

Review Article

Effect of different organic manures on establishment of passion fruit (*Passiflora edulis Sims.*) cv. Coorg Purple and Coorg Yellow under Prayagraj Agro-climatic conditions

ABSTRACT

The experiment was carried out at Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj during the year 2020-2021. The experiment were laid out in Randomized Block Design comprising of 8 treatments viz., T₁ Control, T₂ Poultry manure (100%), T₃ FYM (100%), T₄ Vermicompost (100%), T₅ Control, T₆ Poultry manure (100%), T₇ FYM (100%) and T₈ Vermicompost (100%), with three replications. Result showed that treatment T₄ performed best in terms of plant height (86.77cm), number of branches plant (3.99), number of leaves plant (40.33), stem girth (4.69mm), leaf area (124 sq/cm) and Chlorophyll Content (92.39 µmol per m²).

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Keywords: Passion Fruit, Organic media, FYM, Vermicompost.

1. INTRODUCTION

Passion fruit (*Passiflora edulis*), a native of tropical America (Brazil), belonging to the family Passifloraceae, is a high value and export oriented crop. Passion fruit stands out not only for its exotic and unique flavour and aroma but also for its amazing nutritional and medicinal properties the juice of passion fruit is acidic in nature and has an excellent flavor and is quite delicious, nutritious and liked by most people for its blending quality. Passion fruit are good source of vitamin-A, ascorbic acid, riboflavin and niacin and also contains fair amount of minerals sodium, magnesium, sulphur and chlorides. Passion fruit

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In India, passion fruit cultivation is confined to Kerala, Tamil Nadu (Nilgiri hills and Kodaikanal), Karnataka (Coorg) and Northeastern states (Mizoram, Nagaland, Manipur and Sikkim) with an area and production of 9.11 thousand ha and 45.82 thousand tons. The fruit is rich in Vitamin A and Vitamin C. There are two recognized forms of edible passion fruit; purple (*Passiflora edulis* Sims.) and yellow (*Passiflora edulis* f. *flavicarpa* Deg.).

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The two widely cultivated varieties: a purple colored fruit type, *P. edulis* f. *edulis*, and the yellow colored fruit type *P. edulis* f. *flavicarpa*. Passion fruit vines usually produces a single flower at each node of the plant with a width of 5-7.5cm. The flower of passion fruit have five oblong green sepals and five white petals. The sepals and petals of passion fruit is purple and has five stamens, a branched style and ovary. The style of passion flower tends to bend and anthers of the flower are situated on top of the style with very distinct head on top.

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Areas identified as requiring immediate attention includes fertilizer recommendation for optimum fruit yield and quality. Fertilizer recommendations in particular have been variable. As these medias are well suited, cheap & are easily available, these could be suitable for farmer's use. The use of organic manures as a potential means of maintaining and increasing soil fertility and crop yields has been advocated.

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The use of organic manures as a potential means of maintaining and increasing soil fertility and crop yields has been advocated (Titiloye, 1982; Agboola and Adeoye, 1990; Anikwe, 2000). Soil organic matter is the natural reservoir which furnishes large portions of soil with nitrogen, phosphorus and sulphur and protects it against erosion. Desirable aggregate formation substances are also supplies by organic matter which helps to loosens up the soil for easy movement of air and water (Donahue et al., 1983). Research has recorded the importance of organic matter to maintain soil condition and productive capacity in cereal growing areas and pasture lands of Australia. Aitken et al. (1990) and Fenton and Helyar (2007), reported that the presence of soil organic matter can buffer against strong acidification caused by nitrate leaching and the removal of exchangeable cations such as Ca and Mg in agricultural produce. Soil health and soil condition is important and the management of soil organic matter is an important part of managing soil health and maintaining soil condition.

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Organic matter acts as a reservoir for plant nutrients and prevents leaching loss of nutrients which are vital for plant growth. Organic manure also creates an environment that encourages

beneficial soil organisms i.e. earthworms. Organic matter undergoes mineralization with the release of substantial quantities of nitrogen, phosphorus, sulfur and small amount of micronutrients.

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Farmyard manure is rich in nutrients and improves soil fertility. It refers to the decomposed mixture of dung and urine and farm animals along with litter and left over material from roughages or fodder fed to the cattle. Well decomposed farmyard manure contains 0.5% N, 0.2% P₂O₅ and 0.5% K₂O.

