

## Influence of Organic Manures on Quality of Passion Fruit (*Passiflora edulis*) cv Kaveri

Duanaliu Kamei, Yumnam Somi Singh

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### ABSTRACT

In recent years, there has been an increasing trend in the market for organic agriculture products, particularly fruit products. The objective of this research was to find out the effect of organic manures on quality of Passion fruit (*Passiflora edulis*) cv Kaveri during the year 2021. The experiment was laid out with 10 treatments and 3 replications in Randomized Block Design. From the present investigations, maximum fruit weight (61.33 g) was recorded in T<sub>9</sub> followed by T<sub>3</sub> (57.06 g) which was found statistically at par with T<sub>5</sub> (56.70 g), T<sub>6</sub> (55.90 g) and T<sub>10</sub> (55.37 g). Minimum fruit weight was registered in T<sub>0</sub> (45.76 g). Maximum fruit length (59.67 mm), fruit diameter (64.33 mm), pulp weight (23.42 g) was recorded in T<sub>9</sub>. Highest TSS (16.27 °Brix), Ascorbic acid (35.20 mg/100 g), total sugar (10.55%) was also observed in T<sub>9</sub>. However, acidity was found non-significant. Minimum TSS (13.80 °Brix), total sugar (8.71%), reducing sugar (4.17%) and non-reducing sugar (4.1%) was

recorded in T<sub>1</sub>-Control (no organic manures applied).

**Keywords** Passion fruit, Kaveri, FYM, Vermicompost, Neem cake, Fruit quality.

### INTRODUCTION

Passion fruit is a high value and export oriented crop. It belongs to the family Passifloraceae bearing chromosome number 18 which is represented by 14 genera. Passion fruit is a native of Brazil and widely cultivated in South Africa, Australia, New Zealand and Indonesia. In India, both purple and yellow passion fruits are grown commercially and its cultivation is confined to Kerala, Nilgiri hills and Kodai Kenal of Tamil Nadu, Coorg region of Karnataka (Tripathi 2018). Passion fruit is grown in parts of the Nilgiri hill region in Karnataka, as well as in the North eastern states of Manipur, Nagaland, Mizoram, Arunachal Pradesh and Meghalaya in India. Fresh food and processed goods including juice, squash, jams and jellies are its main uses. It is also added to ice cream as a flavoring component (Jadhav *et al.* 2022). People prefer this fruit as it has a pleasant aroma, delicious taste, is easy to cultivate, bears fruit frequently, requires little maintenance, and performs well in a hill farming system. The area and production of Passion fruit in India was recorded at 12 thousand Ha and 81 thousand MT respectively (NHB 2019). The general health of the soil is endangered by the continuous use of chemical fertilizers. This has led to a decline in the physical and chemical characteristics of the soil, which has stagnated crop yield and could lead to

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Duanaliu Kamei<sup>1\*</sup>, Yumnam Somi Singh<sup>2</sup>

<sup>1</sup>PhD Scholar, <sup>2</sup>Assistant Professor

<sup>1,2</sup>Department of Horticulture, North Eastern Hill University, Tura Campus 794002, Meghalaya, India

Email: [kameidonna@gmail.com](mailto:kameidonna@gmail.com)

\*Corresponding author

serious consequences if it continues. Use of organic manure improve the plant growth performance, fruit quality and yield as organic matter increases infiltration by helping to hold water on the soil surface long enough for it to seep into the soil and by improving the physical condition of the soil and helping to provide better aggregation and the structure.

Though many researches have been done relating to organic amendments on major crops, the studies on minor crop like passion fruit is scanty. The farmers belonging to this region do not have information about the appropriate doses of organic manure, there is growing demand for standardising the amount of organic input doses. Hence, the study was carried out to evaluate the effect of organic manure on fruit quality of Passion fruit (*Passiflora edulis*) cv Kaveri.

## MATERIALS AND METHODS

The experiment was conducted at Horticulture Farm, Department of Horticulture, North Eastern Hill University in the year 2021 to study the effect of organic fertilizers on quality of passion fruit (*Passiflora edulis*) cv Kaveri. The experiment was laid out with 10 treatments and 3 replications in Randomized Block Design.

