International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 761-767 www.ijprajournal.com ISSN: 2456-4494

"To study influence of different organic manures on growth, yield, and quality of papaya (Carica papaya L.) in Chhattisgarh plains"

Bhavya Vishwakarma, Dr. G.D. Sahu
Department of Fruit Science, CoA, IGKV Raipur, Chhattisgarh, India

Submitted: 15-11-2022 Accepted: 26-11-2022

ABSTRACT
The current study, "To study influence of different organic manures on growth, yield, and quality of papaya (Carica papaya l.) in Chhattisgarh plains," was conducted from 2021 to 2022 at the research facility of the Precision Farming Development Center (PFDC), Department of Fruit Science (Horticulture), Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). Different kinds of organic manures were used in combination with recommended dose of fertilizers. The experiment had 11 treatment combinations and was laid out in Randomized Block Design, which was replicated thrice. Application of treatment T_7 T_7: 80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg) gave best results in almost all the parameters such as petiole length, stem girth, number of leaves, plant height.

Keywords: organic manure, combinations, Vermicompost, leaf mold, girth, height.

I. INTRODUCTION

The papaya (Carica papaya L.), often known as papaw or pawpaw, is a tropical fruit with significant commercial worth due to its great nutritional and therapeutic value. It is a big plant in the family Caricaceae. Spanish chronicler Oviedo first wrote about papaya in 1526 after discovering it on the shores of Panama and Colombia. The fruit quickly spread throughout the tropics, most likely as a result of the fruit's plentiful and highly viable seeds.

One of the significant and delectable fruit crops grown in tropical and subtropical regions of the planet is the papaya (Carica papaya L.). It originated in Mexico and has since spread to practically every tropical region. The papaya is a very intriguing and productive crop. It is simple to grow as a crop for a short time. It is used in cooking and some preparations as a raw fruit. Its latex is utilised in the culinary and pharmaceutical industries as papain. Fruit that is in season is sweet and rich in carbohydrates and vitamin A. The fruits are rich in minerals including Fe, Ca, and P and include 10% carbs, 2500 IU of vitamin A per 100g, 700 mg of vitamin C per 100g, and 0.5% protein (Yadav, 2007).

As a tropical crop, papaya benefits from high temperatures and high levels of humidity. It is quite vulnerable to hail and cold. The lengthy days are advantageous for flavour and high quality. High rainfall during flowering is harmful and seriously damages the plant.

The fruit often has a spherical to cylindrical shape, measures 75 to 500 mm (3 to 20 inches) in length or even longer, and occasionally weights up to 9 to 11.5 kg (20 to 25.5 pounds). The extremely delicious flesh has a rich yellow, orange, or crimson hue. The numerous spherical, wrinkled black seeds are adhered to the walls of the enormous central chamber.

Even though the papaya plant can grow to a height of 8 metres (26 feet), its palm-like trunk is not as woody as the name might suggest. Deeply lobed leaves that can measure 60 cm (2 ft) across and are carried on hollow petioles (leaf stalks) that are 60 cm long cover the top of the plant. Although the species is typically dioecious, with male and female flowers growing on distinct plants, there are known hermaphrodite varieties and and there are several anomalies in the distribution of the sexes. On stalks 90 cm long, male flowers are produced in clusters. These funnel-shaped, whitish flowers are 2.5 mm (0.1 inch) in length and have 10 stamens in the throat. The female flowers are much larger, on very short stalks, and frequently grow alone in the leaf axils. They feature five fleshy petals that converge toward the base, a huge cylindrical or globose superior ovary, and five sessile stigmas in the form of fans on top of the ovary.

The papaya is seed propagated for commercial purposes. Only research labs can use the tissue culture procedure. The seeds lose viability quickly, therefore they shouldn't be kept in storage for longer than a season. The prepared

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 761-767 www.ijprajournal.com ISSN: 2456-4494

seedlings are placed in polybags. The newly germinated and immature plants are carefully protected from damping off. Within 6-8 weeks, the seedlings are transplant-ready.

The virus diseases that are spread by insect vectors can affect papayas. To stop the disease from spreading further, the rouging off is closely followed. In addition, insecticidal sprays are used to combat aphids, white flies, and other pests that feed on plant sap. Providing wind breaks, well-drained conditions to the soil, avoiding planting papaya after papaya, and following a suitable crop rotation are some of the methods that will help to keep the papaya crop in good health condition. Other steps include keeping the field clean and weed-free.

