Int.J.Curr.Microbiol.App.Sci (2018) *7*(12): 3605-3610

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 12 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.712.408

Effect of Organic Manures on Fruit Quality of Papaya cv. Arka Prabhat

Rekha Eda[1]*, D.V. Swami[2], B. Prasanna Kumar[1], T.S.K.K. Kiran Patro[1] and D.R. Salomi Suneetha[1]

[1]College of Horticulture, Parvathipuram, [2]PHTRS, Dr.Y.S.R.Horticultural University, Andhra Pradesh, India

**Corresponding author*

Keywords

Papaya, Organic manures, Sugars, Carotene, TSS

Article Info

Accepted:
26 November 2018
Available Online:
10 December 2018

A B S T R A C T

An experiment was conducted to study the effect of different organic manures on fruit quality parameters of papaya cv. Arka Prabhat. The study revealed that among the organic manures applied the maximum pulp thickness (2.84 cm), fruit firmness (11.53 Kg cm^{-2}), ascorbic acid content (67.33 mg $100g^{-1}$) and total soluble solids (13.32 ^{o}Brix) was observed with application of sheep manure 100% RDN. The maximum titrable acidity (0.157%) was observed with application of FYM 50% RDN + vermicompost 50% RDN. The maximum reducing sugars (7.35%) and total sugars (8.92%) was recorded in fruits of plants applied with neem cake 100% RDN. The non-reducing sugars (1.79%) were maximum in vermicompost 100% which was on par with neem cake 100% RDN. The lycopene content of fruits was maximum (5.49 mg 100 g^{-1}) in plants applied with FYM 50% RDN + vermicompost 50% RDN and carotenoid content (2.53 mg 100 g^{-1}) of fruits was recorded in FYM 100% RDN applied treatment.

Introduction

Papaya (*Carica papaya* L.) belongs to the family Caricaceae and is one of the important fruit crop of tropical and subtropical regions of the world. Papaya fruit is rapidly becoming an important commodity worldwide, both as fresh fruit and as processed product (Sankat and Maharaj, 1997). As the papaya demands nutrients continuously in large amounts the use of large quantity of chemically formulated fertilizers alone is not advisable because of quality, health and environmental hazards and also costly to the farmers. The excessive use of chemical fertilizers causes environmental hazards and deleterious effects on soil structure, microflora, quality of water and also on productivity on long term basis. Organic matter helps in reducing soil compaction due to an increase in traffic of orchard machinery. Organic farming offers benefits over conventional farming system particularly with respect to sustainable yield, better quality and production of hazard free produce. There are several evidences on fruit crops, where application of compost manures resulted in improved plant nutrient status and decreased physiological and pathological disorders than the excessive use of inorganic fertilizers. Thus, organic production of fruits is becoming

more popular among the farmers. Though the area is increasing in all the states under papaya cultivation, limited scientific information is available on the organic production system. Hence an attempt was done to know the affect of organic manures on growth of papaya.

Materials and Methods

The present investigation was conducted in the college farm, College o Horticulture, Venkataramannagudem, Andhra Pradesh during the year 2014-15. The design for the experiment was Randomized Block Design (RBD) having 8 treatments replicated thrice. Treatments were randomly allocated in each replication. Each treatment plot consists of 9 plants, one replication had 72 plants and a total of 216 plants were planted in an area of 1000 m^{-2}. The seeds of papaya cv. Arka Prabhat hybrid were procured from Indian Institute of Horticultural Research, Bangalore. The treatments were comprised of T_1 - FYM 100% RDN, T_2- Vermicompost 100% RDN, T_3 - Neem cake 100% RDN, T_4 - Sheep manure 100% RDN, T_5- FYM 50% RDN + Vermicompost 50% RDN, T_6- FYM 50% RDN + Neem cake 50% RDN, T_7- FYM 50% RDN + Sheep manure 50% RDN and T_8- 100 % RDF. The matured fruits with colour change (orange tinge) and having two yellow colour streaks on fruit surface were harvested at regular intervals.

The five randomly fruits selected were cut open longitudinally and measured the pulp thickness with the help of vernier calipers and the mean was computed and expressed in centimeters. The firmness of fruit was tested with penetrometer. The ascorbic acid was estimated by using AOAC, 1965 method. The titratable acidity was calculated as per the procedure laid out by (Ranganna, 1986) and expressed in percentage. The total soluble solids was determined by using ERMA hand refractrometer. The total sugars were determined as procedure described by Lane and Eyon method (AOAC, 1965). Carotenoids were extracted from the pulp using the solvent acetone and lycopene was extracted with petroleum ether, dried using sodium sulphate (anhydrous) to eliminate traces of water and rough impurities. These were analyzed by using UV-spectrophotometer at 450nm and 503nm wavelengths, for estimating carotenoids and lycopene, respectively as per procedure given by Ranganna (1976).

