International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

E-ISSN 2347-2677
P-ISSN 2394-0522
www.faunajournal.com
IJFBS 2021; 8(1): 91-93
Received: 19-11-2020
Accepted: 21-12-2020

Baldev Agrawal
Department of Fruit Science, Indira Gandhi Agricultural University, Raipur Chhattisgarh, India

Dr. GD Sahu
Department of Fruit Science, Indira Gandhi Agricultural University, Raipur Chhattisgarh, India

Corresponding Author:
Baldev Agrawal
Department of Fruit Science, Indira Gandhi Agricultural University, Raipur Chhattisgarh, India

Effect of organic manure and bio-fertilizer on growth and yield of papaya (*Carica papaya* L.) Cv. red lady

Baldev Agrawal and Dr. GD Sahu

Abstract
The present investigation was carried out at Krishi Vigyan Kendra , Balod, Indira gandhi Agricultural University, Raipur, Chhattisgarh during the year 2018 -19 and 2019-20, respectively and was laid out in Randomized Block Design (RBD), the experiment comprising ten treatments and three replications. 200:200:200 gm NPK /plant were applied as per recommendation in all ten treatments combinations involving different organic manures and biofertilizers. The results revealed that the growth parameters viz., plant height (184 cm), were significantly maximum in papaya plant receiving with treatments(RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant) Whereas stem girth (48.47cm), number of leaves(48.13), total leaf area (9.77m^2) and length of petiole (70.57cm) were highest with the treatment RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant(T_8) and treatment (RDF +Azospirillum@ 10 gm / plant + PSB @ 10 gm / plant) found at par for all the growth parameters results. Number of fruits per plant(34.17), average fruit weight (1.15kg), fruit yield per plant (38.95 kg) and per ha(116.86), fruit length (22.58cm) and pulp weight per fruit (845.47gm) were found significant in papaya plants supplied with RDF +Azospirillum@ 10 gm / plant + PSB @ 10 gm / plant and fruit girth (23.15cm) , fruit volume 894.17(cc) and seed weight per fruit(84.96) were found significant with treatment RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant. Likewise poor performance was observed in control for all parameters.

Keywords: papaya, organic manure, biofertilizer, FYM, vermicompost, azospirillum, PSB

Introduction
Papaya (*Carica papaya* L.) is an evergreen herbaceous commercial fruit crop of tropical and subtropical regions and belongs to the family Caricaceae. Papaya is one among the fruits which has attained a great popularity in recent years because of gynodioecious nature, its easy cultivation, quick returns, adoptability to diverse soil and climatic conditions and above all its attractive delicious wholesome fruits having multifarious uses. In India it is cultivated in an area of about 143 thousand ha. with an annual production of 59,80 thousand mt. (Anon,2019a). Water and nutrients were the two important crucial basic sources for augmenting crop production. Out of total cost of cultivation of papaya 30% cost account for nutrient management which is one of the key factor and most important cultivation practices to improve the productivity. For sustainable soil productivity, it is very essential to strike a balance in soil biological activity, as any disturbance will affect the nutrient transformation in soil. Application of organic manure and biofertilizer includes the combine use of organics (*i.e*. manure, compost, Cowdung slurry, bio-fertilizers, green manure, crop residues, *etc*) and inorganic fertilizers to increase crop yield and farmers profits, improve crop quality and minimize nutrient losses to environment. Nutrient supply by organic manure and bio-fertilizer in papaya refers to maintenance of soil fertility and plant nutrient supply to an optimum level for sustaining the desired crop productivity and fruit quality through optimization of benefits from all possible sources in an integrated manner. In this context, the present investigation was undertaken with an objective of finding out the effect of organic manure and biofertilizer in papaya.

Research Methods
The present investigation was carried out during the year 2018-19 & 2019-20 at Krishi Vigyan Kendra, Balod (C.G.) Indira Gandhi Agricultural University, Raipur, and was laid out in Randomized Block Design (RBD), the experiment comprising ten treatments and three replications. 200:200:200 gm NPK /plant were applied as per recommendation in all ten

treatments combinations involving different organic manures and biofertilizers viz. T_0– Control (RDF @ 200:200:200 gm NPK /plant/year) ,T_1- RDF + Cow dung slurry(CDS) @ 4 liter/plant in two split doses),T_2- RDF + FYM @ 10 kg /plant ,T_3- RDF + Vermicompost @ 2 kg /plant ,T_4- RDF+ Azospirillum@ 10 gm / plant ,T_5- RDF + PSB@ 10 gm / plant ,T_6-RDF +Azospirillum@ 10 gm / plant + PSB @ 10 gm / plant ,T_7–RDF +CDS+Azospirillum@ 10 gm / plant + PSB @ 10 gm / plant ,T_8– RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant ,T_9- RDF + Vermicompost@ 2 kg /plant + Azospirillum@ 10 gm / plant + PSB @10 gm / plant.The seedlings of papaya were transplanted I the field adopting a spacing of 1.8 m x 1.8 m. Organic fertilizer and biofertilizer was applied in two split (basal and 45 DAP) as per treatments. Inorganic fertilizers were applied at 2nd, 4th, 6th and 8th month after transplanting. The sourse of N,P,K were urea ,ssp and mop respectively. The data recorded on growth, yield and yield attributes were analysed statistically (Panse and Sukhatme, 1967) [5].

