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Effect of NPK and Organic Manures on Plant Growth Fruit Yield and Fruit Quality of Snake Gourd (*Trichosanthes anguina* L.) CV. Faizabad Long

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A B S T R A C T

Afield experiment entitled "Effect of NPK and Organic manures on plant growth, fruit yield and fruit quality of Snake Gourd (*Trichosanthes anguina* L.) cv. Faziabad Long" was conducted at Vegetable Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences. Prayagraj during Rabi Season of the year 2018-2019. The highest plant height (132.83, 258.64 and 338.47cm) was observed in treatment combination of T10 25% NPK+75% Vermicompost . The maximum fruit length (cm) (98.55) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost. The maximum fruit yield (q/ha) (375.32) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost. From the present investigation, it can be concluded that the treatment T10 25% NPK+75% Vermicompost resulted maximum fruit yield per plant (q/ha) (375.32) with net return, benefit cost ratio and also shows good root quality with TSS (3.11) and ascorbic acid (5.28). Organic farming experiments in long run for stability and better yield.

Introduction

Snake gourd (*Trichosanthes anguina* L.) is an annual vegetable crop, climbing vine, providing both long and short fruits. India is a native home of snake gourd. Vegetables are important in maintaining satisfactory nutritional level in human diet. There will be increasing demand for this commodity with accelerated industrial growth and increasing urban area. Vegetable are not only important source of vitamins and minerals but they can also help in improving economic condition of farmer. Snake gourd is a popular vegetable crop in southern India grown principally for the immature fruits that can be cooked. The fruit is rich in minerals, calcium, phosphorus, and vitamins, riboflavin, thiamine, niacin and

carotene. Lateritic soil is best suited for cultivations of cucurbitaceous family crop. The traditional method of farming and less use of organic manure reduces the quality of snake gourd. For increasing the productivity economical fertilizer package need to be formulated which can provide all the essential elements through both organic and inorganic sources to get good quality, produce with higher production, keeping the production cost at sustainable level of an average farmer. Intensive use of only chemical fertilizers to achieve high production has created various problems. Continuous applications of heavy doses of chemical fertilizers without organic manures has led to deterioration of soil health in terms of physical and chemical properties of soil, decrease in soil microbial activities, and also reductions in soil humus (Anjanappa *et al.,* 2011).

Organic manures increase the organic matter in the soil. They provide organic acids that help dissolve soil nutrients and make them available for the plants. Application of organic manures improves the soil fertility, soil structure and moisture holding capacity. Integrated plant nutrient management is one of the recent methods of supplying nutrients to the plants by organic as well as inorganic means together to fulfill the nutrient requirements. Composts, vermicomposts, poultry manures, Farmyard manure (FYM) etc. are bulky organic manures, although supply low quality of major nutrients, but have potential to supply all essential nutrients for longer periods (Kale *et al.,* 1998). The optimum dose of nitrogen, phosphorus, and potassium vary greatly cultivar, geographical location and the environmental factors.

Materials and Methods

The experiment entitled "Effect of NPK and Organic manures on plant growth, fruit yield and fruit quality of Snake Gourd (*Trichosanthe anguina* L.) cv. Faziabad Long" was conducted in rainy season at Prayagraj region adapting randomized block design consisting of 13 treatments and three replications T_1 - CONTROL (RDF) (100N:50P:50K kg/ha), T_2 - 75% NPK+25% Vermicompost, T_3 - 75% NPK+25% FYM, T_4 - 75% NPK+25% Poultry Manure, T_5 - 75% NPK+25% Sheep manure, T_6 - 50% NPK+50% Vermicompost, T_7 - 50% NPK+50% FYM, T_8 - 50% NPK+50% Poultry Manure, T_9 - 50% NPK+50% Sheep manure, T_{10} - 25% NPK+75% Vermicompost, T_{11} - 25% NPK+75% FYM, T_{12} - 25% NPK+75% Poultry Manure, T_{13} - 25% NPK+75% Sheep manure were used in inorganic and source forms. The inorganic fertilizers used were urea as Nitrogen, SSP. as phosphorus and MOP as potash. Among organic manure as decomposed farmyard manure, vermicompost and poultry manures were used.

The nitrogen was applied in two splits viz. at the sowing and after 30 days of sowing. The seed of snake gourd were dibbled at the rate of 2-3 seed per hill at spacing of 1.5 m × 0.5 m. thinning and gap filling were carried out at 20 days after sowing in order to have one healthy plant per hill.

The observations regarding yield, weight of fruit, length of fruit, fruit per vine and nutrient content were taken and data were analyzed statistically.