In order to ensure optimal fruit set, male trees should be removed following the appearance of inflorescence, keeping one male tree for every 20 female plants. Only one strongly growing female or hermaphrodite tree should be left in each pit, and all other vegetation should be taken out. Keep one hermaphrodite type/pit in gynodioecious types like (Co 3 & Co 7) and cut down female trees.

Papaya requires a lot of nutrients to continue growing vegetatively, fruit, and blossom, so chemical fertilisers are used to augment it. These fertilisers are not only expensive, but they also affect the soil and ground water. The majority of farmers are small-scale and impoverished, and therefore cannot afford the expensive chemical fertilisers that are needed in significant quantities to meet the crop's ongoing nutrient needs. Additionally, the usage of chemicals has caused multinutrient deficits, nutrient imbalances, and a gradual decline in the health and productivity of the soil. (Nambiar and Abrol, 1989).

II. MATERIAL AND METHODS

The current study, "To study influence of different organic manures on growth, yield, and quality of papaya (Carica papaya l.) in Chhattisgarh plains," was conducted from 2021 to 2022 at the research facility of the Precision Farming Development Center (PFDC), Department of Fruit Science (Horticulture), Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). Different kinds of organic manures were used in combination with recommended dose of fertilizers. The experiment had 11 treatment combinations and was laid out in Randomized Block Design, which was replicated thrice. For this experiment papaya seedlings were cultivated in 22 X 15 cm 300 gauge black polyethylene bags. These poly-bags were filled with an equal mix of well-rotten FYM, soil, and sand.

In present investigation, number of treatment combination were 11 resulting from different organic manure combinations were laid out in Randomized block design (RBD). 4 plants were taken under each treatment. T_0 : 80% RDF + control, T_1 : 80% RDF + FYM (10 kg), T_2 : 80% RDF + Vermicompost (10 kg), T_3 : 80% RDF + Neem cake (10 kg), T_4: 80% RDF + Castor cake (10 kg), T_5: 80% RDF + Goat compost (10 kg), T_6: 80% RDF + FYM (5 kg) + Leaf mold (5 kg), T_7: 80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg), T_8: 80% RDF + Neem cake (5 kg) Leaf mold (5 kg), T_9: 80% RDF + Castor cake (5 kg) + Leaf mold (5 kg), T_{10}: 80% RDF + Goat compost (5 kg) + Leaf mold (5 kg).

III. RESULTS AND DISCUSSIONS

The results of experiment pertaining to various aspects of growth parameters is summarized as follows:

Plant height

In all eleven treatments with three replications, observations on plant height were made at thirty, Ninty, one fifty and two ten days after transplanting. The results are provided in Table 4.1. The statistics demonstrate that various types of manures have a substantial impact on plant height.

The range of height at 30 days post-transplantation ranged from a maximum of 35.58 cm (T_7) to a minimum of 21.03 cm in the case of T_0 or control. T_7 (80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)) had a maximum height of 35.58 cm and were significantly superior to most treatments, with the exception of three treatments, namely T_8 (35.11 cm), T_{10} (32.05 cm), and T_9 (31.13 cm).

All eleven treatments' plants ranged in height from a maximum of 96.36 cm (T_7: 80 percent RDF + Vermicompost (5 kg) + Leaf mold (5 kg)) to a minimum of 71.37 cm 90 days after transplanting (T_0). With the exception of T_8, which recorded a plant height of 94.91 cm, which was on par with T_7, T_7's maximum plant height of 96.36 cm in this case was much higher than all other treatments. With a height of 71.37 cm, the control T_0 had the shortest plant.

At 150 days after transplanting, the plant height varied from a maximum of 133.08 cm (T_7) to a minimum of 111.33 cm (T_0), with T_7 being

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 761-767 www.ijprajournal.com ISSN: 2456-4494

noticeably superior to all other treatments except T_8 (131.71 cm), T_{10} (130.70 cm), and T_9 (129.94 cm).

The range in height at 210 days after transplanting was found to be from a maximum of 176.83 cm (T_7) to a minimum of 141.55 cm (T_0), following a similar trend that T_7 was significantly superior to all other treatments with the exception of T_8 (173.06 cm), T_{10} (172.04 cm), and T_9 (170.37 cm).

It is noteworthy to observe that on all four dates—30, 90, 150, and 210 days after transplanting—the plant height followed a similar pattern in that T_7 (80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)) recorded the highest plant height, followed by T8 (80%RDF + Neem cake (5 kg) + Leaf mold (5 kg)), T10 (80%RDF + Goat compost (5 kg) + Leaf mold (5 kg)), and T9 (80%RDF + Castor cake (5 kg) + Leaf mold (5 kg)) in decreasing order. After transplanting, at the 30, 90, 150, and 210-day marks, the control T0 had the lowest plant height.