Research Findings and Discussion

The Effect of Organic manure and Bio-Fertilizer on Growth and Yield of Papaya reveals that plant height (184 cm), were significantly maximum in papaya plant receiving with treatments(RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant) Whereas stem girth (48.47cm), number of leaves(48.13), total leaf area (9.77m^2) and length of petiole (70.57cm) were highest with the treatment RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant(T_8) and treatment (RDF +Azospirillum@ 10 gm / plant + PSB @ 10 gm / plant) found at par for all the growth parameters results. The increase in plant height and stem girth may be due to improvement of physical properties of soil, higher nutrient uptake and increased activity of micro organisms which were manifested in the form of enhanced growth and higher carbohydrates production (Yadav *et al*., 2011a) [10]. Secondly, it could also be because of continuous supply of available nutrient from organic and inorganic form and effect of bio-active substance produced by common application of bio-fertilizer. Organic manure application, also improved the aeration in the soil, which ultimately improved the physiological activities inside the plants. The similar result was reported by Aneesa Rani and Sathiamoorthy (1997) [1], Yadav (2006) [9], Shrivastav (2008) [7], Shivakumar (2010) [10] and Suresh *et al.* (2010) [8] in papaya In case of yield and yield attributes, number of fruits per plant(34.17), average fruit weight (1.15kg), fruit yield per plant (38.95 kg) and per ha(116.86), fruit length (22.58cm) and pulp weight per fruit (845.47gm) were found significant in papaya plants supplied with RDF +Azospirillum@ 10 gm / plant + PSB @ 10 gm / plant and fruit girth (23.15cm) , fruit volume 894.17(cc) and seed weight per fruit(84.96) were found significant with treatment RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant. Likewise poor performance was observed in control for all parameters. Increase in fruit attributes could be due to the increase in morphological traits such as plant height, girth, number of leaves, leaf area, faster rate of leaf production and also higher nutrient uptake by the plant. Increased number of leaves might have increased the photosynthetic activity resulting in higher accumulation of carbohydrates. Relatively higher carbohydrates accumulation could have promoted the growth rate and in turn increased yield. Higher fruit yield (t/ha) in papaya was realized due to increase in fruit number and fruit weight per plant. Higher yield response owing to application of organics and biofertilizer ascribed to improved physical, chemical and biological properties of soil resulting in better supply of plant nutrients, which turn led to good crop growth and yield (Shivakumar, 2010) [10].

The higher fruit yield /plant might be due to increased fruit length, breadth and circumference, fruit number, fruit weight and volume of fruit with application of organic manures and bio-fertilizers in combination with chemical fertilizers as against the straight fertilizer application. The organic manures being the store house of all plant nutrients including trace elements might have released them gradually and steadily and this contributed towards the balanced nutrition of crop throughout the cropping period which results in enhancement in yield attributes (Hazarika and Ansari, 2010) [3].

Table 1: Effect of Organic manure and Bio-Fertilizer on Growth of papaya

Treatments	Plant height (cm)	Stem girth (cm)	No. of leaves per plant	Total leaf area (m^2)	Petiol length (cm)
	At 360 DAP(pooled mean)				
T_0- Control (RDF @ 200:200:200 gm NPK /plant/year)	149.33	43.05	42.05	8.15	68.43
T_1 - RDF + Cow dung slurry (CDS) @ 4 liter/plant in two split doses	153.83	43.48	42.22	8.22	68.43
T_2 - RDF + FYM@ 10 kg / plant	160.00	44.23	42.97	8.30	68.50
T_3 - RDF + Vermicompost @ 2 kg /plant	161.33	44.23	43.72	8.27	69.33
T_4 -RDF+ Azospirillum @ 10 gm / plant	162.00	45.37	44.22	8.48	68.55
T_5 - RDF + PSB @ 10 gm / plant	166.67	44.42	44.93	8.40	70.05
T_6 -RDF + Azospirillum @ 10 gm / plant + PSB @ 10 gm / plant	175.83	48.12	48.02	9.70	70.15
T_7 –RDF + CDS + Azospirillum @ 10 gm / plant + PSB @ 10 gm / plant	180.50	44.07	46.98	9.18	69.12
T_8 – RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant	174.83	48.47	48.13	9.77	70.57
T_9 - RDF + Vermicompost@ 2 kg /plant + Azospirillum@ 10 gm / plant + PSB @10 gm / plant	184.33	44.35	46.98	9.12	69.88
S.Em. ±	0.601	0.601	0.090	0.051	0.465
C.D.at 5%	1.787	1.787	0.268	0.152	1.382