Results and Discussion

Effect of NPK and organic manures on plant height (cm) of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

The plant height was influenced by different level of NPK with different source of organics manures at 30, 60 and 90 DAS and result were found to be significant (Table 1).

The highest plant height (132.83, 258.64 and 338.47cm) was observed in treatment combination of T_{10} 25% NPK+75% Vermicompost followed by T_6 50% NPK+50% Vermicompost, T_4 75% NPK+25% Poultry Manure, T_2 75% NPK+25% Vermicompost and T_7 50% NPK+50% FYM and T_{11} 25% NPK+75% FYM. The plant height was found to be minimum (78.76, 118.66, 228.43cm) in the treatment combination of T_1 CONTROL (RDF) (100N:50P:50K kg/ha). These findings are in consonance with the earlier studies of Arancon *et al.,* (2006), Prabha *et al.,* (2007), Narkhede *et al.,* (2011).

Effect of NPK and organic manures on Number of branches plant^{-1} of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

Influence of different level of NPK with different source of organic manures on number of branches per plant was found to be significant different among the treatments. The maximum number of (13.58) branches per plant was recorded in the treatment combination of T10 25% NPK+75% Vermicompost followed by T_6 50% NPK+50% Vermicompost, T_7 50% NPK+50% FYM, T_3 75% NPK+25% FYM and T_2 75% NPK+25% Vermicompost. The minimum number of (5.28) branches pr plant was recorded in the treatment T_1 CONTROL (RDF) (100N:50P:50K kg/ha). These findings are in consonance with the earlier studies of Arancon *et al.,* (2006), Prabha *et al.,* (2007), Narkhede *et al.,* (2011).

Effect of NPK and organic manures on fruit length (cm) of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

Influence of different level of NPK with different source of organic manures on fruit length (cm) was found to be significant different among the treatments. The maximum fruit length (cm) (98.55) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost followed by T_6 50% NPK+50% Vermicompost, T_7 50% NPK+50% FYM, T_3 75% NPK+25% FYM, T_2 75% NPK+25% Vermicompost and T_{11} 25% NPK+75% FYM. The minimum fruit length (cm) (47.99) was recorded in the treatment T_1 CONTROL (RDF) (100N:50P:50K kg/ha). These findings are in consonance with the earlier studies of Arancon *et al.,* (2006), Prabha *et al.,* (2007), Narkhede *et al.,* (2011)

Effect of NPK and organic manures on fruit weight (kg) of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

The fruit weight (kg) as influenced by different level of NPK with different source of organic manures is furnished in table 2.

Influence of different level of NPK with different source of organic manures on fruit weight (kg) was found to be significant different among the treatments. The maximum fruit weight (kg) (682.42) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost followed by T_6 50% NPK+50% Vermicompost, T_7 50% NPK+50% FYM, T_3 75% NPK+25% FYM, T_2 75% NPK+25% Vermicompost and T_{11} 25% NPK+75% FYM. The minimum fruit weight (kg) (382.48) was recorded in the treatment T_1CONTROL (RDF) (100 N:50P:50K kg/ha). These findings are in consonance with the earlier studies of Arancon *et al.,* (2006), Prabha *et al.,* (2007), Narkhede *et al.,* (2011). The results of the present investigation have similarity with the findings reported earlier by Rai *et al.,* (2012), Kameswari *et al.,* (2011) in cucumber and Dewagan (2012) in bottle gourd.

Effect of NPK and organic manures on number of fruit per plant of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

Influence of different level of NPK with different source of organic manures on number of fruit per plant was found to be significant different among the treatments. The maximum number of fruit per plant (18.33) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost followed byT_6 50% NPK+50% Vermicompost, T_{11} 25% NPK+75% FYM, T_7 50% NPK+50% FYM and T_2 75% NPK+25% Vermicompost. The minimum number of fruit per plant (5.22) was recorded in the treatment T_1CONTROL (RDF) (100N:50P:50K kg/ha). These findings are in consonance with the earlier studies of Arancon *et al.,* (2006), Prabha *et al.,* (2007), Narkhede *et al.,* (2011). The results of the present investigation have similarity with the findings reported earlier by Rai *et al.,* (2012), Kameswari *et al.,* (2011) in cucumber and Dewagan (2012) in bottle gourd.

Effect of NPK and organic manures on fruit yield per plant (q/ha) of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

Influence of different level of NPK with different source of organic manures on fruit yield (q/ha) was found to be significant different among the treatments.

