Studies on combination of different forms of potassium and micronutrients on fruit yield and post-harvest quality of guava (*Psidium guajava* L.)

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ABSTRACT

An investigation was carried out to find out combination of different forms of potassium and micronutrients on fruit yield and post-harvest quality of guava (Psidium guajava L.) was carried out at the Department of Horticulture, College of Agriculture Parbhani during the year 2019-20. The field experiment was laid out in Randomized Block Design with thirteen treatments and three replications. The treatments were: T_1- KH_2PO_4 at 1% + $FeSO_4$ at 0.5%, T_2- KH_2PO_4 at 1.5% + $FeSO_4$ at 0.5%, T_3 - KH_2PO_4 at 1% + $ZnSO_4$ at 0.5%, T_4 - KH_2PO_4 at 1.5% + $ZnSO_4$ at 0.5%, T_5 - K_2SO_4 at 1% + $FeSO_4$ at 0.5%, T_6 - K_2SO_4 at 1.5% at + $FeSO_4$ at 0.5%, T_7-K_2SO_4 at 1% + $ZnSO_4$ at 0.5%, T_8-K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5%,T_9-KNO_3 at 1% +$FeSO_4$ at 0.5%,T_{10}-KNO_3 at 1.5% + $FeSO_4$ at 0.5%,T_{11}-KNO_3 at 1% + $ZnSO_4$ at 0.5%,T_{12}-KNO_3 at 1.5% + ZnSO4 at 0.5% and T_{13}- control through foliar application which was sprayed two times after fruit set at 15 days interval. Results of the study indicated that maximum number of fruits per tree (160.33), fruit retention (80.60 %), yield per tree (39.4 kg), yield per hectare (10.95 Mt per ha) and minimum fruit drop (19.84 %), maximum fruit weight (246.3 g), fruit volume (220.6 ml), fruit length (7.86 cm) and fruit diameter (8.06 cm) were more in treatment T_{12} i.e., KNO3 at 1.5% + ZnSO4 at 0.5%. Better fruit quality and more shelf life (8.4 days) and minimum physiological loss in weight (11.77 %), fruit decay (24.7 %) during at ambient storage was also recorded under above treatment.

Keywords: Forms of potassium, guava**,** micronutrients, quality, yield,

INTRODUCTION

Guava (*Psidium guajava* L.) is considered to be one of the exquisite, nutritionally valuable and remunerative fruit. Guava has gained considerable eminence on an account of its high nutritive and medicinal values and also for its aroma and flavour. Since it is a rich source of vitamin C (260-300 mg/100 g) which is three to five times more than oranges and ten times more than tomatoes, it is an ideal fruit crop for nutritional security. High concentrations of pectin in guava fruits play a significant role in the reduction of cholesterol and thereby decrease the risk of cardiovascular disease. Micronutrients are essentially as important as macronutrients to have better growth, quality and yield in plants. Their requirement by plants is in trace amounts. Foliar application of micronutrients and growth regulators play a vital role in improving the quality of the produce and increased the growth, yield and quality parameters in guava (Balakrishnan, 2000; Yadav *et al*., 2011). Today, due to increased demand for quality produce the interest of growers in production of high quality fruits is increasing. There is also need to improve post-harvest quality of guava fruits. Hence, considering the need, the present investigation "Studies on combination of different forms of potassium and micronutrient on fruit yield and post-harvest quality of guava (*Psidium guajava* L.)" was taken.

MATERIAL AND METHODS

The present study was carried out on rainy season guava crops at the experimental orchard at Khanapur Tal. Khanapur Dist. Parbhani, and Post-harvest qualities was carried out at Post Graduation Laboratory of Department of Horticulture, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani during the year 2019-20. The age of the guava plants, cv. Sardar was six years; planted at 6m x 6m spacing.The experiment was laid out in Random Block Design with thirteen treatments and replicated thrice. The treatments were: T_1- KH_2PO_4 at 1% + $FeSO_4$ at 0.5%, T_2- KH_2PO_4 at 1.5% + $FeSO_4$ at 0.5%, T_3 - KH_2PO_4 at 1% + $ZnSO_4$ at 0.5%, T_4 - KH_2PO_4 at 1.5% + $ZnSO_4$ at 0.5%, T_5 - K_2SO_4 at 1% + $FeSO_4$ at 0.5%, T_6 - K_2SO_4 at 1.5% at + $FeSO_4$ at 0.5%, T_7-K_2SO_4 at 1% + $ZnSO_4$ at 0.5%, T_8-K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5%,T_9-KNO_3 at 1% +$FeSO_4$ at 0.5%,T_{10}-KNO_3 at 1.5% + $FeSO_4$ at 0.5%,T_{11}-KNO_3 at 1% + $ZnSO_4$ at 0.5%,T_{12}-KNO_3 at 1.5% + ZnSO4 at 0.5% and T_{13}- control (no spray) through foliar application which was sprayed two times after fruit set at 15 days interval. Geographically, the place is situated between 19°16'N latitude and 76°47' longitude. The annual precipitation of Parbhani, which comes under assured rainfall zone, is 800-900 mm. The rainfall is mostly received during June to September. The maximum and minimum temperature is 32.0-20.9°C in August and 32.9-15.1°C in November.