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Application of vermicompost in crop production is an important aspect of organic farming. Vermicompost can be used as effective manure in crop production as well as biofertiliser in maintaining soil health. Vermicompost is a rich nutritive organic fertilizer due to rich in humus, micronutrients, and beneficial soil microbes- nitrogen fixing and phosphorus solubilizing bacteria and actinomycetes and growth hormones "auxins", "gibberlins" and cytokinins". Vermicompost contains several nutrient elements such as N-1.9%, C:N- 13.6 %, P- 2%, K- 0.8%, Zn- 100ppm and Mn- 500ppm. Hence, the experiment at the Horticulture Research Farm, Department of Horticulture, SHUATS, Prayagraj was carried out during 2020-2022 with the objectives.

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To determine the effect of different organic manures (poultry, FYM, vermicompost) on growth and survival of passion fruit.

2.MATERIALS AND METHODS

The experiment entitled was carried out the Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. Prayagraj is situated in the agro climatic zone (Sub-tropical belt) of Uttar Pradesh state. Geographically, Allahabad is located at of 20° 15' North latitude, 60° 3' East longitudes and at an altitude of 678 meters above mean sea level (MSL). The maximum temperature of the location reaches up to 46 °C – 48 °C and seldom falls as low as 4 °C – 5 °C. The relative humidity ranged between 20 to 94 per cent. The average rainfall in this areas around 1013.4 mm annually.

The experiment was laid out in Randomized Block Design (RBD) with three replications. The treatment consisted of different levels of FYM, Poultry Manure and Vermicompost. Thus, there were eight treatment combination including control viz, T₁ Control, T₂ Poultry manure (100%), T₃ FYM (100%), T₄ Vermicompost (100%), T₅ Control, T₆ Poultry (100%), T₇ FYM (100%), T₈ Vermicompost (100%). The entire organic manures materials were applied as a basal dose. Then required doses of fertilizers were applied 1st the month of December 2021. For application organic manures the top soil around the plant (equal to the leaf canopy of the plant) was dug up to 30cm and the manures were uniformly mixed in to the soil, which was then leveled. Weeding was done on every 15 days interval and Irrigation was done every alternative day, mostly in evening. The data collected on different parameters during the course of investigation were subjected to statistical analysis as per method of analysis of variance (Fisher 1918). The significance and non-significance of the treatment effect were judged with the help of “F” variance ratio test. Calculated “F” value (variance ratio) was compared with the table value of „F” at 5% level of significance. If calculated value exceeded the table value, the effect was considered to be significant. The significant difference between the means was tested against the critical difference at 5% level of significance.

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3.RESULTS AND DISCUSSION

The progressive increase in plant height (86.77cm) was recorded in T₄ Vermicompost 100% followed by (82.22cm) in T₆ poultry manure 100% and the minimum plant height was recorded in T₁ Control with a reading of (61.57cm). The present findings corroborate with those of Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri *et al.*, (2013)

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The progressive increase in number of branches (3.99) was recorded in T₄ Vermicompost 100% followed by (3.11) in T₆ Poultry manure 100% and the minimum number of branches were recorded in T₁ Control (2.55) . The present findings corroborate with those of Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri *et al.*, (2013).

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The progressive increase in number of leaves (40.33) was recorded in T₄ Vermicompost 100% followed by (35.55) in T₇ FYM and the minimum number of leaves were recorded in T₁ Control (27.11). The present findings corroborate with those of Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri *et al.*, (2013).

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The progressive increase in stem girth (mm) (4.69mm) was recorded in T₆ Poultry manure 100% followed by (4.45mm) in T₄ Vermicompost 100% and the minimum was recorded in T₁ Control (3.63mm) The present findings corroborate with those of Athani *et al.*, (2007), Naik and Babu (2007), Ram *et al.*, (2007), Ram and Pathak (2007), Kumar *et al.*, (2007), Dutta *et al.*, (2009), Patel *et al.*, (2009), Shukla *et al.*, (2009), Dwivedi (2013) and Agnihotri *et al.*, (2013).

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UNDER PEER REVIEW

The maximum leaf area (124sq/cm) was recorded in T₄ Vermicompost 100% followed by (119.84sq/cm) in T₇ FYM and the minimum was recorded in T₁ Control (80.69sq/cm). The present findings corroborate with those of **Athani et al., (2007), Naik and Babu (2007), Ram et al., (2007), Ram and Pathak (2007), Kumar et al., (2007), Dutta et al., (2009), Patel et al., (2009), Shukla et al., (2009), Dwivedi (2013) and Agnihotri et al., (2013)**.

