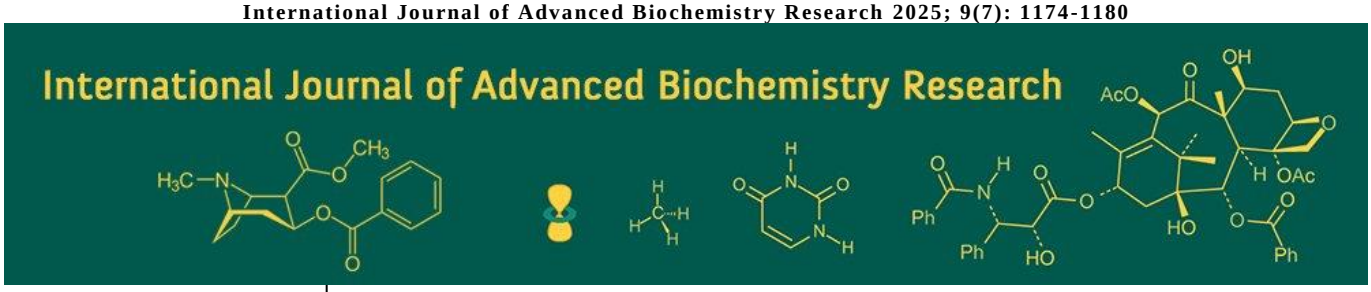

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(7): 1174-1180
www.biochemjournal.com
Received: 22-04-2025
Accepted: 26-05-2025

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Effect of PDKV grade II micronutrient on yield and yield contributing characters of sapota

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DOI: https://www.doi.org/10.33545/26174693.2025.v9.i7o.4908

Abstract
The present investigation entitled "Effect of PDKV grade II micronutrient on yield and yield contributing characters of sapota" was conducted during the year 2024-25 at Regional Fruit Research Station, Katol. The aim was to study the influence of foliar application of PDKV Grade II micronutrients on yield and quality parameters of sapota (cv. Cricket Ball). The experiment was laid out in a Randomized Block Design (RBD) with ten treatment combinations involving different concentrations (1%, 1.5%, and 2%) and number of foliar sprays (one, two, and three), along with a control. Results revealed that two sprays at 1.5% concentration of PDKV Grade II significantly improved yield attributes such as number of fruits plant^{-1}, yield plant^{-1}, days to harvesting and fruit set. The fruit lengths, fruit diameter, were observed in three sprays of 1.5% concentration. Fruit weight was observed in two sprays of 1.5% concentration. The study concluded that two foliar applications of 1.5% concentration PDKV Grade II micronutrient at flowering stage and Pea stage is optimum for achieving superior yield and fruit quality under Vidarbha conditions.

Keywords: PDKV grade II micronutrient, *Manilkara archus*, foliar spray, micronutrient, cricket ball, fruit set

Introduction
Sapota (*Manilkara archus* L.) belongs to family Sapotaceae is native of Mexico and Central America and now widely cultivated throughout tropics. Sapota is mainly cultivated on large scale in Maharashtra, Karnataka, Tamil Nadu, and Kerala in India.

In India sapota is also known as sapodilla or Chiku, it is mainly cultivated for its fruit. Fruits are produced throughout the year but production is not consistent. A major problem in sapota cultivation is the occurrence of certain physiological disorders and short shelf life, apart from the problems of pests and diseases, and problem of low fruit setting. As sapota is a heavy bearing fruit crop, it suffers from problems like low fruit setting about 10 to 12 percent and retains until maturity enormous flowering, flower drop, less fruit set, small sized fruits with low quality and fetches less price in the market. Especially in a wasteland and marginal lands, this crop suffers from mummification which has been described as a nutritional or physiological disorder.

Foliar application of nutrients is quickly absorbed by leaves and transported to different parts of the plant to fulfill the functional requirement of nutrition. This method is extremely helpful for the correction of element deficiencies to restore disrupted nutrient supply, overcome stress factors limiting their availability and it plays a very important role in improving fruit set, productivity, quality and recovery of nutritional and physiological disorder in fruit trees (Shukla *et al.* 2011) [16, 17]. Nutrition management is one of the most important factors in improving the plant growth and yield through increasing photosynthetic efficiency.