Similar findings were also noted by Shivakumar et al. (2007), Srinu et al. (2007) and Kanwar et al. (2020). The organic manures had an enhancing effect on the nutrient uptake that resulted in increased plant height.

Number of leaves

The number of leaves per plant was observed at thirty, Ninty, one fifty and two ten days following transplanting. The results are shown in table 4.2.

The number of leaves ranged from maximum of 5.00 at T_7 to minimum of 3.00 in T_0. T_7 (80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)) was followed by T_8 (5.00), T_{10} (4.66) and T_9 (4.66) at 30 days after transplanting.

At 90 days after transplanting, number of leaves were found maximum in T_7 which was 9.66 and minimum was found in T_0 which was 4.66 with T_7 observed as superior to all the other treatments.

The range in number of leaves at 150 days after transplanting was found to be from a maximum of 18.33 (T_7) to a minimum of 12.66 (T_0), following a similar trend that T_7 was significantly superior to all other treatments with the exception of T_8 (17.33), T_{10} (17.00), and T_9 (16.66).

The range in number of leaves at 210 days after transplanting was found to be from a maximum of 29.66 (T_7) to a minimum of 23.00 (T_0), following a similar trend that T_7 was significantly superior to all other treatments with the exception of T_8 (29.00), T_{10} (28.00), and T_9 (27.33).

The higher number of leaves was observed on using the organic manures. The treatment T_7 (80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)) gave the highest number of leaves followed by T8 (80%RDF + Neem cake (5 kg) + Leaf mold (5 kg)), T_{10} (80%RDF + Goat compost (5 kg) + Leaf mold (5 kg)), and T_9 (80%RDF + Castor cake (5 kg) + Leaf mold (5 kg)) in decreasing order. The results were in close confirmity with the findings of Shivakumar et al. (2007), Pranesh et al. (2016).

Petiole length (cm)

At thirty, Ninty, one fifty and two ten days following transplanting, observations on petiole length were made in all eleven treatments with three replications. The outcomes are listed in Table 4.3. The figures show that different types of manures significantly affect plant height.

All eleven treatments' plants ranged in petiole length from a maximum of 46.96 cm (T_7: 80 percent RDF + Vermicompost (5 kg) + Leaf mold (5 kg)) to a minimum of 35.66 cm (T_0) at 30 days after transplanting. With the exception of T_8, which recorded a petiole length of 44.29 cm, which was on par with T_7, T_7's maximum plant height of 46.96 cm in this case was much higher than all other treatments. With a height of 35.66 cm, the control T_0 had the shortest plant.

At 90 days after transplanting, the petiole length varied from a maximum of 65.88 cm (T_7) to a minimum of 50.30 cm (T_0), with T_7 being noticeably superior to all other treatments except T_8 (63.56 cm), T_{10} (61.77 cm), and T_9 (60.65 cm).

The range in petiole length at 150 days after transplanting was found to be from a maximum of 71.57 cm (T_7) to a minimum of 53.11 cm (T_0), depicting that T_7 was significantly superior to all other treatments with the exception of T_8 (67.99 cm), T_{10} (64.77 cm), and T_9 (63.73 cm).

The range of petiole length was determined to be from a high of 72.69 cm (T_7) to a minimum of 56.15 cm (T_0), following a similar trend that T_7 was significantly better than all other treatments with the exception of T_8 (67.87 cm), T_{10} (67.49 cm), and T_9 (66.70 cm) at 210 days after transplanting.

It is evident from the pooled data that organic manure had an significant effect on petiole length of papaya. Similar findings were given by Pranesh et al. (2017), Srinu et al. (2017) in papaya.

Stem girth (cm)

At thirty, Ninty, one fifty and two ten days following transplanting, observations on stem girth were made in all eleven treatments with three replications. The outcomes are listed in Table 4.4.

The range of stem girth at 30 days post-transplantation ranged from a maximum of 15.01 cm (T_7) to a minimum of 10.39 cm in the case of T_0 or control. T_7 (80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)) had a maximum height of 15.01 cm and were significantly superior to most treatments, with the exception of three treatments, namely T_8 (14.50 cm), T_{10} (14.27 cm), and T_9 (13.74 cm).

At 90 days after transplanting, the stem girth varied from a maximum of 25.57 cm (T_7) to a minimum of 12.74 cm (T_0), with T_7 being noticeably superior to all other treatments except T_8 (24.58 cm), T_{10} (24.08 cm), and T_9 (22.75 cm).