Observations were made on fruit weight, fruit length, and diameter and fruit volume, taking five fruits from each replication following standard methods.

Fruit drop per cent was calculated by following formula:-

$$\text{Fruit drop (\%)} = \frac{(\text{Total no. of fruits at fruit set} - \text{Total no. of fruits at harvest})}{\text{Total no. of fruits at fruit set}} x100$$

Fruit retention per cent was calculated by following formula:-

$$\text{Fruit retention (\%)} = \frac{\text{Total no. of fruits at harvest}}{\text{Total no. of fruits at fruit set}} x100$$

The **number of fruits per tree** was counted at harvesting stage. The **total yield** of fruits at each harvest was weighed from each tree on pan balance and yield per tree was computed by marking the summation of yield values at each harvest till the last harvest. The fruit yield per hectare was calculated by multiplying fruit yield per tree (kg/tree) with total number of trees per hectare (400) and dividing the result by 1000 and was expressed in tonns/ hectare.

For post-harvest quality parameters, five yellow coloured ripe fruits were taken, isolated the seeds and weighed using digital balance. Average weight was calculated and expressed in grams. To calculate pulp weight, seed weight was subtracted from total fruit weight of uniformly five selected fruits and average was calculated and expressed in gram. Pulp weight (g) = Total fruit weight (g) - Seed weight (g).

All the tagged fruits of each plant of each treatment were crushed to form a homogenized sample and then the juice was extracted through muslin cloth. The extract was used for determination of T.S.S. by Erma Hand Refractometer and expressed in %. The percentage of reducing and non-reducing sugar in fresh guava juice was determined by Dinitro-salicylic acid (DNSA) method (Miller, 1972). A known volume of alcohol extract was allowed to evaporate the alcohol completely. Clear solution was taken for the estimation of reducing sugar using DNSA- reagent by following the above method and values were expressed in percentage. Total sugar was estimated by using following formula: Total sugars = Reducing sugar (%) + Non reducing sugar (%).The titrable acidity of the juice extract was determined according to A.O.A.C. (1975) method by titrating the extract against 0.1 N NaOH using Phenolphthalein as indicator.

To know the shelf life, fruits were stored at ambient condition (room temperature) after harvest and shelf life was recorded by visual observation. The shelf life of the fruits was determined by recording the number of days the fruits remained in good condition in each replication during storage. For determination of physiological loss in weight (PLW), five fruits from each treatment were marked and labeled. The marked and labeled fruits in each treatment were weighed prior to storage. Their weight was determined on 3, 5 and 7th days of storage. Physiological loss in weight was expressed on per cent basis (on the basis of original weight of fruit).

$$\text{Loss in weight (\%)} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} x100$$

For recording on **fruit decay (%),** rotten fruits were visually counted out from total number of fruits in each treatment at an interval of 3rd, 5th and 7th day of storage. Rotting was expressed on percentage basis.

$$\text{Percent rotting} = \frac{\text{Rotten Fruits}}{\text{Total Fruits}} x100$$

The data were subjected to statistical analysis of variance according to Panse and Sukhatme (1985). The results were compared with five per cent level of significance. The significant difference of treatment effect was judged with the help of 'F' (variance ratio) test. The differences between the significant treatment means and their interactions were tested against the critical differences at 5 percent, where'F' test was statistically significant.

RESULTS AND DISCUSSION

Physical parameters of fruits

Fruit weight (g)

The fruit weight ranged from 195.0 g to 246.3 g in different treatments under study (Table 1). Significantly maximum fruit weight of guava was recorded in the treatment applied with KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (246.3g), however was found at par with the treatment T_8 (239.13 g), T_{11} (236.6), T_7 (232.97g), T_{10} (231.66) and T_4 (230.23). The remaining treatment showed intermediate results and were at par with each other. Such findings have also been reported by Gill and Bal (2009), Manju (2016), Sharma *et al.* (2016).