PDKV Micronutrient Grade II is a specially formulated blend containing essential micronutrients including phosphorus in a bio available form, tailored to meet the needs of fruit crops in Maharashtra. However, there is limited scientific research available on the specific response of sapota to this formulation, especially regarding foliar application methods, dosages, and frequency of sprays. Therefore, this study is essential to: Determine the optimal concentration and number of foliar sprays of PDKV Grade II micronutrient

mixture for enhancing sapota yield. Evaluate improvements in fruit yield and quality parameters such as No of fruits^{-1} plant and Yield plant^{-1}, days to harvesting, fruit set, fruit size and fruit weight.

Materials and Methods

The present investigation was carried out at fruit regional research station, Katol. Where the trail was conducted on sapota orchard of 25 years of age planted at spacing of 10 m x 10 m. The experiment was framed in RBD with 3 replication and 10 treatments. Recommended dose of fertilizer (RDF) with NPK applied to all treatments as per the scheduled in all treatments. Different treatments were imposed using Micronutrient mixture like PDKV Grade ll having composition of (Zn-3%, Fe-2.5%, Cu-1%, Mn-1%, B-0.5%, Mo-0.1%). Treatments T_1-T_3 were applied with single spray of micronutrient during 1st week of Sept. (i.e. at 50% flowering), For treatment T_4-T_6 two foliar spray of micronutrient, applied 1st during 1st week of Sept (at 50% flowering) and 2nd i.e. at 1st week of Oct. i.e. at pea stage, For treatment T_7 to T_9 Three foliar spray were applied 1st at 1st week of Sept. (at 50% flowering), 2nd i.e. at 1st week of Oct. (at pea stage) & 3rd at 1st week of Nov.) For T_{10} treatment no micronutrients were not applied (control).

Treatment Details

Treatments	Treatment details
T_1	Single spray of grade II micronutrients at 1% (10 ml/liter)
T_2	Single spray of grade II micronutrients at 1.5% (15 ml/liter)
T_3	Single spray of grade II micronutrients at 2% (20 ml/liter)
T_4	Two sprays of grade II micronutrients at 1% (10 ml/liter)
T_5	Two sprays of grade II micronutrients at 1.5% (15 ml/liter)
T_6	Two sprays of grade II micronutrients at 2% (20 ml/liter)
T_7	Three sprays of grade II micronutrients at 1% (10 ml/liter)
T_8	Three sprays of grade II micronutrients at 1.5% (15 ml/liter)
T_9	Three sprays of grade II micronutrients at 2% (20 ml/liter)
T_{10}	Control (No spray)

Results and Discussion

The result of the effect of PDKV Grade II micronutrient on sapota was studied and presented below.

A. Yield Parameter

1. The effect of PDKV Grade II micronutrient on number of fruits plant^{-1}

The effect of PDKV Grade II micronutrient on number of fruits per plant of sapota had significant difference among the different treatments and the number of fruits^{-1} plant were harvested in varied range from (1383) to (989.67) and The maximum number of fruits per plant (1383) was recorded in the treatment T_5 @ -two spray at con.1.5% which was at par with T_8 @ -three spray at con.1.5% (1362), T_7 @ -Single spray at con. 1%) (1347.33), T_4 @ -two spray at con.1% (1337.33), T_2 @ -Single spray at con. 1.5% (1268.67) However, the minimum number of fruits per plant were recorded in T_{10} control (989.67) which is followed by T_1 @ -single spray at con. 1% (1030.33). These results suggest that 1.5% micronutrient application effectively improves fruit retention, possibly due to enhanced physiological activity and nutrient translocation this result similar to Baviskar *et al.* (2011) [1], Ghumare *et al.*, 2014 [4], Patel *et al.* (2017) [19].

