Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.2623

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (3):** 978-981 (2017)

International Journal of Pure & Applied Bioscience

Research Article

OPEN ACCESS

Study the correlation effect of integrated nutrient sources and their interaction on soil properties of Custard Apple (*Annona squamosa*) field

Asheesh Sharma[1*], Prerak Bhatnagar[2] and Santosh Kumar[3]

[1,2]Department of Fruit Science, College of Horticulture and Forestry, M.P.U.A. & T. Udaipur (Raj.)

[3]M.Sc. Scholar, Department of Horticulture, S.K.N. College of Agriculture – Jobner, Rajasthan

*Corresponding Author E-mail: asbhardwaj2113@gmail.com

Received: 21.02.2017 | Revised: 2.03.2017 | Accepted: 5.03.2017

ABSTRACT

The study conducted at the Fruit research farm, Department of Fruit Science, College of Horticulture and Forestry, Jhalrapatan, Jhalawar. The Integrated Nutrient Management (INM) effect on soil parameters of custard apple cv. Arka Sahan field. The experiment consisted of different treatment combinations comprising recommended dose of fertilizers, vermicompost and biofertilizer (Azotobacter, PSB and VAM). Experimental findings revealed that different treatments of integrated nutrient sources significantly improve the soil parameters. Among these integrated nutrient management treatments, treatment T_{10} comprising 50 % recommended dose of fertilizers + 50 % N through vermicompost and biofertilizers (Azotobacter 50 g + PSB 50 g + VAM 20 g) was found significantly superior over other treatments with respect result in improving the water holding capacity (%), organic carbon percentage, N, P, and K content of soil under T_{10} treatment which was found significantly superior over other treatments. Like-wise, soil pH and electrical conductivity also reduced significantly under T_{10} treatment over other treatments.

Key words: *Custard Apple, Bio-Fertilizers, Organic and Inorganic Fertilizers, Soil Parameters.*

INTRODUCTION

Annonas are very delicious, tropical fruit crop. Among them, custard apple (*Annona squamosa* L.) is considered the best. Custard apple is also known as sugar apple, sweetsop, *sharifa*, *sitaphal* and *noi-na* in different parts of growing regions. Nutrition is one of the most important aspects of fruit production and accounts for 30 per cent of its total cost of cultivation. Fruits are considered for their medicinal value besides their general use in ice cream, confectionary, beverage and certain milk products[3]. Ayurvedic practionaries in India have extensively use various parts of the sugar apple tree for the management of diabetes. Similarly, Inca tribes in the Peruvian Andes have used cherimoya as a medicinal plant[10]. Currently the Annonaceae remain a hot family for the discovery of new anti-cancer drugs. Nutrition is one of the most important aspects of fruit production and accounts for 30 per cent of its total cost of cultivation.

Cite this article: Sharma, A., Bhatnagar, P. and Kumar, S., Study the correlation effect of integrated nutrient sources and their interaction on soil properties of Custard Apple (*Annona squamosa*) field, *Int. J. Pure App. Biosci.* **5(3):** 978-981 (2017). doi: http://dx.doi.org/10.18782/2320-7051.2623

However, in most of the orchard, poor nutrition is one of the major causes of low productivity. Plants need sufficient nutrients in proper balance for normal growth and development. There is a continuous removal of nutrients from the soil owing to regular and not of balance dose of nutrition. Depletion soil nutrients pose a major threat to sustainability of crop production and underline the need for maintaining it by tapping other plant nutrient sources. Eeffect of VAM on soil pH and nutrient availability under grapevine cultivation. Organic and inorganic fertilizers were applied either with or without VAM strains *Glomus mossae, Glomus deserticola* and *Gigaspora calospora*. Application of VAM in grapevines revealed substantial decrease in soil pH from 8.3 to 6.9 and EC from 0.31 to 0.28 and an increase in availability of N, P and K. Further VAM inoculation increased soil organic carbon and organic matter compared to treatments where only chemical fertilizers were used[4].

The indiscriminate use of inorganic fertilizers and synthetic pesticides leading totally to a deteriorating chemical farming scenario in the country and increased use of inorganic fertilizers resulted in elemental imbalance at soil and plant level, accumulation of harmful substances in plant soil, residual toxicity and reduced inherent resistance of crops to external influence. There is an urgent need for an alternative nutritional package to attain long term sustainability for fruit production as well as for maintaining soil productivity under integrated nutrient management (INM) system.

