Int.J.Curr.Microbiol.App.Sci (2020) *9*(9): 391-395

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 9 Number 9 (2020)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2020.909.049

Effect of Organic Manures and Biostimulants on Quality of Orange Fleshed Sweet Potato (*Ipomoea batatas* L.) under Godavari Alluviums of Andhra Pradesh

P. Vimatha[1*], K. Mamatha[2], K. Umajyothi[1], K. Sasikala[1] and V. S. N. Deepika[2]

[1]College of Horticulture, DRYSRHU, India
[2]Horticultural Research station, Kovvur, DRYSRH, India

**Corresponding author*

Keywords

Organic sources, Vermicompost, Arka microbial consortium, *Ipomoea batatas* L.

Article Info

Accepted:
04 August 2020
Available Online:
10 September 2020

A B S T R A C T

An experiment was conducted to study the effect of organic sources of nutrients on orange fleshed sweet potato (*Ipomoea batatas* L.) under Godavari alluvial soils at Horticultural research station, Dr. Y. S. R. Horticultural University, Kovvur, West Godavari District, Andhra Pradesh during *Rabi* 2018-19 to study the effect of different organic sources of nutrients in sweet potato hybrid PSP-1 under organic conditions. The experimental design adopted was the mixed factorial RBD with three levels of organic manures (FYM @ 13.6 t/ha, Vermicompost @ 8.3 t/ha and Neem cake @ 9.3 t/ha) and with five levels of foliar sprays (Seaweed extract @ 3 %, Humic acid @ 4 %, Jeevamruth @ 500 l/ha, Arka microbial consortium (soil drenching) @ 7.5 l/ha and Water spray). The results revealed that the basal application of vermicompost @ 8.3 t/ha along with soil drenching of Arka microbial consortium @ 7.5 l/ha recorded highest starch content (20.24 %), total sugars (3.28 %), reducing sugars (0.50 %), ascorbic acid content (3.49 mg/100g) and β-carotene (14.22 mg/100g).

Introduction

The sweet potato (*Ipomoea batatas* L.) a member of convolvulaceae family is one of the most important tropical food crops with versatile utility. It probably originated in tropical South America and is also known as Irish potato. Sweet potato (*Ipomoea batatas*) is a herbaceous perennial but cultivated as annual, forms roots as it trails along the ground. It is cultivated throughout the country for its tuber production, occupying an area of 1, 34,880 ha with production of 16, 38,840 MT whereas in Andhra Pradesh , sweet potato is cultivated in an area 530 ha with production of 10,910MT (NHB, 2018). The cultivation of sweet potato in arid and semi arid regions is mainly done in rainy season. But, due to one or other reasons, farmers are not harnessing the desired production potential of the crop. Sweet potato is vegetatively propagated by vine cuttings taken from freshly harvested vines grown in secondary nursery (Selvakumar, 2014). Among the food crops sweet potato (*Ipomoea batatas* L.) is ranked as the 5th most important crop with versatile

utility, producing substantially high edible energy per hectare per day compared to rice, wheat, maize and cassava.

The tubers are used as a subsidiary food after boiling, baking and frying and also form as an industrial raw material for the production of starch, alcohol, pectin *etc*. Besides energy provider, it is a good source of minerals and vitamins. More than this, the tubers are having a number of nutrient categories responsible for the health benefits like antioxidants, anti-inflammatory nutrients, and blood sugar-regulating nutrients. Orange fleshed sweet potatoes have emerged as one of the most promising plant sources of β-carotene, the pro vitamin A (Mitra, 2012).

The health of entire environment is a major concern today compelling all the living beings to run for a change. The reason for deterioration of environmental health is attributable mainly due to excessive and imbalanced use of agrochemicals and fertilizers that leads to residual toxicity all over the environment affecting all living beings resulting huge disturbances in natural cycles and bio activities. Organic farming in its modern form is not only productive enough to meet our growing demands but is also resource conserving and continuously contributing the improvement of soil health and fertility.

Organic production technologies are adopted with a main objective of producing safe food and maintaining a pollution free environment. Organic farming does not hold good for all crops in all situations. Tuber crops in general are very much suited for organic production system. Organic manure is known to be effective in maintenance of adequate supply of organic matter in soils with attendant improvement in soil physical and chemical conditions and enhanced crop performance.

Materials and Methods

The study was conducted to work out the effect of organic sources of nutrients on quality attributes of sweet potato hybrid PSP-1 at Horticultural Research Station, Kovvur, Dr. Y.S.R.H.U, Venkatramannagudem, West Godavari district, Andhra Pradesh during the period from September, 2018 to March, 2019.

The experiment was laid out in mixed factorial RBD with three levels of organic manures (M_1: FYM @ 13.6 t/ha, M_2: Vermicompost @ 8.3 t/ha and M_3: Neem cake @ 9.3 t/ha) as basal application and with five levels of foliar sprays (F_1: Seaweed extract @ 3 %, F_2: Humic acid @ 4 %, F_3: Jeevamruth @ 500 l/ha, F_4: Arka microbial consortium (soil drenching) @ 7.5 l/ha and F_5: Water spray) at 30, 60 and 90 DAP.