Results and Discussion

The data furnished (Table 1) showed significant difference on pulp thickness among the treatments. The maximum pulp thickness of 2.84 cm was recorded in fruits of plants applied with sheep manure 100% RDN followed by FYM 100% RDN (2.59 cm), vermicompost 100% RDN (2.54 cm) and FYM 50% RDN + sheep manure 50 % RDN (2.54 cm) whereas minimum pulp thickness of 2.31 cm was recorded in fruits of plants applied with 100% RDF. Damatto *et al.*, (2005) also reported that application of cattle manure increased the pulp production in passion fruit.

The fruit firmness was differed significantly among the treatments and was presented in Table 1. The maximum fruit firmness of 11.53 Kg cm^{-2} was recorded in plants applied with sheep manure 100% RDN which was on par with FYM 50% RDN + sheep manure 50% RDN (10.96 Kg cm^{-2}) and minimum fruit firmness of 8.56 Kg cm^{-2} was recorded in FYM 50% RDN + vermicompost 50% RDN.

The maximum ascorbic acid content of 67.33 mg $100g^{-1}$ (Table 1) was recorded in fruits of plants applied with sheep manure 100% RDN which was on par with in FYM 50% RDN + neem cake 50% RDN (61.61 mg $100g^{-1}$) and FYM 100% RDN (60.66 mg $100g^{-1}$) whereas minimum of 51.16 mg $100g^{-1}$ was recorded in

fruits of plants applied with 100% RDF. Similar findings were reported with FYM application by Ram and Pathak (2007) in guava, Ravishankar *et al.,* (2010) and Reddy *et al.,* (2012) in papaya.

The data furnished (Table 1) showed that total soluble solids (TSS) differed significantly among the treatments. The maximum TSS of 13.32^{o}Brix was recorded in fruits of plants applied with sheep manure 100% RDN which was on par with FYM 50% RDN + vermicompost 50% RDN (12.79 ^{o}Brix) whereas minimum of 10.78 ^{o}Brix was recorded in fruits of plants applied with100% RDF.

In the present investigation, the maximum TSS was recorded in plants applied with organic manures particularly in fruits of plants applied with sheep manure 100% RDN might be due to better uptake of nutrients and release of phytohormones (Babu Ratan, 2006). Rathi *et al.,* (2004) reported that poultry manure along with inorganic fertilizer gave maximum TSS in pant pear-18. The highest TSS was recorded with animal manures was reported by Naik and Babu (2007) in guava. Similar reports of increased TSS with FYM and poultry manure were reported by Ray *et al.,* (2008) in papaya cv. Pusa delicious and Ravishankar *et al.,* (2010) in papaya.

The titrable acidity was differed significantly among the treatments and was presented in Table 1. The maximum titrable acidity of 0.157% was recorded in fruits of plants applied with FYM 50% RDN + vermicompost 50% RDN which was on par with vermicompost 100% RDN (0.149%) and the minimum of 0.106% was recorded in fruits of plants applied with 100% RDF. Naik and Babu (2007) reported that the highest titrable acidity with FYM in guava.

Significant differences were recorded in reducing sugars among the different treatment (Table 2). The maximum reducing sugars of 7.35% were recorded in fruits of plants applied with neem cake 100% RDN and the minimum of 6.08% was recorded in fruits of plants applied with vermicompost 100% RDN. These results were in conformity with findings of Dutta Ray *et al.,* (2014) in pomegranate. The highest non-reducing sugars of 1.79% were recorded in fruits of plants applied with vermicompost 100% RDN which was on par with neem cake 100% RDN (1.56%) and sheep manure 100% RDN (1.73%). The lowest non-reducing sugars of 0.94% were recorded in fruits of plants applied with FYM 50% RDN + sheep manure 50% RDN. The results obtained were in close conformity with findings of Venkatesh (1995) in grape and Dutta Ray *et al.,* (2014) in pomegranate.

The total sugars were significantly differed among the treatments and presented in Table 2. The maximum total sugars of 8.92% were recorded in fruits of plants applied with neem cake 100% RDN which was on par with sheep manure 100% RDN (8.33%).

The minimum total sugars of 7.34% were recorded in fruits of plants applied with FYM 50% RDN + neem cake 50% RDN. The percentage of total sugars (8.92%) were more in fruits of plants applied with neem cake 100% RDN could be due to presence of more reducing sugars (7.35%), less per cent of non reducing sugars (1.56%) and titrable acidity (0.113%). Similar findings were recorded by Singh *et al.,* (2012) in aonla and Dutta Ray *et al.,* (2014) in pomegranate.