2. The effect of PDKV Grade II micronutrient on yield plant^{-1}

The significant difference was observed among the different treatments and the yield per plant were harvested in varied range from (147.65) kg/ha to (69.36) kg/ha and the maximum yield per plant (147.65) kg/ ha was recorded in the treatment T_5 @ -two spray at con. 1.5% which was at par with T_8 @ -three spray at con.1.5% (138.96) kg/ha. However, the minimum yields per plant were recorded in T_{10} control (69.36) kg/ha which is followed by T_1 @ -single spray at con. 1% (81.70) kg/ha. Improved yield can be attributed to better fruit set and enhanced fruit development due to adequate micronutrient availability (Thirupathaiah & Shirol, (2017) [6], Ghumare *et al.* (2014) [4], Ghosh *et al.* (2012) [5] in sapota.

3. The effect of PDKV Grade II micronutrient on Days to Harvesting.

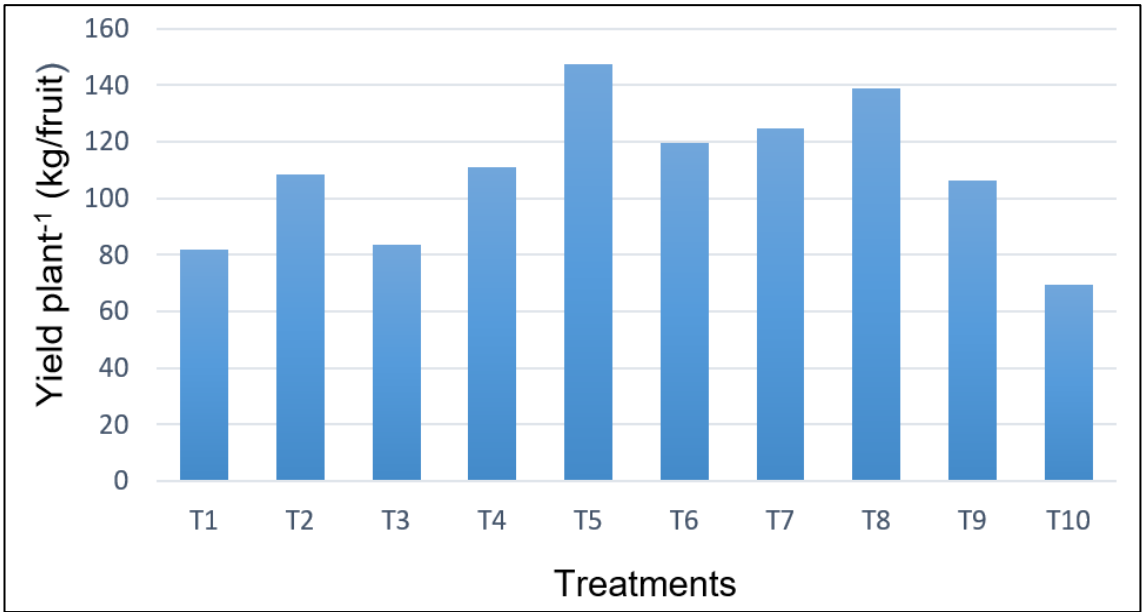
The effect of PDKV Grade II micronutrient on days to harvesting per plant of sapota had significant difference among the different treatments and days to harvesting per plant were harvested in varied range from (265.33) days to (246.67) days and the minimum days to harvesting were recorded in T_5 @ -two spray at con. 1.5% (246.67) days which is at par with T_8 @ -three spray at con.1.5% (247.67) days However, maximum days required for harvesting (265.33) days was recorded in the treatment T_{10} @ -control which was followed by T_9 @ -three spray at con. 2% (263.33) days. The quicker maturity may be due to improved metabolic activity resulting from balanced micronutrient supply. This result were similar to Ghumare *et al.* (2014) [4], Manjare *et al.* (2016) [10].