Fruit volume (ml)

The treatment application of KNO_3 at 1.5% + $ZnSO_4$ at 0.5% resulted in significantly maximum fruit volume of guava fruit (220.6 ml) as compared with rest of the treatments in present study(Table 1), however it was found at par with the treatment T_8 (212.33 ml) and T_{11} (205.29 ml). The results are in line with the findings of Pandey *et al.* (1988), Sarrwy (2012) and Sharma *et al.* (2016).

Fruit length (cm)

The fruit length ranged from 6.00 cm to 7.86 cm in different treatments in present study(Table 1). Significantly maximum fruit length of guava was recorded in the treatment T_{12} (7.86 cm) over rest of the treatments under study. It was followed by the treatment T_8 (7.5 cm), T_{11} (7.3 cm) and T_7 (7.26 cm) and were found at par with each other. The results are in line with the findings of Gill and Bal (2009), Burondkar *et al.* (2009), Manju (2016) and Sharma *et al.* (2016).

Fruit diameter (cm)

Significantly maximum fruit diameter of guava was recorded in the treatment applied with KNO_3 at 1% + $ZnSO_4$ at 0.5% (8.06 cm), over rest of the treatments under study, except the treatments T_8 (7.80 cm), T_{11} (7.70 cm) and T_7 (7.40 cm), which were at par with each other(Table 1). The results are in line with the findings of Waskela *et al.*(2013) and Sarrwy (2012).

Yield parameters of fruits

Fruit drop (%)

The fruit drop per cent ranged from 19.84 % to 33.67 % in different treatments of potassium form and micronutrient in present study (Table 1). The treatment application of KNO_3 at 1.5% + $ZnSO_4$ at 0.5% resulted in significantly minimum fruit drop % of guava fruit (19.894) as compared with rest of the treatments in present study. It was followed by the treatment T_8 (22.34) and T_{11} (24.17) and were at par with each other. The treatment T_6, T_7 and T_9 were the next treatments showed less fruit drop and were at par with each other. The present result is supported by the finding of Meena *et al.* (2014) in Aonla.

Fruit retention (%)

The fruit retention per cent ranged from 66.33 % to 80.16 % in different treatments under present study (Table 1). The treatment application of KNO_3 at 1.5% + $ZnSO_4$ at 0.5% resulted in significantly maximum fruit retention % of guava fruit (80.16) as compared with rest of the treatments in present study and was found at par with treatment T_{11}, T_7, T_{10} and T_4. The treatment T_6, T_9, and T_2 were the next treatments showed more fruit retention per cent and were at par with each other. The present result is supported by the findings of Trivedi *et al* (2012) ; Giriraj and Kancha (2014) in guava.

Number of fruits per tree

The number of fruits per tree ranged from 132.7 to 160.3 in different treatments of present study (Table 1). The treatment consisting of KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (160.3) recorded significantly maximum number of fruits per tree of guava, however was found at par with the treatment T_8 (155.33), T_{11} (151.66), T_{10} (145.26), T_7 (146) and T_4 (144.33). The treatment control recorded minimum number of fruits per tree of guava (132.6). Similar results were also obtained by Sharma *et al.*(2016), Patolia *et al.* (2017).

Fruit yield per tree (kg)

The yield per tree ranged from 25.9 kg to 39.4 kg in different treatments of potassium form and micronutrient in present study (Table 1). Significantly maximum yield per tree (39.4 kg) of guava was recorded in the treatment KNO_3 at 1.5% + $ZnSO_4$ at 0.5% over rest of the treatments under study. It was found at par with the treatment T_8 (37.11 kg) and T_{11} (35.8 kg). The remaining treatment showed intermediate results and were at par with each other. A similar finding has been reported by Ramesh *et al.* (2016) and Pandey *et al.* (2018).

Fruit yield per hectare (tons)

The yield per hectare ranged from 11.0 t/ha to 7.2 t/ha in different treatments of present study (Table 1). Significantly maximum yield per hectare of guava was recorded in the treatment KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (10.95 t/ha) over rest of the treatments under study. However, it was found at par with the treatment T_8 (10.31 t/ha) and T_{11} (9.95 t/ha). Similar findings has been reported by Waskela *et al.* (2013) and Yadav *et al.* (2017).