The maximum fruit yield per plant (q/ha) (375.32) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost followed by T_6 50% NPK+50% Vermicompost, T_{11} 25% NPK+75% FYM, T_7 50% NPK+50% FYM, T_2 75% NPK+25% Vermicompost, T_{12} 25% NPK+75% Poultry Manure and T_3 75% NPK+25% FYM. The minimum fruit yield (q/ha) (59.90) was recorded in the treatment T_1CONTROL (RDF) (100N:50P:50K kg/ha). These findings are in consonance with the earlier studies of Arancon *et al.,* (2006), Prabha *et al.,* (2007), Narkhede *et al.,* (2011). The results of the present investigation have similarity with the findings reported earlier by Rai *et al.,* (2012), Kameswari *et al.,* (2011) in cucumber and Dewagan (2012) in bottle gourd.

Effect of NPK and organic manures on TSS of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

Influence of different level of NPK with different source of organic manures on TSS was found to be significant different among the treatments. The maximum TSS (3.11) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost followed by T_6 50% NPK+50% Vermicompost, T_7 50% NPK+50% FYM, T_{12} 25% NPK+75% Poultry Manure and T_{13} 25% NPK+75% Sheep manure (Table 3).

The minimum TSS (2.05) was recorded in the treatment T_1 CONTROL (RDF) (100N:50P:50K kg/ha). These findings are in consonance with the earlier studies of (Marilou *et al.,* 2012).

Effect of NPK and organic manures on Ascorbic acid of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

The ascorbic acid as influenced by different level of NPK with different source of organic manures is furnished in table.

Influence of different level of NPK with different source of organic manures on ascorbic acid was found to be significant different among the treatments.

Table.1 Effect of NPK and Organic manures on plant height, number of branches, number of female flowers, at different plant crop growth stages on one cultivar

S.No	Treatment	Treatment Combination	Plant Height (cm)			Number Of Branches/Plant(cm)	Number \of Female Flower/Vine(cm)
			30days	60days	90days		
1	T_1	CONTROL(RDF)100N:50P:50K)	78.76	118.66	228.43	47.99	382.48
2	T_2	75%NPK+25%VERMICOMPOST	121.59	242.33	341.38	92.47	630.39
3	T_3	75%NPK+25% FYM	116.92	241.63	348.72	93.51	648.59
4	T_4	75%NPK+25%POULTRY MANURE	123.92	246.73	348.63	83.4	558.37
5	T_5	75%NPK+25%SHEEP MANURE	110.77	232.59	333.44	72.54	480.38
6	T_6	50%NPK+50%VERMICOMPOST	131.89	252.58	355.09	97.54	674.72
7	T_7	50%NPK+50%FYM	127.86	248.44	352.73	96.84	660.42
8	T_8	50%NPK+50%POULTRY MANURE	107.74	229.81	334.45	79.82	611.89
9	T_9	50%NPK+50%SHEEP MANURE	110.83	237.63	338.47	88.48	580.51
10	T_{10}	25%NPK+75%VERMICOMPOST	132.83	258.64	358.52	98.55	682.42
11	T_{11}	25%NPK+75% FYM	118.99	240.85	341.72	91.51	595.73
12	T_{12}	25%NPK+75%POULTRY MANURE	113.92	234.34	334.97	85.51	579.68
13	T_{13}	25%NPK+75%SHEEP MANURE	102.48	215.81	322.30	77.62	542.51
		F-test	**S**	**S**	**S**	**S**	**S**
		C.D. at 0.5%	**0.794**	**0.392**	**2.768**	**0.209**	**0.239**
		S.Ed. (±)	**0.385**	**0.190**	**1.341**	**0.101**	**0.116**

Table.2 Effect of NPK and Organic manures on fruit length (cm), fruit weight (kg), number of fruit per plant, total yield per vine (kg) fruit yield per plant (q/ha).
At different plant growth stages on one cultivar

S.No	Treatment	Treatment Combination	Fruit Length (Cm)	Fruit Weight(Kg)	Number Of Fruits Per Plant	Total Yield Per Vine (Kg)	Fruit Yield per Plant (Q/Ha)
1	T_1	CONTROL(RDF)100N:50P:50K)	47.99	382.48	5.22	2.00	59.9
2	T_2	75%NPK+25%VERMICOMPOST	92.47	630.39	12	7.56	226.94
3	T_3	75%NPK+25% FYM	93.51	648.59	10.67	6.92	207.56
4	T_4	75%NPK+25%POULTRY MANURE	83.4	558.37	8.67	4.84	145.18
5	T_5	75%NPK+25%SHEEP MANURE	72.54	480.38	7	3.36	100.87
6	T_6	50%NPK+50%VERMICOMPOST	97.54	674.72	15	10.12	303.63
7	T_7	50%NPK+50%FYM	96.84	660.42	12.33	8.15	244.36
8	T_8	50%NPK+50%POULTRY MANURE	79.82	611.89	8.67	5.31	159.42
9	T_9	50%NPK+50%SHEEP MANURE	88.48	580.51	9.67	5.61	168.35
10	T_{10}	25%NPK+75%VERMICOMPOS	98.55	682.42	18.33	12.51	375.32
11	T_{11}	25%NPK+75% FYM	91.51	595.73	13.67	8.13	244.04
12	T_{12}	25%NPK+75%POULTRY MANURE	85.51	579.68	12.33	7.15	214.48
13	T_{13}	25%NPK+75%SHEEP MANURE	77.62	542.51	8	4.34	130.2
		F-test	**S**	**S**	**S**	**S**	**S**
		C.D. at 0.5%	**0.402**	**27.352**	**2.383**	**1.485**	**44.547**
		S.Ed. (±)	**0.195**	**13.253**	**1.155**	**0.719**	**21.548**