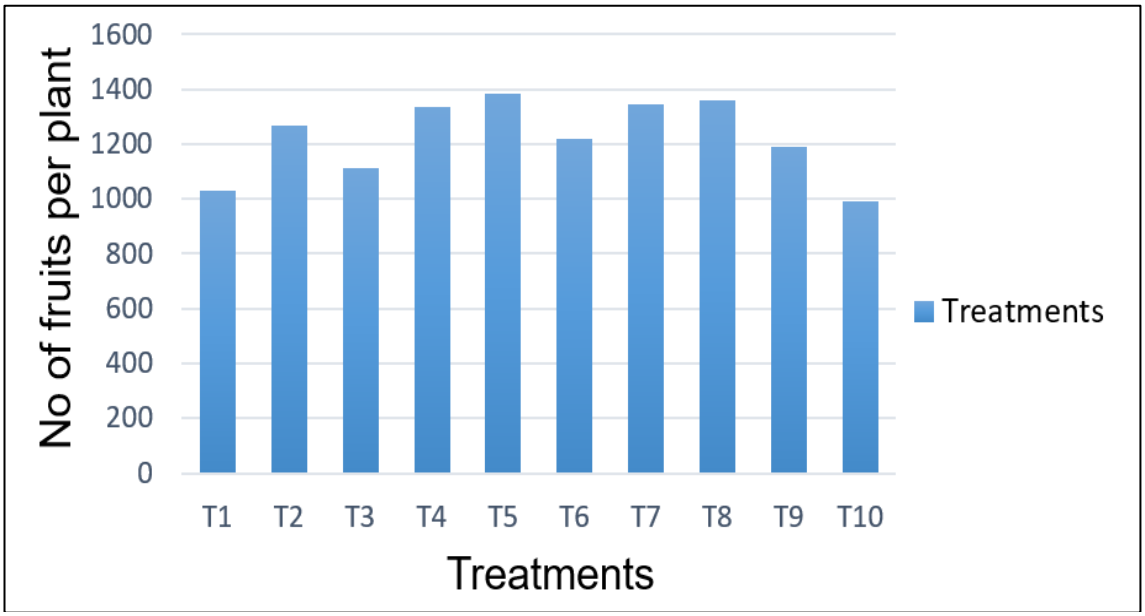
4. The effect of PDKV Grade II micronutrient on Fruit set

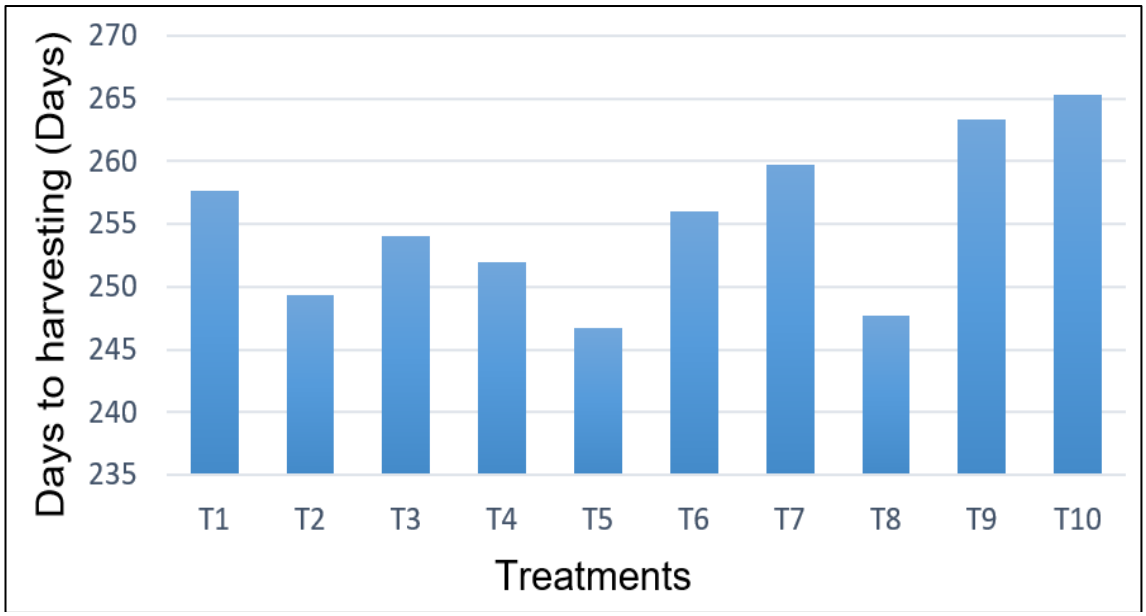
The effect of PDKV Grade II micronutrient on Fruit set of sapota had significant difference among the different treatments and the fruit set were in varied range from (15.76)% to (24.33)% and The maximum number of fruit set (24.33)% was recorded in the treatment T_5 @ -two spray at con.1.5% which was at par with T_8 @ -two spray at con.1.5% (22.35)% and T_4 @ -two spray at con.1% (21.99)%,, However, the minimum number of fruit set were recorded in T_{10} control (15.76)% which is followed by T_1 @ -Single spray at con. 2% (18.48) %. Micronutrients play crucial roles in various physiological and biochemical processes that directly influence fruit set the combined application of micronutrients ensures their immediate availability during critical stages of flowering and fruit development, leading to improved fruit set percentages. The similar result reported by Ghumare *et al.* (2014) [4], Improved fruit set is likely due to increased pollen viability and fertilization success under optimal nutrient conditions. Shukla *et al.*, (2011) [16, 17], Patel *et al.* (2017) [19].