Post-harvest quality

Seed weight per fruit (g)

The seed weight per fruit ranged from 2.3 g to 2.9 g in different treatments of potassium form and micronutrient in present study (Table 2). Significantly minimum seed weight per fruit of guava was recorded in the treatment applied with KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (2.3 g). The treatment control recorded maximum seed weight per fruit of guava (2.9 g). The experimental findings were similar to Ramesh *et al.* (2016) and Pippal *et al.* (2019).

Pulp weight per fruit (g)

Maximum fruit pulp weight of guava was recorded in the treatment T_{12} (244 g), however was found at par with the treatment T_8 (236.8 g) and T_{11} (234.25 g) (Table 2). The minimum pulp weight was recorded from T_{13} -control plant (189.0). The experimental findings are similar to Waskela *et al.* (2013) and Sharma *et al.* (2016).

Total soluble solids (%)

Significantly maximum total soluble solids was recorded in the treatment applied with KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (14.21%) (T_{12}) and minimum of 10.9 % from T_{13} (Control) (Table 2), however it was found at par with the treatment T_{11} (13.4 %) and T_8 (13.2 %). Similar findings have been reported by Gill and Bal (2009), Sarrwy (2012) and Prasad *et al.* (2015).

Reducing sugar

Reducing sugar of fruits ranged from 3.20 % to 4.75% in different treatments of potassium form and micronutrient in present study (Table 2). Significantly maximum reducing sugar of guava fruits was recorded in the treatment KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (4.75 %), however it was found at par with the treatment K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5% (4.63), KNO_3 at 1% + $ZnSO_4$ at 0.5% (4.50) and K_2SO_4 at 1% + $ZnSO_4$ at 0.5% (4.37).

Non-reducing sugar

Non-reducing sugar ranged from 2.50% to 4.40% in different treatments of potassium form and micronutrient in present study (Table 2). Significantly maximum non-reducing sugar % of guava was recorded in the treatment applied with KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (4.40), however it was found at par with the treatment T_8 (4.19%) and T_{11} (4.10%). The remaining treatment showed intermediate results and were at par with each other. These results corroborate the earlier records of Prasad *et al.* (2015) and Patolia *et al.* (2017).

Total sugar

Total sugar ranged from 5.8 % to 9.2 % in different treatments of potassium form and micronutrients in present study (Table 2). Significantly maximum total sugar of guava fruits was recorded in the treatment KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (9.2%) over remaining treatments under study, however it was found at par with the treatment T_8 (8.82%) and T_{11} (8.60%). The next best treatments were T_7. T_{10}, T_9 and T_6 and were found at par with each other. The results are in confirmation with the findings of Manivannan (2015).

Acidity

Significantly minimum acidity of guava fruits was recorded in the treatment applied with KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (0.36) and maximum with control (0.58%) (Table 2), however, it was found at par with the treatment applied with KNO_3 at 1% + $ZnSO_4$ at 0.5% (0.38 %), K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5% (0.39 %) and K_2SO_4 at 1% + $ZnSO_4$ at 0.5% (0.41%). Similar findings have been reported by Yadav *et al.* (2011), Prasad *et al.* (2015) and Jawandha *et al.* (2017).

Shelf life of fruits at ambient temperature

Significantly maximum shelf life of fruits was recorded in the treatment KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (8.4 days), however it was found at par with the treatment T_8 (8.2), T_7 (8.1), T_{11} (8.0 days), T_{10} (7.8 days) and T6 (7.5 days) (Table 2). The treatment control recorded minimum shelf life of fruits (5.6 days) in present study. The above observations are in conformity with the findings of Goswami *et al.* (2012), Goswami *et al.* (2014) and Sonkariya *et al.* (2016).

Physiological loss in weight

At 3rd day of ambient storage of guava fruit, physiological loss in weight of fruit ranged from 3.5 % to 6.0% in different treatments of potassium form and micronutrients in present study (Table 2). Significantly minimum physiological loss in weight of guava was recorded in the treatment T_{12} (3.5%), however it was found at par with the treatment T_8 (3.8%) and T_{11} (3.9%). On the 5th day of room temperature storage physiological loss in weight ranged from 6.8% to 8.9% in different treatments under present study. Significantly minimum physiological loss in weight of guava was recorded in the treatment T_{12} followed by the treatment T_8 (7.0 %), T_{11} (7.1%) and T_7 (7.3%), however, all the treatments were at par with each other. On the 7th day of storage physiological loss in weight was significantly minimum in the treatment KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (11.77), however was found at par with the treatment T_8 (11.9%), T_{11} (12.3%) and T7 (12.3%). The treatment control recorded maximum physiological loss in weight of guava (8.9 %) in present study. Similar results have been earlier reported by Vishwakarma, (2015) and Sonkariya *et al.* (2016).