MATERIALS AND METHODS

The experimental entitled "Integrated Nutrient Management in custard apple cv. Arka Sahan" was conducted during the year 2011, at the Fruit Research Farm, Department of Fruit Science, College of Horticulture and Forestry, Jhalawar. The application of different integrated nutrient management treatments were applied during September, 2010 in two years old plants. The treatment combination were: T_1 = Control, T_2 = Biofertilizers (AZB 50 g + PSB 50 g + VAM 20 g/plant), T_3 = 100 % N through Vermicompost (1533.33 g/plant), T_4 = 100 % NPK through chemical fertilizers (Urea 50 g + SSP 200 g + MOP 50 g/plant), T_5 = 75 % RDF + 25 % N through Vermicompost (37.5g Urea + 150g SSP + 37.5g MOP + 382.25g Vermicompost/plant), T_6 =50 % RDF + 50 % N through Vermicompost (25g Urea + 100g SSP + 25g MOP + 766.5g Vermicompost/plant), T_7 = 25 % RDF + 75 % N through Vermicompos (12.5g Urea + 50g SSP + 12.5g MOP + 1149.75g Vermicompost/plant), T_8 = T_4 + Biofertilizers (AZB 50g + PSB 50g + VAM 20 g/plant), T_9 = T_5 + Biofertilizers (AZB 50g + PSB 50g + VAM 20 g/plant), T_{10} = T_6 + Biofertilizers (AZB 50g + PSB 50g + VAM 20 g/plant), T_{11} = T_7 + Biofertilizers (AZB 50g + PSB 50g + VAM 20 g/plant). The experiment was laid down in randomized block design with three replications. Soil parameters soil pH, electrical conductivity (dSm^{-1}), organic carbon (%), available NPK (kg ha^{-1}) and water holding capacity (%) were recorded at initiation of experiment and termination of experiment. Soil pH determined by glass electrode pH meter, electrical conductivity of soil by using standard precision conductivity bridge, organic carbon by Walkley and Black's (1934) wet digestion method, available Nitrogen (kg/ha) by using alkaline Potassium Permanganate method, available Phosphorus in soil (kg/ha) by Olsen *et al*., (1954), available Potassium (kg/ha) by Flame Photometer and water holding capacity (%) by Piper, 1950 method. The data obtained during the experiment were subjected to statistical analysis using Fisher's (1950) analysis of variance technique.

RESULTS AND DISCUSSION

Table: 1 Effect of integrated nutrient sources on soil parameters of custard apple cv. Arka Sahan field

Treatment	Soil parameters						
	WHC (%)	pH	EC (dsm^{-1})	OC (%)	N ($kgha^{-1}$)	P ($kgha^{-1}$)	K ($kgha^{-1}$)
Initial values	31.48	7.68	0.46	0.58	324	20.83	298.00
T_1	33.88	7.58	0.46	0.59	318.55	20.54	295.46
T_2	34.98	7.60	1.44	0.62	332.75	21.55	316.05
T_3	35.78	7.56	0.45	0.68	315.96	20.36	298.48
T_4	36.13	7.63	0.43	0.70	326.40	21.07	342.24
T_5	36.89	7.65	0.43	0.75	368.73	24.11	375.99
T_6	37.04	7.67	0.41	0.73	338.64	23.02	348.12
T_7	37.46	7.35	0.41	0.72	308.96	20.86	309.65
T_8	38.22	7.34	0.40	0.78	341.05	22.14	345.27
T_9	38.72	7.30	0.38	0.79	354.65	23.11	360.36
T_{10}	40.32	7.20	0.35	0.82	382.93	25.13	392.44
T_{11}	39.63	7.25	0.36	0.81	359.14	23.43	365.35
SEm (±)	0.171	0.078	0.011	0.016	4.479	1.974	5.209
CD (5%)	0.491	0.163	0.024	0.034	9.344	4.119	10.866