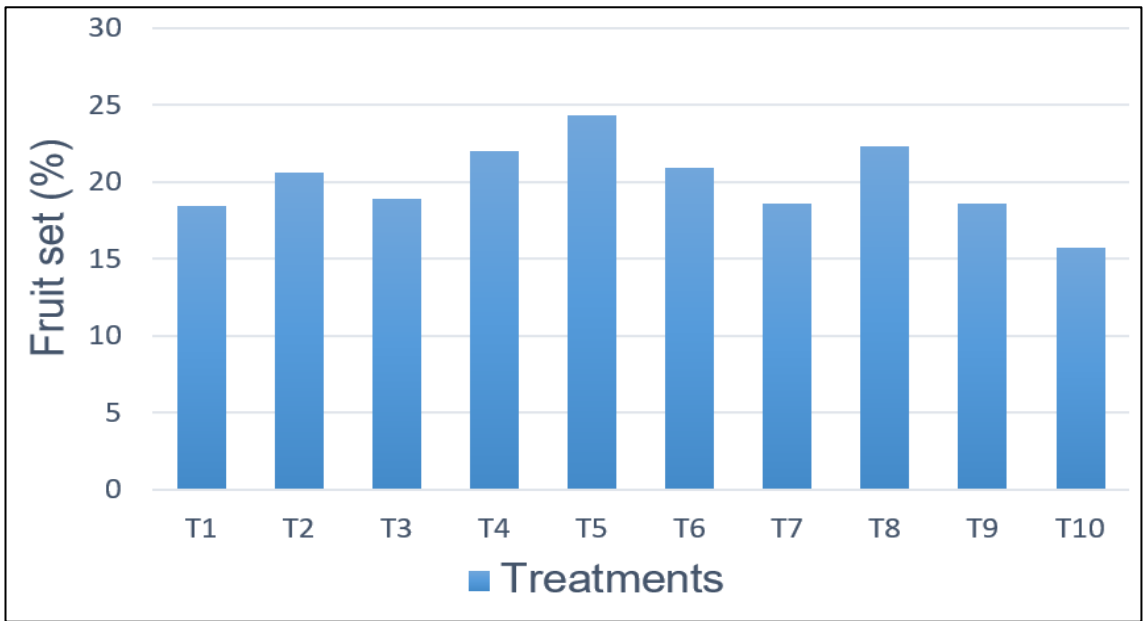
Table 1: Effect of PDKV Grade II micronutrient on Yield Parameter

PDKV Grade II micronutrient treatments	No of Fruits plant^{-1}	Yield plant^{-1}(kg/plant)	Days to Harvesting (Days)	Fruit set (%)
T1-Single Spray @ 1% (10 ml/ liter)	1030.33	81.70	257.67	18.48
T2-Single Spray @ 1.5% (15 ml/ liter)	1268.67	108.53	249.33	20.59
T3-Single Spray @ 2% (20 ml/ liter)	1114.67	83.81	254.00	18.87
T4-Two Sprays @ 1% (10 ml/ liter)	1337.33	110.86	252.00	21.99
T5-Two Sprays @ 1.5% (15 ml/ liter)	1383.00	147.65	246.67	24.33
T6-Two Sprays @ 2% (20 ml/ liter)	1221.00	119.52	256.00	20.89
T7-Three Sprays @ 1% (10 ml/ liter)	1347.33	124.64	259.67	18.61
T8-Three Sprays @ 1.5% (15 ml/ liter)	1362.00	138.96	247.67	22.35
T9-Three Sprays @ 2% (20 ml/ liter)	1190.00	106.41	263.33	18.63
T10-No Spray (Control)	989.67	69.36	265.33	15.76
F test	Sig.	Sig.	Sig.	Sig.
S.E. m±	40.62	5.02	2.45	0.79
C.D. at 5%	120.70	14.92	7.28	2.34