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The highest chlorophyll content (92.39 sq/cm) was recorded in T₄ Vermicompost 100% followed by (90.10 sq/cm) in T₆ Poultry manure 100% and the minimum was recorded in T₅ Control (71.74sq/cm). This finding correlates the findings of **Coronel et al., (2009)** in Lettuce and **Hokmalipour et al., (2012)** in Maize

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The maximum survival (%) (100) was found in treatment with T₄ Vermicompost (100%) followed by T₈ Vermicompost (100%), T₇ FYM (100%), T₆ Poultry manure (100%), T₅ Control, T₃ FYM (100%) and T₂ Poultry manure (100%) and the minimum survival (%) (66.67) was recorded in T₁ Control.

UNDER PEER REVIEW

Table 1. Effects of different organic manures on the growth of passion fruit plant.

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Treatments		T1	T2	T3	T4	T5	T6	T7	T8
Treatment details		Control (Coorg Purple)	Poultry manure (100%)	FYM (100%)	Vermicompost (100%)	Control (Coorg Yellow)	Poultry (100%)	FYM (100%)	Vermicompost (100%)
Plant height	30 DAP	18.67	23.33	21.89	27.89	19.44	22.77	24.55	21.77
	60 DAP	24.19	35	34	40.55	32.55	37.66	37.33	32.88
	90 DAP	41.12	55.33	58.44	64.11	58.77	59.89	57	55.11
	120 DAP	61.57	79.11	78.33	89.77	77.33	82.22	78.11	76.78
No of leaves	30 DAP	0.55	1.89	2.33	1.77	2.22	2.11	1.88	1.44
	60 DAP	2	2.22	2.33	2.88	2.33	2.33	2.44	2
	90 DAP	2.44	2.66	2.77	3.77	2.66	3.22	2.88	2.22
	120 DAP	2.55	2.77	3	3.99	3	3.11	2.99	2.77
No of branches	30 DAP	5.99	6.55	6.55	9.11	6.11	7	7.89	6.44
	60 DAP	8.78	9.55	9.55	13.66	8.66	10.33	11.55	9.93
	90 DAP	14.11	14.44	15.55	21.11	13.88	16.66	18.22	15.11
	120 DAP	27.11	28.66	29.44	40.33	27.66	30.22	35.55	30.22
Stem girth	30 DAP	2.71	2.93	2.89	3.01	2.8	3.3	2.89	2.05
	60 DAP	2.77	3.26	3.29	3.44	3.22	3.67	3.32	3.2
	90 DAP	3.07	3.75	3.74	3.95	3.79	4.19	3.83	3.66
	120 DAP	3.63	4.25	4.26	4.45	4.28	4.69	4.01	4.2

Table 2. Effects of different organic manures on leaf area, chlorophyll content and survival per cent of a passion fruit plant.

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Treatment	Treatment combinations	leaf area(cm ²)	Chlorophyll content (μmol per m ²)	Survival (%)
T1	Control (Coorg purple)	80.69	75.67	66.67
T2	Poultry manure (100%)	104.97	90.18	100.00
T3	FYM (100%)	105.02	89.03	100.00
T4	Vermicompost (100%)	124	92.39	100.00
T5	Control (Coorg yellow)	100.84	71.74	100.00
T6	Poultry (100%)	115.37	90.10	100.00
T7	FYM (100%)	119.84	86.41	100.00
T8	Vermicompost (100%)	103.54	77.81	100.00

4. CONCLUSION

On the basis of the investigation it is concluded that T4 Vermicompost 100% (Coorg Purple) performed best in terms of plant height (86.77cm), number of branches plant (3.99), number of leaves plant (40.33), stem girth (4.69mm), leaf area (124 sq/cm) and Chlorophyll Content (92.39 $\mu\text{mol per m}^2$). The cost of establishment was found lowest in T1 (Rs 46,060 ha⁻¹)

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REFERENCES

1. **Akinboye, O.E. Nwokocho, A. G. and Abiola F.R. (2016)** The effect of three organic amendments on early growth of yellow passion fruit (*passiflora edulis* var. *Flavicarpa*). *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)* e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 9, Issue 3 Ver. I (Mar. 2016), PP 33-37
2. **Athani SI, Prabhuraj HS, Ustad AI, Swamy GSK, Patil PB and Kotikal YK. (2007 b).** Effect of organic and inorganic fertilizers on growth, leaf, major nutrient and chlorophyll content and yield of guava cv. Sardar. *Acta Horticulture*, 735: 351-356.
3. **Athani SI, Ustad AI, Prabhuraj HS, Swamy GSK, Patil PB and Kotikal YK. (2007 a).** Influence of vermi-compost on growth, fruit yield and quality of guava cv. Sardar. *Acta Horticulturae*, 735: 381-385.
4. **Atom A., (2013)** Effect of inorganic and biofertilizers on growth, yield and quality of Sardar Guava (*Psidium guajava L.*). M.Sc.Thesis, College of Agriculture, Latur.
5. **Baiyeri, K.P., Ugese, F.D., and Uchendu, T.O. (2011)** The effects of previous fertilizer treatments on passion fruit seed quality, and seedling emergence and growth qualities in soilless media. *Journal of Agricultural Technology* 2011 Vol. 7(5): 1397-1407
6. **Chadha, K.L. (2013).** Carambola. In Handbook of horticulture. Directorate of knowledge Management in Agriculture ICAR publishing house, Krish Anusandhan Bhavan, Pusa New Delhi, pp.159.
7. **Crane, J.H. (1994).** The carambola (star fruit). Fact Sheet HS-12. Florida Cooperative Extension Service, IFAS, University of Florida, Gainesville, FL. pp. 1-5.
8. **Devadas VS and Kuriakose KP. (2005).** Evaluation of different organic manures on yield and quality of pineapple var. Mauritius. *Acta Horticulturae*, 666:185-189.
9. **Dhomane PA, Kadam AS, Lakade SK and Gharage VR. (2011).** Effect of different