Table.3 Effect of NPK and organic manures on TSS and ascorbic acid at different plant growth stages on one cultivar

S.No	Treatment	Treatment Combination	Tss	Ascorbic Acid
1	T_1	CONTROL(RDF)100N:50P:50K)	2.05	3.2
2	T_2	75%NPK+25%VERMICOMPOST	2.43	3.76
3	T_3	75%NPK+25% FYM	2.68	3.63
4	T_4	75%NPK+25%POULTRY MANURE	2.79	3.56
5	T_5	75%NPK+25%SHEEP MANURE	2.43	4.66
6	T_6	50%NPK+50%VERMICOMPOST	2.62	3.6
7	T_7	50%NPK+50%FYM	2.61	4.33
8	T_8	50%NPK+50%POULTRY MANURE	2.4	4.54
9	T_9	50%NPK+50%SHEEP MANURE	2.31	4.74
10	T_{10}	25%NPK+75%VERMICOMPOST	3.11	5.28
11	T_{11}	25%NPK+75% FYM	2.79	5.14
12	T_{12}	25%NPK+75%POULTRY MANURE	2.75	4.95
13	T_{13}	25%NPK+75%SHEEP MANURE		
		F-test	**S**	**S**
		C.D. at 0.5%	**0.197**	**0.239**
		S.Ed. (±)	**0.095**	**0.116**

Table.4 Economics of different varieties and benefit cost ratio of Snake gourd (*Trichosanthes anguina* L.) cv. Faizabad long

Treatments	Treatments combinations	Yield q ha-1	Selling Rate (q Rs.)	Gross return (q Rs.	Cost of cultivation	Net return q Rs,	Benefit cost rtaio
T_1	CONTROL (RDF) (100N:50P:50K kg/ha)	59.9	2100	125790	120645	5146	1.04
T_2	75% NPK+25% Vermicompost	226.94	2100	476574	179166	297408	2.66
T_3	75% NPK+25% FYM	207.56	2100	435876	149166	286710	2.92
T_4	75% NPK+25% Poultry Manure	145.18	2100	304878	130416	174462	2.34
T_5	75% NPK+25% Sheep manure	100.87	2100	211827	130416	81411	1.62
T_6	50% NPK+50% Vermicompost	303.63	2100	637623	157687	479936	4.04
T_7	50% NPK+50% FYM	244.36	2100	513156	137687	375469	3.73
T_8	50% NPK+50% Poultry Manure	159.42	2100	334782	125187	209595	2.67
T_9	50% NPK+50% Sheep manure	168.35	2100	353535	125187	228348	2.82
T_{10}	25% NPK+75% Vermicompost	375.32	2100	788172	136208	651964	5.79
T_{11}	25% NPK+75% FYM	244.04	2100	512484	126208	386276	4.06
T_{12}	25% NPK+75% Poultry Manure	214.48	2100	450408	119958	330450	3.75
T_{13}	25% NPK+75% Sheep manure	130.2	2100	273420	119958	153462	2.28

The maximum ascorbic acid (5.28) was recorded in the treatment combination of T10 25% NPK+75% Vermicompost followed by T_{11} 25% NPK+75% FYM, T_{12} 25% NPK+75% Poultry Manure, T_{13} 25% NPK+75% Sheep manure, T_9 50% NPK+50% Sheep manure and T_5 75% NPK+25% Sheep manure. The maximum ascorbic acid (3.20) was recorded in the treatment T_1 CONTROL (RDF) (100N:50P:50K kg/ha). These findings are in consonance with the earlier studies of (Marilou *et al.,* 2012) (Table 4).

From the present investigation, it can be concluded that the treatment T10 25% NPK+75% Vermicompost resulted maximum fruit yield per plant (q/ha) (375.32) with net return, benefit cost ratio and also shows good root quality with TSS (3.11) and ascorbic acid (5.28). Organic farming experiments in long run for stability and better yield.

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