B. Quality parameter

Table 2: Effect of PDKV Grade II micronutrient on quality parameter

PDKV Grade II micronutrient treatments	Fruits length (cm)	Fruit diameter(cm)	Fruit weight(g)
T_1-Single Spray @ 1% (10 ml/ liter)	4.80	5.37	79.28
T_2-Single Spray @ 1.5% (15 ml/ liter)	4.94	5.58	85.29
T3-Single Spray @ 2% (20 ml/ liter)	4.65	5.25	75.19
T4-Two Sprays @ 1% (10 ml/ liter)	5.30	5.84	82.91
T5-Two Sprays @ 1.5% (15 ml/ liter)	5.70	6.13	106.76
T6-Two Sprays @ 2% (20 ml/ liter)	5.20	5.55	97.88
T7-Three Sprays @ 1% (10 ml/ liter)	5.35	5.90	92.50
T8-Three Sprays @ 1.5% (15 ml/ liter)	5.79	6.20	102.03
T9-Three Sprays @ 2% (20 ml/ liter)	5.17	5.60	89.68
T10-No Spray (Control)	4.55	4.89	70.11
F test	Sig.	Sig.	Sig.
S.E. m±	0.15	0.11	3.01
C.D. at 5%	0.46	0.32	8.96

1. The effect of PDKV Grade II micronutrient on Fruit length

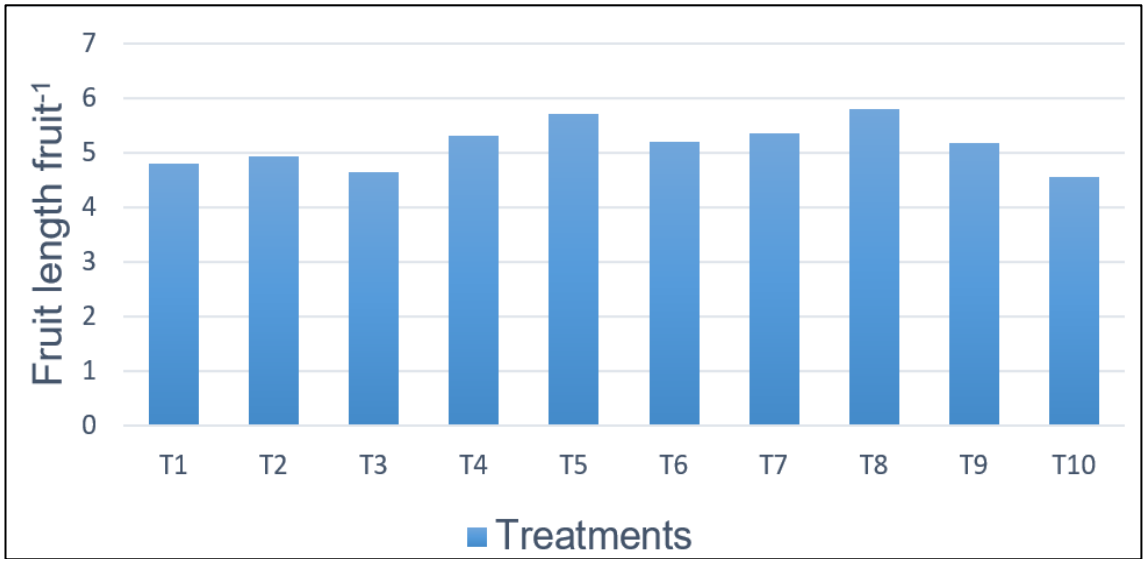
The effect of PDKV Grade II micronutrient on Fruit length of sapota had significant difference among the different treatments and the fruit length were in varied range from (5.79) cm to (4.55) cm and The maximum number of fruit length (5.79) cm was recorded in the treatment T_8 @ -three spray at con.1.5% which was at par with T_5 @ -two spray at con.1.5% (5.70) cm and T_7 @ -three spray at con.1% (5.35) cm However, the minimum number of fruit length were recorded in T_{10} @ -Control (4.55) cm which is followed by T_3 @ -single spray at con. 2% (4.65) cm. this is due to increased size may result from better cell division and expansion due to micronutrient activity. This result similar to Baviskar *et al.* (2011) [1], Ghumare *et al.* (2014) [4], Thirupathaiah & Shirol, (2017) [6].