All eleven treatments plants ranged in girth from a maximum of 54.68 cm (T_8: 80% RDF + neem cake (5 kg) leaf mold (5 kg)) to a minimum of 21.10 cm (T_0) at 150 days after transplanting. With the exception of T_7, which recorded a stem girth of 33.41 cm, which was on par with T_8, T_8's maximum stem girth of 54.68 cm in this case was much higher than all other treatments. With a girth of 21.10 cm, the control T_0 had the thinnest plant.

The range in girth at 210 days after transplanting was found to be from a maximum of 58.68 cm (T_8) to a minimum of 24.93 cm (T_0), depicting that T_8 was significantly superior to all other treatments with the exception of T_7 (39.31 cm), T_{10} (38.06 cm), and T_9 (36.17 cm).

It was observed that the stem girth was found maximum in the treatment T_7 (80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)). This might due the nutrients present in adequate amount in the soil. Similar work has been reported by Pranesh et al. (2016), Shivakumar et al. (2007).

Table 4.1 Effect of different organic manures on plant height (cm) of papaya (Carica papaya L.)

TREATMENTS	PLANT HEIGHT (cm)			
	30 DAT	90 DAT	150 DAT	210 DAT
T_0 : 80% RDF + control	21.03	71.37	111.33	141.55
T_1 : 80% RDF + FYM (10 kg)	23.86	85.68	120.58	159.38
T_2 : 80% RDF + Vermicompost (10 kg)	25.67	89.95	123.58	165.66
T_3 : 80% RDF + Neem cake (10 kg)	28.34	92.80	128.20	169.07
T_4: 80% RDF + Castor cake (10 kg)	27.94	90.78	125.73	167.20
T_5: 80% RDF + Goat compost (10 kg)	28.70	91.33	126.57	168.60
T_6: 80% RDF + FYM (5 kg) + Leaf mold (5 kg)	24.50	86.22	121.46	162.94
T_7: 80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)	35.58	96.36	133.08	176.83
T_8: 80% RDF + Neem cake (5 kg) Leaf mold (5 kg)	33.11	94.91	131.71	173.06
T_9: 80% RDF + Castor cake (5 kg) + Leaf mold (5 kg)	31.13	93.70	129.94	170.37
T_{10}: 80% RDF + Goat compost (5 kg) + Leaf mold (5 kg)	32.05	94.02	130.70	172.04
SE (±m)	0.554	0.575	0.512	0.539
CD at 5%	1.644	1.707	1.521	1.602

Table 4.2 Effect of different organic manures on Number of leaves of papaya.

TREATMENTS	NUMBER OF LEAVES			
	30 DAT	90 DAT	150 DAT	210 DAT
T_0 : 80% RDF + control	3.000	4.667	12.667	23.000
T_1 : 80% RDF + FYM (10 kg)	3.333	5.667	14.000	24.333
T_2 : 80% RDF + Vermicompost (10 kg)	4.333	5.667	15.000	25.667
T_3 : 80% RDF + Neem cake (10 kg)	4.667	6.667	16.000	27.000
T_4: 80% RDF + Castor cake (10 kg)	4.000	5.667	15.333	26.000
T_5: 80% RDF + Goat compost (10 kg)	4.000	6.333	15.667	26.667
T_6: 80% RDF + FYM (5 kg) + Leaf mold (5 kg)	3.667	6.000	14.667	25.000
T_7: 80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)	5.000	9.667	18.333	29.667
T_8: 80% RDF + Neem cake (5 kg) Leaf mold (5 kg)	5.000	9.333	17.333	29.000
T_9: 80% RDF + Castor cake (5 kg) + Leaf mold (5 kg)	4.667	7.333	16.667	27.333
T_{10}: 80% RDF + Goat compost (5 kg) + Leaf mold (5 kg)	4.667	8.333	17.000	28.000
SE (±m)	0.764	0.659	0.523	0.637
CD at 5%	N/A	1.958	1.554	1.893

Table 4.3 Effect of different organic manures on Petiole length (cm) of papaya.