Details of treatments

The treatments consisted of two factors. The treatment details are as follows:

Factor-1: Organic manures (3 levels)
M_1. FYM (14286 kg/ha)
M_2. Vermicompost (8333 kg/ha)
M_3. Neem cake (9091 kg/ha)

Factor -2: Biostimulants (5 levels)
F_1. Foliar sprays with Seaweed extract (3%)
F_2. Foliar sprays with Humic acid (4%)
F_3. Foliar sprays with Jeevamrutham (500 l/ha)
F_4. Drenching with Arka microbial consortium (7.5 l/ha)
F_5. Water spray

Vine cuttings of 20 - 25 cm length were planted at a spacing of 60x20 cm and irrigated immediately. Each treatment consists of 40 plants and observations were recorded at 30, 60, 90 DAP and at harvest.

Results and Discussion

The data pertaining to the quality attributes as influenced by organic manures and biostimulants are presented in the Table 1.

Starch (%)

There was a significant difference among different levels of organic manures in combination with biostimulants. The maximum starch content (20.24 %) was recorded with the application of vermicompost along with Arka microbial consortium (M_2F_4) followed by the treatment combination neem cake along with jeevamruth (M_3F_3) (19.02 %). The combination of FYM + water spray (M_1F_5) recorded the lowest starch content (12.21 %).

Total sugars (%)

The total sugars varied significantly among different levels of organic manures in combination with biostimulants. The maximum total sugars (3.28 %**)** was recorded with the application of vermicompost + Arka microbial consortium (M_2F_4) followed by the treatment combination neem cake + jeevamruth (M_3F_3) (3.10 %).

Table.1 Effect of organic sources of nutrients on quality characters of Sweet potato (*Ipomoea batatas* L.)

Treatment combinations	Quality parameters				
	Starch content (%)	Total sugars (%)	Reducing sugars (%)	Ascorbic acid content (mg/100gm)	β carotene (mg/100gm)
T_1 - M_1F_1	17.00	2.85	0.38	3.12	13.46
T_2-M_1F_2	16.75	2.91	0.36	3.18	13.26
T_3- M_1F_3	16.75	2.89	0.34	3.28	13.16
T_4-M_1F_4	17.48	2.73	0.40	3.12	13.63
T_5-M_1F_5	12.21	2.43	0.23	2.73	10.92
T_6-M_2F_1	15.11	2.99	0.35	3.19	13.55
T_7-M_2F_2	15.32	2.69	0.43	3.19	13.78
T_8-M_2F_3	16.53	2.81	0.35	3.19	13.58
T_9-M_2F_4	20.24	3.28	0.50	3.49	14.22
T_{10}- M_2F_5	14.67	2.68	0.32	2.96	11.94
T_{11}-M_3F_1	16.11	2.88	0.35	3.20	13.25
T_{12}-M_3F_2	17.62	2.68	0.35	3.25	12.73
T_{13}-M_3F_3	19.02	3.10	0.48	3.36	13.80
T_{14}-M_3F_4	15.45	3.01	0.37	3.25	13.71
T_{15}-M_3F_5	12.47	2.45	0.24	2.74	11.55
SE(m) ±	0.17	0.04	0.02	0.05	0.14
CD at 5%	0.49	0.12	0.05	0.14	0.41

Table.2 Effect of organic sources of nutrients on NPK content (kg/ha) of the soil after harvest of sweet potato (*Ipomoea batatas* L.)

Organic manures / Foliar sprays	NPK after harvest											
	Nitrogen				Phosphorus				Potassium			
	M_1	M_2	M_3	Mean	M_1	M_2	M_3	Mean	M_1	M_2	M_3	Mean
F_1	394.67	401.33	384.33	393.44	9.67	10.00	10.00	9.89	677.50	660.50	610.50	649.50
F_2	363.00	416.67	400.33	393.33	12.00	9.67	9.00	10.22	599.00	641.00	638.00	626.00
F_3	375.00	386.00	309.67	356.89	9.00	11.00	8.67	9.56	647.00	619.00	563.00	609.67
F_4	355.33	**264.00**	388.33	**335.89**	9.00	**8.50**	10.00	**9.17**	594.00	**560.00**	666.00	**606.67**
F_5	519.00	478.67	515.67	504.44	18.33	9.00	16.00	14.44	739.50	568.67	722.00	676.72
Mean	401.40	**389.33**	399.67		11.60	**9.63**	10.73		651.40	**609.83**	639.90	
	SE(m) ±		CD at 5%		SE(m) ±		CD at 5%		SE(m) ±		CD at 5%	
M	2.87		8.30		0.38		1.098		17.43		NS	
F	3.70		10.72		0.49		1.417		22.51		NS	
M x F	6.41		18.57		0.847		2.454		38.98		NS	

M_1. FYM M_2. Vermicompost M_3. Neem cake

F_1. Seaweed extract F_2. Humic acid F_3. Jeevamruth F_4. Arka microbial consortium F_5. Water spray

Reducing sugars (%)

The reducing sugars varied significantly at different levels of organic manuresin combination with sprayings. Application of vermicompost combined with Arka microbial consortium (M_2F_4) has recorded the maximum reducing sugars(0.50 %)which was on par with the treatment combination neem cake in combination with jeevamruth (M_3F_3) (0.48 %).