The data furnished in Table 3 showed that lycopene content differed significantly among the treatments. The maximum lycopene content of 5.49 mg 100 $g^{-1}$was recorded in fruits of plants applied with FYM 50% RDN + vermicompost 50% RDN which was on par with FYM 100% RDN (5.36 mg 100 g^{-1}) and vermicompost 100% RDN (5.32 mg 100 g^{-1}).

Table.1 Effect of organic manures on pulp thickness, fruit firmness, ascorbic acid, titrable acidity and TSS of papaya

Treatments	Pulp thickness (cm)	Fruit firmness ($kgcm^{-2}$)	Ascorbic acid ($mg100g^{-1}$)	Titrable acidity (%)	TSS (^{o}Brix)
T_1 - FYM 100% RDN	2.59	10.47	60.66	0.123	12.46
T_2- Vermicompost 100% RDN	2.54	9.50	57.58	0.149	11.51
T_3 - Neem cake 100% RDN	2.34	8.78	56.08	0.113	12.58
T_4 - Sheep manure 100% RDN	2.84	11.53	67.33	0.133	13.32
T_5- FYM 50% RDN + Vermicompost 50% RDN	2.44	8.56	51.16	0.157	12.79
T_6- FYM 50% RDN + Neem cake 50% RDN	2.38	9.44	61.61	0.118	11.04
T_7- FYM 50% RDN + Sheep manure 50% RDN	2.54	10.96	51.75	0.137	11.42
T_8- 100 % RDF	2.31	9.61	51.16	0.106	10.78
S.Em±	0.04	0.20	1.15	0.004	0.15
C.D at 0.05	0.15	0.63	9.65	0.013	0.47

Table.2 Effect of organic manures on Reducing sugars, Non-reducing sugars total sugars, of papaya cv Arka Prabhat

Treatments	Reducing sugars (%)	Non reducing sugars (%)	Total sugars (%)
T_1 - FYM 100% RDN	6.37	1.44	7.82
T_2- Vermicompost 100% RDN	6.08	1.79	7.87
T_3 - Neem cake 100% RDN	7.35	1.56	8.92
T_4 - Sheep manure 100% RDN	6.60	1.73	8.33
T_5- FYM 50% RDN + Vermicompost 50% RDN	6.75	1.11	7.87
T_6- FYM 50% RDN + Neem cake 50% RDN	6.30	1.04	7.34
T_7- FYM 50% RDN + Sheep manure 50% RDN	6.76	0.94	7.70
T_8- 100 % RDF	6.22	1.60	7.82
S.Em±	0.10	0.10	0.07
C.D at 0.05	0.31	0.33	0.22

Table.3 Effect of organic manures on lycopene and carotenoid content of papaya cv Arka Prabhat

Treatments	Lycopene ($mg100g^{-1}$)	Carotenoids ($mg100g^{-1}$)
T_1 - FYM 100% RDN	5.36	2.53
T_2- Vermicompost 100% RDN	5.32	2.32
T_3 - Neem cake 100% RDN	3.75	1.83
T_4 - Sheep manure 100% RDN	4.25	2.21
T_5- FYM 50% RDN + Vermicompost 50% RDN	5.49	2.38
T_6- FYM 50% RDN + Neem cake 50% RDN	4.31	2.27
T_7- FYM 50% RDN + Sheep manure 50% RDN	4.52	2.39
T_8- 100 % RDF	3.27	1.18
S.Em±	0.07	0.01
C.D at 0.05	0.23	0.05

The minimum lycopene content of 3.27 mg 100 $g^{-1}$was recorded in fruits of plants applied with 100% RDF. Reddy *et al.*, (2012) reported that the higher amount of lycopene with application of FYM in papaya cv. Surya. The increase in lycopene content with organic practices than in recommended dose of fertilizers was also reported by Reddy *et al.*, (2014) in papaya.

The carotenoid content was significantly differed with treatments (Table 3). The maximum carotenoid content of 2.53 mg 100 g^{-1} was recorded in fruits of plants applied with FYM 100% RDN followed by FYM 50% RDN + sheep manure 50% RDN (2.39 mg 100 g^{-1}), FYM 50% RDN + vermicompost 50% RDN (2.38 mg 100 g^{-1}) and vermicompost 100% RDN (2.32 mg 100 g^{-1}). The minimum caroteniod content of 1.18 mg 100 g^{-1} was recorded in fruits of plants applied with 100% RDF. The carotenoid content was more in fruits of plants applied with organic manures might be due to continous supply of both macro and micro nutrients to the plants. These results were in harmony with the earlier findings of Reddy *et al.*, (2012) in papaya cv. Surya and Reddy *et al.*, (2014) in papaya.