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- sources of nitrogen on growth and yield of guava (*Psidium guajava* L.) cv. Sardar. *Asian Journal of Horticulture*, 6(1): 92-95.
10. **Dubey, A.K; Singh, D.B. and Neeru Dubey (2001)**. Effect of foliar spray of urea on fruit yield and quality of guava (*Psidium guajava* L.). *Prog. Hort.*, 33 (1): 37-40.
11. **Dutta P, Moji SB and Das BS., (2009)**. Studies on the response of biofertilizer on growth and productivity of guava. *Indian Journal of Horticulture*, 66(1): 39-42.
12. **Dwivedi DH, Rubee L and Ram RB. (2010)**. Effect of biofertilizers and organic manures on yield and quality of guava cv. Red fleshed. *The Scientific Temper*, 193: 193-198.
13. **Godage SS, Parekh NS, Nehete DS and Jagtap VM. (2013)**. Influences of chemical and biofertilizers on growth, flowering, fruit yield and quality of guava (*Psidium guajava* L.) cv. Allahabad Safeda. *Bioinfolet*, 10 (2A): 480-485.
14. **Darpreet Kour, V.K Wali , Parshant Bakshi , Deep Ji Bhat, B. C Sharma, Vikas Sharma and B. K Sinha (2019)**. Effect of Organic and Inorganic fertilizers along with *Azotobacter* on Growth, Yield and Quality of Aonla (*Embllica officinalis gaertn.*) Cv. Na-7. *Int.J.Curr.Microbiol.App.Sci* (2019) 8(9): 1142-1151
15. **Imtiyaz A. Wani, M. Y. Bhat, M. A. Dar, Sheikh Mehraj, I. A. Bisati, Sartaj A. Wani and Mehraj-Ud-Din Khanday (2016)**. response of different walnut (*juglans regia* l.) Selection to combined application of inorganic fertilizers and organic manures, *american journal of experimental agriculture* 12(6): 1-10, 2016, article no.ajea.24695, issn: 2231-0606.
16. **J.U. Ani, P.K. Baiyeri (2008)** Impact of poultry manure and harvest season on juice quality of yellow passion fruit (*Passiflora edulis* var. *flavicarpa* Deg.) in the sub-humid zone of Nigeria. *Fruits*, 2008, vol. 63, p. 239–247 2008 Cirad/EDP Sciences All rights reserved DOI: 10.1051/fruits:2008017 www.fruits-journal.org
17. **Kaushik das, d. Roy, d. Sengupta and P. Datta, (2015)**. Department of fruits and orchard management 10(3): 1371-1374, 2015.
18. **Khattak MR, Abdul L, Bashir A and Wazir Muhammad. (2005)**. Effect of different levels of nitrogen, phosphorus and potassium on the growth and yield of guava. *Sarhad Journal of Agriculture*, 21(2):185-187.
19. **Kiran R. Kumar, S. Jaganath, and T. R. Guruprasad, (2017)**. Impact of Organic, Inorganic and Bio-Fertilizers with Different Spacing on Vegetative Growth and Yield of Guava (cv. Lalit) During Summer Season, *Int. J. Pure App. Biosci.* 5 (1): 310-319.