Ascorbic acid content (mg/100 g)

The maximumascorbic acid content(3.49 mg) was recorded with the application of vermicompost along with drenching of Arka microbial consortium (M_2F_4) which was on par with the treatment combination neem cake + jeevamruth (M_3F_3) (3.36 mg). The combination of FYM + water spray (M_1F_5) recorded the lowest ascorbic acid content (2.73 mg). The results were in accordance with the findings of Malathi (2019). Increase in ascorbic acid content due to application of organics in chilli was reported by Shashidhara (2000).

β-carotene (mg/100 g)

The interaction effect of different levels of organic manures in combination with sprayings was found to be highly significant. The maximum β-carotene (14.22 mg) was recorded with the application of vermicompost+ Arka microbial consortium (M_2F_4) followed by the treatment combination neem cake+ jeevamruth (M_3F_3) (13.80 mg). The combination of FYM + water spray (M_1F_5) recorded the lowest β-carotene (10.92 mg).

Post harvest soil nutrient status

The data pertaining to the nutrient status in the soil after the experiment as influenced by the organic manures and sprayings are presented in Table 2.

Nitrogen content of the soil

The residual nitrogen content in the soil after the harvest was found to be significant with the application of different levels of organic manures and biostimulants.

The lowest residual nitrogen in the soil (264.00 kg/ha**)** was recorded with the application of vermicompost + Arka microbial consortium (M_2F_4) followed by the treatment combination neem cake + jeevamruth (M_3F_3) (309.67 kg/ha). The combination of FYM + water spray (M_1F_5) recorded the maximum residual nitrogen content in the soil (519.00 kg/ha).

The less amount of available N in the soil after harvest may be due to the greater utilization of nutrients by the plant and due to highest uptake of nutrients in the treatment combination vermicompost along with Arka microbial consortium (M_2F_4).

Phosphorous content of the soil

The residual phosphorous content in the soil after the harvest was found to be significant with the application of different treatment combinations. The minimum residual phosphorous in the soil (8.50 kg/ha**)** was recorded with the application of vermicompost along with Arka microbial consortium (M_2F_4) which was on par with the treatment combination neem cake + jeevamruth (M_3F_3) (8.67 kg/ha). The combination of FYM + water spray (M_1F_5) recorded the highest residual phosphorous content in the soil (18.33 kg/ha).

Potassium content of the soil

The interaction effect of different levels of organic manures in combination with sprayings on potassium content of the soil after harvest was found to be non significant as the soils under Godavari alluviums are rich in Potassium content.

In conclusion the soil application of vermicompost @ 8.3 t/ha along with application of Arka microbial consortium @ 7.5 l/ha at 30, 60 and 90 DAP can be recommended to obtain good quality and maximumβ-carotene content of orange fleshed sweet potato.

References

Malathi, P. 2019. Quality of chillies (*Capsicum annuum* L.) as influenced by organic manures application. *International Journal of Current Microbiology and Applied Sciences*. 8(1): 2811-18.

Mitra, S. 2012. Nutritional status of orange fleshed sweet potatoes in alleviating vitamin A malnutrition through food based approach. Journal of Nutrition &Food sciences. 2(8):160-162.

Molla, A.H, Shamsuddin, Z.H. and Saud, H.M. 2001. Mechanism of root growth and promotion of nodulation in vegetable soybean by *Azospirillum*. *International Journal of Biosciences*. 123-30.

National Hortiulture Board 2018. State wise area production and productivity of sweet potato in India.www.nhb.gov.in.

Selvakumar, R. 2014. "*A Textbook of Glaustus Olericulture*," New Vishal Publications, New Delhi. 478-82.

Shashidhara, G.B. 2000. Integrated nutrient management for chilli (*Capsicum annuum* L.) in Alfisols of Northern Transition Zone of Karnataka. M. Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad, Karnataka, India.

How to cite this article:

Vimatha, P., K. Mamatha, K. Umajyothi, K. Sasikala and Deepika, V. S. N. 2020. Effect of Organic Manures and Biostimulants on Quality of Orange Fleshed Sweet Potato (*Ipomoea batatas* L.) under Godavari Alluviums of Andhra Pradesh. *Int.J.Curr.Microbiol.App.Sci.* 9(09): 391-395. doi: https://doi.org/10.20546/ijcmas.2020.909.049