Fruit decay

At 3rd day of ambient storage of guava fruit, fruit decay was not observed in any treatments under investigation (Table 2). At 5th day of room storage the fruit decay % ranged from 10.7 to 25.8 in different treatments in present study. Significantly minimum fruit decay % in guava was recorded in the treatment applied with KNO_3 at 1.5% + $ZnSO_4$ at 0.5% (10.7), however it was found at par with the treatment T_8 (11.0%), T_{11} (11.5%) and T_7 (12.20%). The treatment control recorded maximum fruit decay % of guava fruits (25.8) in present study. On 7th day of storage the fruit decay % ranged from 24.7 to 54.4 in different treatments of present study. Significantly minimum fruit decay % of guava fruits was recorded in the treatment T_{12} (24.7), however it was found at par with the treatment T_8 (26%), T_{11} (28.4%) and T_7 (29.33%). The treatment control recorded maximum fruit decay % of guava (54.4%) in present study. Similar results have been earlier reported by Goswami *et al.*, (2012), Vishwakarma (2015) and Sonkariya *et al.* (2016).

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Table 1: Effect of combined application of different forms of potassium and micronutrients on fruit weight (g), fruit volume (ml), fruit length (cm), fruit diameter (cm), fruit drop (%), fruit retention (%), number of fruits/ tree and fruit yield /tree and per ha of guava

Treatment	Fruit Weight (g)	Fruit volume (ml)	Fruit length (cm)	Fruit diameter (cm)	Fruit drop (%)*	Fruit retention(%)*	Number of fruits per tree	Fruit yield /tree (kg)	Fruit Yield/ha (tons)
T_1	217.3	182.1	6.55	6.70	32.00 (34.44)	68.00 (55.55)	136.0	29.6	8.2
T_2	220.4	184.0	6.75	6.88	31.84 (34.34)	68.16 (55.65)	136.3	30.5	8.4
T_3	225.7	191.3	6.86	7.10	30.30 (33.39)	69.70 (56.60)	139.4	31.4	8.7
T_4	230.2	197.2	7.00	7.20	27.84 (31.83)	72.16 (58.16)	144.3	33.3	9.2
T_5	223.0	188.3	6.70	6.95	31.39 (34.06)	68.61 (55.54)	137.2	30.6	8.5
T_6	228.2	195.2	6.94	7.19	28.80 (32.44)	71.20 (55.76)	142.4	32.5	9.0
T_7	233.0	202.7	7.26	7.40	27.00 (31.29)	73.00 (58.70)	146.0	34.3	9.5
T_8	239.1	212.3	7.50	7.80	22.34 (28.19)	77.66 (61.72)	155.3	37.1	10.3
T_9	225.4	192.3	6.80	6.97	29.04 (32.59)	70.96 (57.12)	141.9	31.9	8.9
T_{10}	231.7	198.3	7.06	7.26	27.37 (31.54)	72.63 (58.48)	145.3	33.6	9.3
T_{11}	236.6	205.3	7.30	7.70	24.17 (29.44)	75.83 (60.31)	151.7	35.8	10.0
T_{12}	246.3	220.6	7.86	8.06	19.84 (26.43)	80.16 (63.71)	160.3	39.4	11.0
T_{13}	195.0	170.0	6.00	6.40	33.67 (35.46)	66.33 (53.46)	132.7	25.9	7.2
S.Em.±	5.97	5.96	0.25	0.26	0.73	0.79	5.29	1.33	0.34
C.D.(0.05)	17.41	17.40	0.75	0.77	2.19	2.37	15.43	3.88	1.02