TREATMENTS	PETIOLE LENGTH (cm)			
	30 DAT	90 DAT	150 DAT	210 DAT
T_0 : 80% RDF + control	35.663	50.307	53.117	56.157
T_1 : 80% RDF + FYM (10 kg)	37.357	54.877	56.253	58.840
T_2 : 80% RDF + Vermicompost (10 kg)	38.697	56.613	59.013	62.800
T_3 : 80% RDF + Neem cake (10 kg)	41.533	59.473	62.763	65.453
T_4: 80% RDF + Castor cake (10 kg)	39.473	57.557	60.663	63.817

T_5: 80% RDF + Goat compost (10 kg)	40.480	58.063	61.423	64.340
T_6: 80% RDF + FYM (5 kg) + Leaf mold (5 kg)	38.013	55.607	58.747	61.357
T_7: 80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)	46.967	65.887	71.573	72.693
T_8: 80% RDF + Neem cake (5 kg) Leaf mold (5 kg)	44.290	63.567	67.997	67.870
T_9: 80% RDF + Castor cake (5 kg) + Leaf mold (5 kg)	42.403	60.657	63.733	66.707
T_{10}: 80% RDF + Goat compost (5 kg) + Leaf mold (5 kg)	43.407	61.777	64.773	67.493
SE (±m)	0.341	0.604	0.554	0.380
CD at 5%	1.013	1.794	1.645	1.129

Table 4.4 Effect of different organic manures on stem girth (cm) of papaya.

TREATMENTS	STEM GIRTH (cm)			
	30 DAT	90 DAT	150 DAT	210 DAT
T_0 : 80% RDF + control	10.390	12.747	21.107	24.937
T_1 : 80% RDF + FYM (10 kg)	10.337	14.933	21.820	26.990
T_2 : 80% RDF + Vermicompost (10 kg)	10.620	17.770	24.567	30.670
T_3 : 80% RDF + Neem cake (10 kg)	12.647	20.693	28.513	33.373
T_4: 80% RDF + Castor cake (10 kg)	12.447	18.700	24.863	31.310
T_5: 80% RDF + Goat compost (10 kg)	11.600	17.803	26.667	29.303
T_6: 80% RDF + FYM (5 kg) + Leaf mold (5 kg)	10.170	15.977	23.327	27.750
T_7: 80% RDF + Vermicompost (5 kg) + Leaf mold (5 kg)	15.017	25.570	33.417	39.317
T_8: 80% RDF + Neem cake (5 kg) Leaf mold (5 kg)	14.503	24.580	54.687	58.683
T_9: 80% RDF + Castor cake (5 kg) + Leaf mold (5 kg)	13.740	22.750	31.000	36.177
T_{10}: 80% RDF + Goat compost (5 kg) + Leaf mold (5 kg)	14.270	24.083	32.570	38.060

SE (±m)	0.591	0.309	6.656	5.965
CD at 5%	1.755	0.917	N/A	17.722

IV. CONCLUSIONS

The current experiment could lead to the following conclusions. (T_7: 80% RDF + 5 kg of vermicompost + 5 kg of leaf mould) performed better than other treatments (T_8: 80% RDF + Neem cake (5 kg) Leaf mould (5 kg)) that were then applied. It was concluded that (T_7: 80% RDF + Vermicompost (5 kg) + Leaf mould (5 kg)) improved the yield and early production. Additionally, it was shown that the treatment (T_8: 80% RDF + Neem cake (5 kilogramme) + Leaf mould (5 kg)) produced fruits of a larger size that sold for a higher price. Along with earlier fruiting, the treatment T7 also produced a greater number of fruits, which increased papaya yield, improved fruit quality, and benefit-to-cost ratio. Providing leaf mould along with the treatments has been discovered to be beneficial for papaya farming.

REFERENCES

[1]. Kanwar, A., Sahu, G. D., & Panigrahi, H. K. (2020). Impact of integrated nutrient management on yield and quality parameters of papaya (Carica papaya L.) Cv. Red Lady under net house. Journal of Pharmacognosy and Phytochemistry, 9(3), 1443-1445.

[2]. Nambiar, K.K.M. and Abrol, I.P. 1989. Long term fertilizer experiments in India: An area view. Fert. News, 34: 11 – 26.

[3]. Pranesh; A R Kurubar; Ashok Hugar; S S Patil; S R Balanagoudar, Effect of Organic Manures On Growth and Yield Performance of Papaya (Carica papaya) cv. Red Lady. 2016: 8(2).

[4]. Shivakumar, B. S., Dharmatti, P. R. and Channal, H. T., 2012, Effect of organic cultivation of papaya on yield, economics and soil nutrient status. Karnataka J. Agric. Sci., 25 (4): 488-492.

[5]. Srinu. B., Manohar Rao, A., Veenajoshi, K., Reddy, N.S. and Sharma H,K, 2017. Effect of different integrated nutrient management on groeth, yield and quality of papaya (Carica papaya L.) cv Red Lady. Bull. Env. Pharmacol. Life Sci., 6(1) : 132 – 135.

[6]. Yadav, P.K., 2007, Fruit production technology. International Book Distributing Co., Lucknow. p.257.