Table 1: Effect of Organic manure and Bio-Fertilizer on fruit growth and yield of papaya

Treatments	Number of fruit per plant	Average wt of fruit (Kg)	Fruit per plant(Kg)	Fruit yield per hac.(t)	Fruit girth (cm)	Fruit volume (cc)	Seed wt. per fruit (gm)	Fruit length (cm)	Pulp wt. per fruit
	(Pooled mean)								
T_0- Control (RDF @ 200:200:200 gm NPK /plant/year)	30.50	0.87	26.43	79.30	14.90	740.83	70.79	19.02	681.31
T_1 - RDF + Cow dung slurry (CDS) @ 4 liter/plant in two split doses	29.50	0.93	27.39	82.18	15.07	740.83	74.23	19.03	742.01
T_2 - RDF + FYM@ 10 kg / plant	29.83	0.93	27.87	83.62	15.47	750.83	75.03	19.33	745.90
T_3 - RDF + Vermicompost @ 2 kg /plant	30.50	0.96	29.26	87.78	16.22	773.33	75.35	19.57	748.80
T_4 -RDF+ Azospirillum @ 10 gm / plant	29.83	1.01	30.08	90.25	16.50	792.50	75.86	19.95	769.46
T_5 - RDF + PSB @ 10 gm / plant	30.17	1.02	30.67	92.02	17.08	817.50	76.14	20.19	782.01
T_6 -RDF + Azospirillum @ 10 gm / plant + PSB @ 10 gm / plant	34.17	1.15	38.95	116.86	20.07	851.67	83.10	22.49	845.43
T_7 –RDF + CDS + Azospirillum @ 10 gm / plant + PSB @ 10 gm / plant	33.00	1.12	36.85	110.56	19.40	841.67	80.76	21.65	832.03
T_8 – RDF+ FYM@ 10 kg /plant +Azospirillum@ 10 gm / plant + PSB @10 gm / plant	34.00	1.14	38.64	115.92	23.15	894.17	84.96	22.58	841.36
T_9 - RDF + Vermicompost@ 2 kg /plant + Azospirillum@ 10 gm / plant + PSB @10 gm / plant	32.50	1.11	36.18	108.55	20.52	843.33	82.21	21.63	830.49
S.Em. ±	0.295	0.016	0.551	1.653	0.157	2.099	0.31	0.061	3.21
C.D.at 5%	0.878	0.0468	1.637	4.912	0.469	6.236	0.93	0.182	9.54

References

1. Aneesa Rani MS, Sathiamoorthy S. Effect of organics and bio fertilizers on root enzyme activity, nematode, total biomass and growth enhancement of papaya cv. Co.6. South Indian Hort 1997;45(5, 6):217-223.
2. Anonymous. Area and production of horticultural crops. National Horticulture board 2019a, 1.
3. Hazarika BN, Ansari S. Effect of integrated nutrient management on growth and yield of banana *cv*. Jahaji. Indian J Hort 2010;67(2):270-273.
4. Kuttimani R, Velayudham K, Somasundararam E. Growth and yield parameters and nutrient uptake of banana as influenced by integrated nutrient management practices. International J Advance Res 2013a;4(5):680-686.
5. Panse VG, Sukhatme PV. Statistical methods for agricultural workers, ICRA Pub; New Delhi 1967, 152-165.
6. Shivakumar BS. Integrated nutrient management studies in papaya (*Carica papaya* L.) *cv*. Surya. Ph.D. Thesis submitted to Univ. of Agril. Science, Dharwad, Karnataka 2010.
7. Shrivastava A. Integrated nutrient management(*Carica papaya* L.) Ph.D. Thesis, submitted to N.D. University of Agriculture and Technology, Faizabad (U.P.) India 2008.
8. Suresh CP, Nath S, Poduval M, Sen SK. Studies on the efficacy of phosphate solubilizing microbes and VAM fungi with graded levels of phosphorus on growth, yield and nutrient uptake of papaya (*Carica papaya* L.). Acta Hort 2010;851:401-406.
9. Yadav PK. Effect of integrated nutrient management on growth yield and quality of papaya (*Carica papaya* L.) fruit. Ph.D. Thesis C.S.A. University of Agriculture and Technology, Kanpur (U.P.) India 2006.
10. Yadav PK, Yadav AL, Yadav AS, Yadav HC. Effect of integrated nutrient nourishment on vegetative growth and physico-chemical attributes of papaya (*Carica papaya* L.) fruit *cv*. Pusa Dwarf. Plant Archives 2011a;11(1):327-329.