Treatment details :

T<sub>1</sub>-Control,  
 T<sub>2</sub>- 100% FYM,  
 T<sub>3</sub>-100% Vermicompost,  
 T<sub>4</sub>- 100% Neem cake,  
 T<sub>5</sub>-50% FYM + 50% Vermicompost,  
 T<sub>6</sub>-50% FYM + 50% Neem cake,  
 T<sub>7</sub>-50% Vermicompost + 50% Neem cake,  
 T<sub>8</sub>- 50% FYM + 25% Vermicompost+ 25% Neem cake,  
 T<sub>9</sub>- 50% Vermicompost + 25% FYM+ 25% Neem cake and  
 T<sub>10</sub>- 50% Neem cake+ 25% FYM+ 25% Vermicompost.

T<sub>1</sub>-Control (no organic manures applied), T<sub>2</sub>-100% FYM (5 kg FYM), T<sub>3</sub>-100% Vermicompost (0.67 kg Vermicompost), T<sub>4</sub>- 100% Neem cake (0.33 kg Neem cake), T<sub>5</sub>-50% FYM (2.5 kg FYM) + 50%

Vermicompost (0.33 kg Vermicompost), T<sub>6</sub>-50% FYM (2.5 kg FYM) + 50% Neem cake (0.17 kg Neem cake), T<sub>7</sub>-50% Vermicompost (0.33 kg Vermicompost) + 50% Neem cake ( 0.17 kg Neem cake), T<sub>8</sub>- 50% FYM (2.5 kg FYM) + 25% Vermicompost (0.16 kg Vermicompost) + 25% Neem cake (0.086 kg Neem cake), T<sub>9</sub>- 50% Vermicompost (0.33 kg Vermicompost)+ 25% FYM (1.25 kg FYM) + 25% Neem cake (0.086 kg Neem cake) and T<sub>10</sub>- 50% Neem cake (0.17 kg Neem cake) + 25% FYM (1.25 kg FYM) + 25% Vermicompost (0.16 kg Vermicompost).

Fresh fruit weight was recorded in a weighing balance and the length and diameter of the weighed fruit was measured by Vernier calliper and expressed in mm. Juice percentage was calculated by the formula, Juice %= weight of juice/weight of fruit × 100.

Total Soluble Solids (TSS) of the samples was estimated by Erma Hand Refractometer (0-32°B) and the result was expressed in Degree Brix (°B). Titratable acidity was determined by titrating the juice against standard alkali solution (0.1N NaOH). 10 ml of juice was taken by means of pipette and transferred into 100 ml volumetric flask and distilled water added to make up the volume to 100 ml. 10 ml aliquot of diluted juice pipette out and transferred in 250 ml beaker. 1-2 drops of phenolphthalein indicator were added to the solution. The juice of conical flask was titrated against 0.1 N NaOH solution. The percentage of acidity was calculated using the following formula.

$$\text{Percentage of acidity (\%)} = \frac{\text{Titre Volume} \times 0.1 \times 64 \times 10}{\text{Aliquot} \times 10}$$

Total sugar and reducing sugar was calculated using Lane and Eynon Method (1923) and expressed in percentage. Non-reducing sugar were calculated by subtracting reducing sugar from total sugar and the difference obtained was multiplied by standard factor 0.95. Ascorbic acid content was estimated by the Visual titration method as described by Rangana (1997). The volume of filtered 5 ml of juice was made up to 50 ml with 3% meta phosphoric acid (HPO<sub>3</sub>) and centrifuged. Extract of sample was titrated against 0.02% 2-6- dichlorophenol indophenol dye. A standard was run simultaneously with pure ascorbic acid

solution and the reading was expressed in mg/100 g of sample.

