainly grown in Bihar, Uttar Pradesh, Karnataka, Madhya Pradesh, Gujarat, Andhra Pradesh and Maharashtra. In Punjab, guava is second major fruit crop preceded by the citrus. It covers an area of 9,580 ha with production of 0.216 mMT (Anonymous 2020b). It grows throughout the state in all the districts with highest area in Patiala, Ludhiana, Sangrur and Fatehgarh Sahib. It is considered very hardy tree due to its tolerance to various biotic stress situations like drought and alkalinity. It is an established fact that Indian soils, particularly North Indian soils are deficient in micronutrients particularly Zinc and Boron. Besides other nutrient elements, micro-nutrients particularly Zinc, Ca, Mg and Boron plays vital role in growth, development, retention and quality of fruits. Zinc is an essential micro element for plants. It is involved in many enzymatic reactions. For growth and development of plant, zinc is necessary. It is also involved in regulating the protein and carbohydrate metabolism. Its availability to plants is reduced in high pH soils. Boron is a heavy non-metal micronutrient. It is absorbed by plant in the form of boric acid (H3BO3). For translocation of sugar, reproduction of plants and germination of pollen grains boron is necessary. Its role has been observed in hormone movement and active salt absorption. It has also an important role in fruit quality. Calcium is important constituent of the middle lamella in cell wall. It is essential in strengthening of the cell wall of plants tissue and also in the formation of cell membrane, cell division. Thus, micronutrients especially calcium, boron and zinc perform a specific role in the growth and development of plant as well as fruit, quality of produce and uptake of major nutrients.

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MATERIALS AND METHODS

The field experiment study entitled, **"**Enhance the guava quality with nutrients in winter season" was conducted at research farm of BarwalaHisar during 2021-22. The climate, soil condition, design of experiment, material used, and procedures followed during the course of investigation as under: The experiment comprising total 15 treatments viz. T_1-

Control, T_2- $CaNO_3$ @ 1%, T_3- $ZnSO_4$ @ 0.5%, T_4- $MgSO_4$ @ 0.5%, T_5- Borax @ 0.2%, T_6- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%, T_7- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%, T_8- $CaNO_3$ @ 1% +Borax @ 0.2%, T_9- $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%, T_{10}- $ZnSO_4$@ 0.5% + Borax @ 0.2%, T_{11}- $MgSO_4$ @ 0.5% + Borax @ 0.2%, and T_{12}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%, T_{13}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2% and T_{14}- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2% and T_{15}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%. The observation recorded Fruit set, Fruit drop, Fruit length, Fruit width, Volume of fruit, Specific gravity, Number of fruit per plant, Weight of Fruit, Yield of fruit per plant.

RESULTS AND DISCUSSION

Fruit Set and Fruit Drop

Table 4.1. Effect of foliar application of micronutrients on fruit set and fruit drop of guava

Treatments	Fruit set (%)	Fruit drop (%)
T_1- Control	61.31	53.65
T_2- $CaNO_3$ @ 1%	61.74	52.66
T_3- $ZnSO_4$ @ 0.5%	62.50	50.52
T_4- $MgSO_4$ @ 0.5%	62.15	51.91
T_5- Borax @ 0.2%	63.29	50.42
T_6- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%	65.09	49.86
T_7- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%	64.46	50.11
T_8- $CaNO_3$ @ 1% +Borax @ 0.2%	65.32	49.90
T_9- $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%	65.65	49.86
T_{10}- $ZnSO_4$ @ 0.5% + Borax @ 0.2%	66.18	49.20
T_{11}- $MgSO_4$ @ 0.5% + Borax @ 0.2%	65.38	47.71
T_{12}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%	66.06	49.68
T_{13}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2%	68.99	48.31
T_{14}- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2%	68.00	46.46
T_{15}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%	70.29	45.77
SEm±	0.88	1.32
C.D. at 5 %	2.54	3.83

Fruit length and width (cm)

Table 4.2. Effect of foliar application of micronutrients on fruit length and width of guava

Treatments	Fruit length (cm)	Fruit width (cm)
T_1- Control	6.22	5.59
T_2- $CaNO_3$ @ 1%	6.19	5.56
T_3- $ZnSO_4$ @ 0.5%	6.40	5.72
T_4- $MgSO_4$ @ 0.5%	6.36	5.69
T_5- Borax @ 0.2%	6.51	5.81
T_6- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%	6.78	6.01
T_7- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%	6.55	5.84
T_8- $CaNO_3$ @ 1% +Borax @ 0.2%	6.88	6.08
T_9- $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%	7.02	6.18
T_{10}- $ZnSO_4$ @ 0.5% + Borax @ 0.2%	7.24	6.28
T_{11}- $MgSO_4$ @ 0.5% + Borax @ 0.2%	6.91	6.10
T_{12}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%	7.19	6.31
T_{13}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2%	7.98	6.89
T_{14}- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2%	7.78	6.74
T_{15}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%	7.99	6.90
SEm±	0.24	0.20
C.D. at 5 %	0.71	0.58