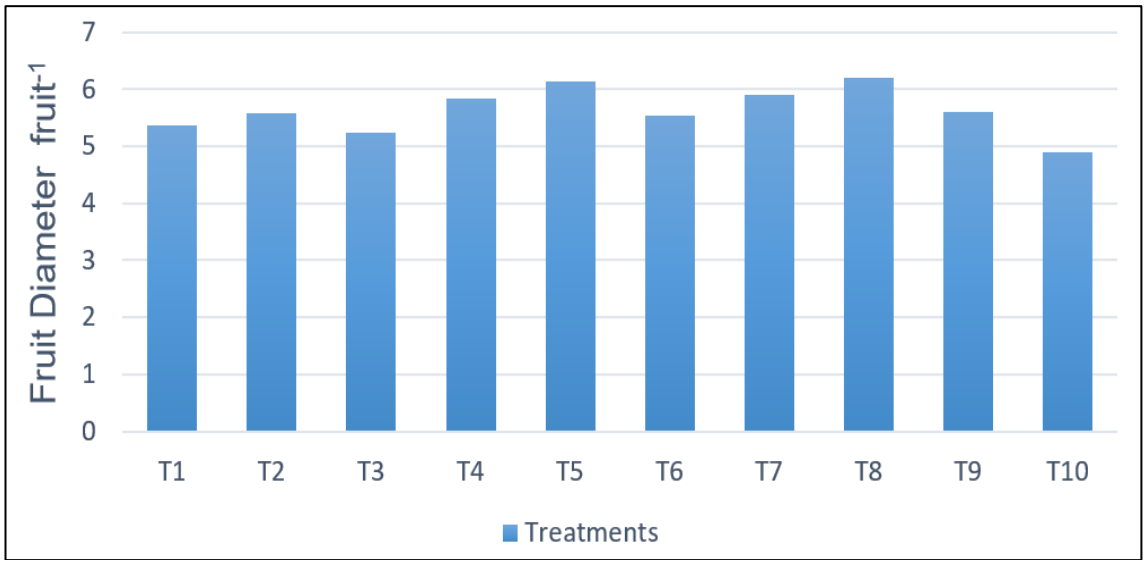
2. The effect of PDKV Grade II micronutrient on Fruit diameter