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20. **Kumar Dinesh; Pandey, V; Anjaneyulu, K. and Vishal Nath (2009).** Optimization of major nutrients for guava yield and quality under east coastal conditions. *Ind. J. of Hort.*, 66 (1): 18-21.
21. **Kumar P. and Rehalia AS. (2007).** Standardization of micronutrient ranges in mango (*Mangifera indica* L.) by orchard survey. *The Asian Journal of Horticulture* 2(1): 218-221.
22. **Kumar Pankaj; Tiwari, J. P. and Raj Kumar (2008).** Effect of N, P & K on fruiting, yield and fruit quality in guava cv. Pant Prabhat. *J. of Hort. Sci.*, 3 (1): 43-47.
23. **R. Venugopalan and S. Anilkumar (2017).** Studies on Plant Density and Integrated Nutrient Management for Growth, Yield, Quality and Shelf Life of Guava cv. Lalit in Rainy Season. *Int. J. Pure App. Biosci.* 5 (2): 354-366 (2017).
24. **Lewis, Y.S., Dwarakanath, C.T. and Johar, D.S. (1954).** Acids and sugars in the Kamrakh fruit, *Averrhoa carombola* Linn. *Curr. Sci.*, 23: 54-55.
25. **Kundu, S; Ghosh, B; Mitra, S.K. and D. Mazumdar (2007).** Effect of foliar spraying of nitrogen, phosphorus and potassium on yield and fruit quality of guava (*Psidium guajava* L.). *Acta Hort.*, 735: 433-440.
26. **Naik MH and Sri Hari Babu R. (2007).** Feasibility of organic farming in guava (*Psidium guajava* L.). *Acta Horticulturae (ISHS)*, 735: 365-372..
27. **Nandi, B. Bhandari, S.C. Meena, R. H. Meena, R. R. (2013).** Effect of vermicompost on plant growth, fruit yield and quality of pomegranate cv Ganesh. *Environment and Ecology* 31(1A):322- 324.
28. **Rocky Thokchom and Goutam Mandal (2017)** Production Preference and Importance of Passion Fruit (*Passiflora Edulis*): A Review *Journal of Agricultural Engineering and Food Technology* p-ISSN: 2350-0085; e-ISSN: 2350-0263; Volume 4, Issue 1; January-March, 2017 pp. 27-30
29. **Ram RA and Pathak RK. (2007 b).** Integration of organic farming practices for sustainable production of guava. *A case study. Acta Horticulturae (ISHS)*, 735: 357-363.
30. **Rao KD and Subramanyam K. (2009).** Effect of nitrogen fertigation on growth and yield of pomegranate var. Mridula under low rainfall zone. *Agricultural Science Digest* 29(2):54-56.

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31. **Ray, P.K. (2002).** Carambola. In: Breeding Tropical and Subtropical Fruits. *Published by Narosa Publishing House*, pp.307-315.
32. **Shukla AK, Sarolia DK, Kumari B, Kaushik RA, Mahawere LN and Bairwa HL. 2009.** Evaluation of substrate dynamics for integrated nutrient management under high density planting of guava cv. Sardar. *Indian Journal of Horticulture*, 66(4): 461- 463.
33. **Singh M and Singh JK. (2009).** Studies on integrated nutrient management on vegetative growth, fruiting behaviour and soil fertilizer status of ber (*Zizyphus mauritiana Lamk.*) orchard cv. Banarsi Karaka. *Asian Journal of Horticulture*, 4(1): 230-232.
34. **Sushil Kumar Shukla, Tarun adak, Atul singha, Kailash Kumar, Vinod Kumar Singh, Achal Singh (2014).** Response of guava trees (*psidium guajava*) to soil applications of mineral and organic fertilisers and biofertilisers under conditions of low fertile soil, *journal of horticultural research 2014*, vol. 22(2): 105-114
35. **Samson, J.A. (1986).** Carambola. In: Tropical Fruits. Published by Longman Science and Technology, pp. 33.
36. **Singh, S.R., Phurailatpam, A.K., Wangchu, L., Ngangbam, P. and Chanu, T.M. (2014).** Traditional medicinal knowledge of underutilized minor fruits as medicine in Manipur. *Int. J. Agric. Sci.*, 4 (8): 241-247.
37. **Singh, A.K., Singh, B.P. and Rajput. C.B.S. (1990).** Studies on correlation between the physico-chemical properties of fruit in mango (*Mangifera indica L.*). *Res. Dev. Rep.*, 7: 12 - 14.
38. **Uma Shankar; Pathak, R.A; Pathak, R.K. and C.M. Ojha (2002).** Effects of NPK on the yield and fruit quality of guava cv. Sardar. *Prog. Hort.*, 34 (1): 49-55.
39. **Vandana Dwivedi and Santosh Agnihotri (2018).** Effect of Integrated Nutrient Management on Growth, Yield and Economics of Guava (*Psidium guajava L.*) cv. Allahabad Safeda. *Int.J.Curr.Microbiol.App.Sci* (2018) 7(6): 3449-3453

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