In conclusion, the improved fruit quality by plant nutrients through organic manures was due to balanced availability of nutrients leading to enhanced metabolic activities (Patil *et al.*, 1995; Patil *et al.*, 1997). The plants applied with farm yard manure and sheep manure resulted in an increase in quality parameters like pulp thickness (2.84 cm), fruit firmness (11.53 Kg cm^{-2}), ascorbic acid content (67.33 mg 100 g^{-1}), total soluble solids (13.32 ^{o}Brix), total sugars (8.92%), lycopene (5.49 mg 100 g^{-1}) and carotenoid content (2.53 mg 100 g^{-1}) as compared to recommended dose of fertilizers. This trend could be attributed to aspects of improved soil fertility and organic carbon contents through application of organic inputs that may ensure maintenance of sustainability of production.

References

AOAC, 1965. Association of Official Agricultural Chemist, *Official Methods of Analysis*, AOAC, Washington DC.

Babu Ratan, P. 2006. Standardization of Banana (Musa sp.) Production by organic Farming *Ph.D Thesis* submitted to ANGRAU.

Damatto J.E.R, Leonel, S. and Pedroso, C.J. 2005. Organic fertilization in fruit production and quality of sweet passion fruit. *Revista Brasileira de Fruticultura.* 27(1): 188-190.

Dutta Ray, S.K, Takawale, S.K, Chatterjee, R. and Hnamte, V. 2014. Yield and quality of pomegranate as influenced by organic and inorganic nutrients. *The Bioscan*. 9(2): 617-620.

Naik, M.H. and Babu, R.S.H. 2007. Feasibility of organic farming in guava (*Psidium guajava* L.). *Acta Horticulturae*. 735: 365-372.

Patil, K.B, Patil, B.B. and Patil, M.T. 1995. Nutritional investigation in papaya cv. Washington. *Journal of Maharastra Agricultural University*. 20 (3): 364-366.

Patil, K.B, Patil, B.B. and Patil, M.T. 1997. Studies on manurial requirements in papaya. *J. Soil and Crops*. 7 (2); 123-127.

Ram, R. A. and Pathak, R, K, 2007. Integration of organic farming practices for sustainable production of guava. *Acta Horticulturae* 735: 357-363.

Ranganna, S. 1976. In: Manual of Analysis of Fruit and Vegetable Products, McGraw Hill, New, Delhi, Pp. 77.

Rathi D.S. and Bist L.D. 2004. Inorganic fertilization through the use of organic supplements in low chill pear *cv*. Pant pear -18. *Indian Journal of Horticulture.* 61(3): 223-225.

Ravishankar, H., Karunakaran, G. and Srinivasa, M. 2010. Performance of Coorg Honey Dew Papaya under Organic Farming regimes in the hill zone of Karnataka. *Acta Horticulturae.* 851: 259-62.

Ray, P.K, Singh, A.K. and Arun Kumar. 2008. Performance of Pusa Delicious papaya under organic farming. *Indian Journal of Horticultural science*. 65:100-02.

Reddy, Y.T.N, Reju, M, Ganeshamurthy, A.N, Pannerselvan, P. and Shivu Prasad, S.R. 2014. Effect of organic practices on growth, fruit yield, quality and soil health of papaya cv. Arka Prabhat. *Indian Horticultural Journal*. 4 (1): 09-13.

Reddy, Y.T.N, Shivu Prasad, S.R, Reju, Kurien,R. M, Ganeshamurthy, A.N. and Pannerselvan, P. 2012. Effect of organic practices on fruit quality in papaya cv. Surya. *Journal of Horticultural Science*. 7 (1): 88-99.

Sankat, C.K. and Maharaj, R.P. 1997. In: Mitra, S.K, editor. *Post harvest physiology and storage of tropical and subtropical foods.* New York. 167–89.

Singh, A.K,Sanjay Singh, and Appa Rao, V.V, 2012. Influence of organic and inorganic nutrient sources on soil properties and quality of *aonla* in hot semi arid ecosystem. *Indian Journal of Horticulture*, 69(1): 50-54

Venkatesh, 1995. Effect of vermiculture on soil composition, growth, yield and quality of Thomson seedless grapes (*Vitis vinifera* L.). *M.Sc.(Agri.) Thesis*, University of Agricultural Sciences, Dharwad.

How to cite this article:

Rekha Eda, D.V. Swami, B. Prasanna Kumar, T.S.K.K. Kiran Patro and Salomi Suneetha, D.R. 2018. Effect of Organic Manures on Fruit Quality of Papaya cv. Arka Prabhat. *Int.J.Curr.Microbiol.App.Sci.* 7(12): 3605-3610. doi: https://doi.org/10.20546/ijcmas.2018.712.408