## RESULTS AND DISCUSSION

Data presented in Table 1 revealed that the physical properties of fruits were evaluated in regards to weight, length, breadth, pulp weight, seed numbers and juice percentage. The maximum fruit weight (61.33 g) was recorded in T<sub>9</sub> followed by T<sub>3</sub> (57.06

**Table 1.** Influence of organic manures on physical properties of Kaveri. T<sub>1</sub>-Control, T<sub>2</sub>- 100% FYM, T<sub>3</sub>-100% Vermicompost, T<sub>4</sub>- 100% Neem cake, T<sub>5</sub>-50% FYM + 50% Vermicompost, T<sub>6</sub>-50% FYM + 50% Neem cake, T<sub>7</sub>-50% Vermicompost + 50% Neem cake, T<sub>8</sub>- 50% FYM + 25% Vermicompost+ 25% Neem cake, T<sub>9</sub>- 50% Vermicompost + 25% FYM+ 25% Neem cake and T<sub>10</sub>- 50% Neem cake+ 25% FYM+ 25% Vermicompost.

Treatment	Fruit wt (g)	Fruit length (mm)	Fruit diameter (mm)	Juice (%)
T <sub>1</sub>	45.76	42.80	45.94	31.41
T <sub>2</sub>	53.67	48.98	52.45	32.47
T <sub>3</sub>	57.06	48.54	50.12	32.38
T <sub>4</sub>	54.10	52.70	52.05	31.80
T <sub>5</sub>	56.70	54.99	58.09	32.23
T <sub>6</sub>	55.90	53.65	52.42	32.38
T <sub>7</sub>	48.89	52.83	56.64	32.75
T <sub>8</sub>	50.56	51.80	54.44	32.54
T <sub>9</sub>	61.23	59.67	64.33	34.31
T <sub>10</sub>	55.37	53.75	57.33	32.49
CD				
(p=0.05)	4.72	3.95	3.62	N/A
SEm±	1.58	1.32	1.21	0.59

g) which was found statistically at par with T<sub>5</sub> (56.70 g), T<sub>6</sub> (55.90 g) and T<sub>10</sub> (55.37 g). Minimum fruit weight was registered in T<sub>0</sub> (45.76 g). Maximum fruit length (59.67 mm) was observed in T<sub>9</sub> whereas maximum fruit diameter (64.33 mm), pulp weight (23.42 g), juice percentage (34.31%) was recorded in T<sub>9</sub>. Lowest fruit weight (45.76 g), fruit length (42.80 mm), breadth (45.94 mm), pulp weight (14.58 g) and juice percentage (31.41 %) was observed in T<sub>1</sub>. The fruit juice percentage was found to be non-significant. Table 2 shows that highest TSS content (16.27 °Brix), Ascorbic acid (35.20 mg/100 g), total sugar (10.55%), reducing sugar (4.70%) and non-reducing sugar (5.56%) were recorded in T<sub>9</sub> which was found statistically at par with T<sub>10</sub>. Lowest TSS (13.80 °Brix), Ascorbic acid (26.08 mg/100 g), total sugar (8.71%), reducing sugar (4.17%) and non-reducing sugar (4.31%) were recorded in T<sub>1</sub> (Control). However, acidity was found non-significant. Similar findings had been reported in peach (Narayan *et al.* 2016 and Ghosh *et al.* 2014) in sweet orange. The use of vermicompost increased fruit quality, which may have resulted from the adequate supply of micronutrients and hormone induction, which promotes cell division and elongation, enhances fruit weight and size, as well as root development, water uptake, and nutrient deposition. It might also result from enhanced N addition and several enzymes' catalytic activity. Significant improvement of fruit quality was also observed in Assam Lemon by incorporations of organic manure (Pachau *et al.* 2019).

**Table 2.** Effect of organic manures on quality parameters of Passion fruit (*Passiflora edulis*) cv Kaveri. T<sub>1</sub>-Control, T<sub>2</sub>- 100% FYM, T<sub>3</sub>-100% Vermicompost, T<sub>4</sub>- 100% Neem cake, T<sub>5</sub>-50% FYM + 50% Vermicompost, T<sub>6</sub>-50% FYM + 50% Neem cake, T<sub>7</sub>-50% Vermicompost + 50% Neem cake, T<sub>8</sub>- 50% FYM + 25% Vermicompost+ 25% Neem cake, T<sub>9</sub>- 50% Vermicompost + 25% FYM+ 25% Neem cake and T<sub>10</sub>- 50% Neem cake+ 25% FYM+ 25% Vermicompost.