T_1- KH_2PO_4 at 1% + $FeSO_4$ at 0.5%, T_2- KH_2PO_4 at 1.5% + $FeSO_4$ at 0.5%, T_3 - KH_2PO_4 at 1% + $ZnSO_4$ at 0.5%, T_4 - KH_2PO_4 at 1.5% + $ZnSO_4$ at 0.5%, T_5 - K_2SO_4 at 1% + $FeSO_4$ at 0.5%, T_6 - K_2SO_4 at 1.5% at + $FeSO_4$ at 0.5%, T_7-K_2SO_4 at 1% + $ZnSO_4$ at 0.5%, T_8-K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5%,T_9-KNO_3 at 1% +$FeSO_4$ at 0.5%,T_{10}-KNO_3 at 1.5% + $FeSO_4$ at 0.5%,T_{11}-KNO_3 at 1% + $ZnSO_4$ at 0.5%,T_{12}-KNO_3 at 1.5% + ZnSO4 at 0.5% and T_{13}- control

***** Figures in the brackets are angular transformed value.

Table 2: Effect of combined application of different forms of potassium and micronutrients on seed weight/ fruit (g), pulp weight/ fruit (g), Total soluble solids (%), reducing sugar (%), non-reducing sugar, Total sugar, shelf life, PLW and decay percent of guava.

Treatment	Seed weight/ fruit (g)	Pulp weight (g)	TSS (%)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)	Acidity (%)	Shelf life (Days)	Physiological Loss in Weight (%)			Fruit decay (%)		
									3rd day	5th day	7th day	3rd day	5th day	7th day
T_1	2.8	214.2	11.6	3.60	2.71	6.3	0.49	6.9	4.9	8.2	13.3	0	17.2	40.8
T_2	2.8	217.6	11.8	3.80	3.39	7.2	0.48	7.0	4.8	8.1	13.2	0	16.4	39.1
T_3	2.5	223.2	12.2	3.98	3.63	7.6	0.47	7.1	4.8	8.1	13.1	0	15.9	37.2
T_4	2.4	227.8	12.3	4.02	3.59	7.6	0.45	7.2	4.7	8.0	13.0	0	15.7	36.4
T_5	2.7	220.3	12.4	4.06	3.61	7.7	0.45	7.3	4.6	7.9	12.8	0	14.9	35.6
T_6	2.5	225.7	12.4	4.08	3.76	7.8	0.44	7.5	4.5	7.8	12.7	0	13.0	30.5
T_7	2.4	230.5	12.8	4.37	4.08	8.5	0.41	8.1	4.1	7.3	12.3	0	12.2	29.3
T_8	2.3	236.8	13.2	4.63	4.19	8.8	0.39	8.2	3.8	7.0	11.9	0	11.0	26.0
T_9	2.6	222.7	12.5	4.10	4.0	8.1	0.43	7.3	4.3	7.5	12.5	0	14.1	33.3
T_{10}	2.4	229.2	12.6	4.28	4.06	8.3	0.42	7.8	4.2	7.4	12.5	0	13.2	31.1
T_{11}	2.4	234.3	13.4	4.50	4.10	8.6	0.38	8.0	3.9	7.1	12.3	0	11.5	28.4
T_{12}	2.3	244.0	14.2	4.75	4.40	9.2	0.36	8.4	3.5	6.8	11.8	0	10.7	24.7
T_{13}	2.9	189.0	10.9	3.20	2.50	5.8	0.58	5.6	6.0	8.9	15.1	0	25.8	54.4
S.Em.±	0.12	3.56	0.35	0.14	0.10	0.22	0.02	0.32	0.14	0.18	0.19		0.51	1.57
C.D.(0.05)	0.37	10.41	1.03	0.41	0.32	0.65	0.06	0.95	0.42	0.53	0.57		1.51	4.69

T_1- KH_2PO_4 at 1% + $FeSO_4$ at 0.5%, T_2- KH_2PO_4 at 1.5% + $FeSO_4$ at 0.5%, T_3 - KH_2PO_4 at 1% + $ZnSO_4$ at 0.5%, T_4 - KH_2PO_4 at 1.5% + $ZnSO_4$ at 0.5%, T_5 - K_2SO_4 at 1% + $FeSO_4$ at 0.5%, T_6 - K_2SO_4 at 1.5% at + $FeSO_4$ at 0.5%, T_7-K_2SO_4 at 1% + $ZnSO_4$ at 0.5%, T_8-K_2SO_4 at 1.5% + $ZnSO_4$ at 0.5%,T_9-KNO_3 at 1% +$FeSO_4$ at 0.5%,T_{10}-KNO_3 at 1.5% + $FeSO_4$ at 0.5%,T_{11}-KNO_3 at 1% + $ZnSO_4$ at 0.5%,T_{12}-KNO_3 at 1.5% + ZnSO4 at 0.5% and T_{13}- control