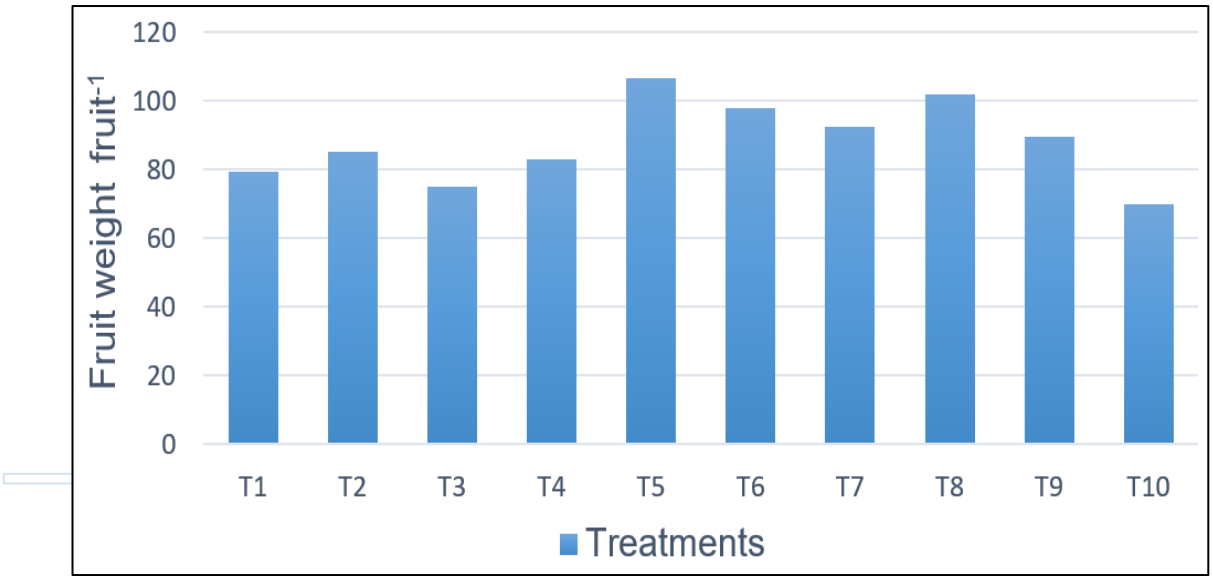
The effect of PDKV Grade II micronutrient on Fruit breadth of sapota had significant difference among the different treatments and the fruit breadth were in varied range from (5.76) cm to (4.89) cm and The maximum number of fruit breadth (5.76) cm was recorded in the treatment T_8 @ -three spray at con.1.5% which was at par with T_5 @ -two spray at con.1.5% (5.67) cm, T_7 @ -three spray at con.1% (5.58) cm and T_4 @ -two spray at con.1% (5.41) cm However, the minimum number of fruit breadth were recorded in T_{10} (4.89) cm control which is followed by T_3 @ -single spray at con. 2% (5.07) cm.

3. The effect of PDKV Grade II micronutrient on Fruit weight

The effect of PDKV Grade II micronutrient on fruit weight of sapota had significant difference among the different treatments and the fruit weight were in varied range from (106.76) g to (70.11) g and The maximum number of fruit weight (106.76) g was recorded in the treatment T_5 @ -two spray at con.1.5% which was at par with T_8 @ -three spray at con.1.5% (102.03) g, T_6 @ -two spray at con.2% (97.88) g However, the minimum number of fruit weight were recorded in T10 control (70.11) g which is followed by T_3 @ -single spray at con.2% (75.19) g. Micronutrients like Zinc (Zn), Iron (Fe), Manganese (Mn), and Boron (B) play crucial roles in cell division, elongation, and wall development. When these are supplied through foliar sprays, especially during critical growth stages like flowering and fruit set, they promote rapid cell expansion and increased fruit size. This result similar to. Ghumare *et al.* (2014) [4], Manjare P.B. *et al.* (2016) [10], Modi *et al.* (2021) [20] in sapota.







Conclusion

Thus from the above yield and yield contributing characteristic it was observed that application of PDKV grade II micronutrient (Two Spray at Conc. 1.5% (15ml/liter) showed significant higher number of fruits plant^{-1}, yield plant^{-1} and Days to harvesting and Fruit set. In respect to fruit size it was observed that application of PDKV grade II micronutrient T_8 (Three Spray at Conc. 1.5% (15ml/liter) showed significant results for fruit length, fruit breadth treatment T_5 (Two Spray at Conc. 1.5% (15ml/liter) showed significantly higher fruits weight.

It was concluded that application of PDKV Grade II micronutrient significantly improved yield and yield contributing characteristics which gave higher economic returns with Two spray of micronutrient was the most efficient and profitable treatment. Excessive spraying three spray did not proportionally increase yield indicating diminishing returns at higher doses due to scorching effect.

Acknowledgements

This study is part of thesis research of first author submitted to Horticulture Section, College of Agriculture, Nagpur Dr. PDKV Akola. And RFRS, Katol all professors and staff members Authors are thankful to the Associate Dean. College of Agriculture, Nagpur for providing necessary laboratory facilities. Authors are also grateful to the student's advisory committee members for their critical comments and valuable suggestions during the study.

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