Treatment	TSS (°Brix)	Acidity (%)	Ascorbic acid (mg/100 g)	Total sugar (%)	Reducing sugar (%)	Non reducing sugar (%)
T <sub>1</sub>	13.80	3.20	26.08	8.71	4.17	4.31
T <sub>2</sub>	15.33	3.03	28.24	9.41	4.24	4.91
T <sub>3</sub>	15.40	3.07	28.57	10.13	4.43	5.42
T <sub>4</sub>	14.67	2.94	30.36	9.10	4.73	4.15
T <sub>5</sub>	15.53	2.90	31.24	9.71	4.37	5.08
T <sub>6</sub>	15.40	2.94	30.65	10.21	4.70	5.23
T <sub>7</sub>	15.80	2.98	33.00	10.02	5.42	4.37
T <sub>8</sub>	15.53	2.90	33.44	9.54	4.51	4.77
T <sub>9</sub>	16.27	2.82	35.20	10.55	4.70	5.56
T <sub>10</sub>	16.00	2.86	31.68	10.34	4.49	5.56
CD p=(0.05%)	0.77	N/A	3.50	0.94	0.59	1.23
SEm±	0.26	0.08	1.17	0.33	0.19	0.41

## CONCLUSION

In conclusion, the research conducted to evaluate the effect of various organic manures on the quality of Passion fruit (*Pasiflora edulis*) cv Kaveri in the year 2021 has provided valuable insights. The study, carried out with 10 different treatments, revealed that the combination of 50% Vermicompost, 25% FYM, and 25% Neem cake (T<sub>9</sub>) resulted in the highest fruit weight, diameter, total soluble solids (TSS), Ascorbic acid and total sugar content. The research highlights the positive impact of organic manures on fruit quality parameters, emphasizing the potential of organic farming practices for enhancing Passion fruit quality. In the context of sustainable agriculture, the results advocate for the adoption of organic farming practices to enhance soil health, mitigate the adverse effects of chemical fertilizers, and improve the overall quality of Passion fruit. Further research and extension activities can build upon these findings to develop practical recommendations for farmers, promoting the sustainable cultivation of high-value and export-oriented crops like Passion fruit.

## REFERENCES

- Ghosh B, Irenaeus TKS, Kundu S, Datta P (2014) Effect of organic manuring on growth, yield and quality of sweet orange. *Acta Horticulturae* 1024 : 121—125.
- Jadhav S, Kakade V, Nangare DD, Chavan S (2022) Passion Fruit: Growing and Planting Techniques. *Vigyan Varta* 3 (5) : 107—112.
- Lane JH, Eynon L (1923) Methods for determination of reducing and non-reducing sugars. *Journal of Sciences* 42 : 32—37.
- Narayan A, Singh PN, Brijwal M, Singh KS (2016) Response of organic manures on quality of peach (*Prunus persica* Batsch) cv florida prince. *Environment and Ecology* 34 (3): 985—987.
- National Horticulture Board (2019) Ministry of Agriculture. Govt of India, Available. <http://nhb.gov.in/statistics/area-production-statistics.html>
- Pachua R, Singh B, Lalnunpuia J, Lalthamawii (2019) Effect of organic manures on growth, yield and quality of Assam lemon (*Citrus limon* (L.) Burm.). *International Journal of Current Microbiology and Applied Sciences* 8 (9) : 1009—1019. <https://doi.org/10.20546/ijcmas.2019.809.118>
- Rangana S (1997) Manual of analysis of fruit and vegetable products. Tata McGraw Hill, New Delhi.
- Tripathi PC (2018) Passion Fruit. In Peter KV (ed.) Horticultural Crops of high nutraceutical values. Brillion Publishing New Delhi, pp 245—270.