Fruit volume (ml) and Specific gravity (g/ml)

Table 4.3: Effect of foliar application of micronutrients on fruit volume and specific gravity of guava

Treatments	Fruit volume (ml)	Specific gravity (g/ml)
T_1- Control	85.10	0.94
T_2- $CaNO_3$ @ 1%	86.41	0.96
T_3- $ZnSO_4$ @ 0.5%	88.73	0.97
T_4- $MgSO_4$ @ 0.5%	87.67	0.96
T_5- Borax @ 0.2%	91.13	0.99
T_6- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%	96.61	1.04
T_7- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%	94.90	1.00
T_8- $CaNO_3$ @ 1% +Borax @ 0.2%	97.34	1.02
T_9- $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%	98.32	1.04
T_{10}- $ZnSO_4$ @ 0.5% + Borax @ 0.2%	99.96	1.06
T_{11}- $MgSO_4$ @ 0.5% + Borax @ 0.2%	97.51	1.06
T_{12}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%	99.57	1.08
T_{13}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2%	108.52	1.11
T_{14}- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2%	106.84	1.12
T_{15}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%	112.47	1.13
SEm±	2.27	0.03
C.D. at 5 %	6.57	0.08

Number of fruits and Fruit weight

Table 4.4. Effect of foliar application of micronutrients on number of fruits and fruit weight of guava

Treatments	Number of fruits/plant	Fruit weight (g)
T_1- Control	272.78	180.61
T_2- $CaNO_3$ @ 1%	278.49	184.50
T_3- $ZnSO_4$ @ 0.5%	288.02	190.98
T_4- $MgSO_4$ @ 0.5%	283.31	187.78
T_5- Borax @ 0.2%	297.97	197.76
T_6- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%	319.33	212.30
T_7- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%	312.80	207.86
T_8- $CaNO_3$ @ 1% +Borax @ 0.2%	321.84	214.01
T_9- $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%	325.19	216.30
T_{10}- $ZnSO_4$ @ 0.5% + Borax @ 0.2%	331.09	220.31
T_{11}- $MgSO_4$ @ 0.5% + Borax @ 0.2%	322.50	214.46
T_{12}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%	329.48	219.21
T_{13}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2%	361.15	240.78
T_{14}- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2%	351.00	233.86
T_{15}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%	373.81	249.40
SEm±	8.48	9.79
C.D. at 5 %	24.58	27.05

Fruit yield (kg/plant) and Fruit yield (t/ha)

Table 4.5. Effect of foliar application of micronutrients on fruit yield of guava

Treatments	Fruit yield/plant (kg)	Fruit yield (t/ha)
T_1- Control	49.31	10.06
T_2- $CaNO_3$ @ 1%	51.42	10.48
T_3- $ZnSO_4$ @ 0.5%	55.15	11.23
T_4- $MgSO_4$ @ 0.5%	53.44	10.87
T_5- Borax @ 0.2%	59.00	12.04
T_6- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5%	67.83	13.84
T_7- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5%	65.07	13.27
T_8- $CaNO_3$ @ 1% +Borax @ 0.2%	68.99	14.06
T_9- $ZnSO_4$ @ 0.5% + MgSO4 @ 0.5%	70.57	14.34
T_{10}- $ZnSO_4$ @ 0.5% + Borax @ 0.2%	73.21	14.88
T_{11}- $MgSO_4$ @ 0.5% + Borax @ 0.2%	69.27	14.11
T_{12}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5%	72.59	14.73
T_{13}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2%	86.98	16.74
T_{14}- $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2%	82.12	15.74
T_{15}- $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%	93.32	17.02
SEm±	3.66	0.45
C.D. at 5 %	10.59	1.31

Conclusion

Keeping in view the objectives framed for undertaking study and the results obtained after experimental period, under mentioned conclusions may be drawn. Foliar application of $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2% at par with $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + Borax @ 0.2% and $CaNO_3$ @ 1% + $MgSO_4$ @ 0.5% + Borax @ 0.2% and fruits registered maximum fruit length and width, number of fruits, fruit weight, fruit yield, TSS and acidity. Based on the finding of the present investigation, it is recommended that foliar application of $CaNO_3$ @ 1% + $ZnSO_4$ @ 0.5% + $MgSO_4$ @ 0.5% +Borax @ 0.2%. However, these results are only indicative and required further experimentation to arrive at some more consistent and final conclusion.

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