The different physicochemical properties of soil showed in Table: 1 viz. soil pH, electrical conductivity, organic carbon content, available NPK, water holding capacity (%) were significantly influenced by different integrated nutrient management treatments after experiment. Water holding capacity was found maximum (40.32 %) significant under T_{10} treatment. Organic matter increases infiltration rate by helping to hold water on the soil surface long enough for it, to enter into the soil and improving the physical condition of the soil, thereby helping to provide better aggregation and structure and consequently lower bulk density and increase capillary water movement. The maximum soil pH reduction observed in T_{10} treatment. The decrease in soil pH under T_{10} treatment could be attributed to improved mobilization of nutrients from bound or unavailable fractions in soil as a result of synergistic effect of VAM symbiosis coupled with vermicompost application in addition to inorganic fertilization. Soil electrical conductivity was found significantly lower under T_{10} treatment. The maximum soil electrical conductivity (0.46 dSm^{-1}) was recorded at control. The organic carbon percentage was found increased after application of treatments and it was obtained maximum under T_{10} treatment. Finally, the maximum organic carbon content percentage was recorded under T_{10} treatment (0.82%). The nitrogen content (382.93 $kgha^{-1}$), phosphorous content (25.13 $kgha^{-1}$) and potassium content (392.44 $kgha^{-1}$) were found increased significantly under T_{10} treatment. The better nitrogen content under T_{10} treatment could be attributed to *Azotobacter* nitrogen enrichment of soil along with growth promoting effects of PSB, VAM and 50% recommended dose of inorganic fertilizer. T_{10} treatment (Vermicompost in combination with 50 % RDF and biofertilizers) has resulted significantly better impact with respect to higher vegetative growth parameters over other treatments including control. The application vermicompost along with 50 % N through RDF and biofertilizers provided better nutrition as it contains all the macro and micro nutrients required for growth and development of plants. It also improved physicochemical properties of soil of the treated plants by reducing pH and EC, improving water holding capacity and enriching the organic carbon, N, P, K status of the soil over other treatments. Reported that recently the emphasis has been placed on N and Ca, the nutrients most closely associated with fruit quality. Secure supply of high quality fruit, possible responses include precision horticulture with more targeted nutrient management. Effort to adopt more environmentally benign low input and organic

production systems will require improved understanding of nutrient availability from organic and biological amendments Neilsen *et al*., (2010). Response of Washington navel orange trees to sources and rates of mineral fertilizer, organic manure and biofertilizer application, bio fertilizers reduce the soil pH and increased N, P soil contents. Soil N, P, K contents were highest with the application of organic manure in combination with the bio fertilizer at different rates Tayeh, E.A.H, (2003)**.** The maximum water holding capacity (87.04%), organic carbon content (0.82%), available N (382.93 $kgha^{-1}$), available P (25.13 $kgha^{-1}$), available potassium (392.44 $kgha^{-1}$) and minimum electrical conductivity (0.35 dSm^{-1}) and soil pH (7.2) were recorded under T10 treatment comprising 50% recommended dose of fertilizers along with 50% N through vermicompost (766.5g) supplemented with biofertilizers comprising Azotobacter (50g), PSB (50g) and VAM (20g).

CONCLUSION

The maximum water holding capacity (87.04%), organic carbon content (0.82%), available N (382.93 $kgha^{-1}$), available P (25.13 $kgha^{-1}$), available potassium (392.44 $kgha^{-1}$) and minimum electrical conductivity (0.35 dSm^{-1}) and soil pH (7.2) were recorded under T10 treatment comprising 50% recommended dose of fertilizers along with 50% N through vermicompost (766.5g) supplemented with biofertilizers comprising Azotobacter (50g), PSB (50g) and VAM (20g).

REFERENCES

1. Black, C.A (ed.) Method of soil analysis. *American Society of Agronomy, Madison*, Wisconsin USA (1965).
2. Fisher, R.A., Statistical methods for research workers. Oliver and Boyd, Edinburgh (1950).
3. Kamble, K.J., Soni, S.B., Effect of steam blanching on quality of custard apple pulp. *Journal of Horticulture and Forestry* **2(5):** 104-107 (2010).
4. Mathew, Rebecca; Usha, K. and Kumar saxena, Anil. Influence of VAM strains and inorganic fertilizers on soil characteristics and nutrient uptake by grapevine (*Vitis vinifera). Indian J. Plant Physiol*. (special issue) pp. 554-559 (2003).
5. Neilsen, D. and Neilsen, G.H., Tomorrow's challenges in fruit nutrition research: Quo Vadis. *Acta Hort*. 868. ISHS (2010).
6. Olsen, S.R., Cole, C.S., Wantable, F.S. and Dean, C.A., Estimation of available phosphorus in soils by extraction with sodium bicarbonate USDA, Washington, D.C. Circular. **18:** 939 (1954).
7. Piper, C.S., 1950. *Soil and Plant Analysis*. Academic Press, New York
8. Singh, V. Markam R., Uikey P., Shinde, V., Study on the biochemical, sensory and microbial contamination of custard apple beverage. *Hort Flora Research Spectrum* 202-207 (2013).
9. Tayeh E.A.H., Response of Washington navel orange trees to sources and rates of mineral fertilizer, bio-fertilizer and organic manure. *Annals of Agricultural science, Moshtohor*. **41:** 799-817 (2003).
10. Topno, K.K., Plant used by tribes of chotanagpur against diabetes. *Botanica* **47:** 99-101 (1997).