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

A field experiment entitled “Effect of NPK and Organic manures on plant growth, fruit yield and fruit quality of Snake Gourd (Trichosanthes anguina L.) cv. Faizabad 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 338.47 cm) 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.

Keywords
Randomized block design, Urea, Dap, Mop and Fym, Vermicompost, Sheep manure, Poultry manure

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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 farmers. 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. T1 - CONTROL (RDF) (100N:50P:50K kg/ha), T2 - 75% NPK+25% Vermicompost, T3 - 75% NPK+25% FYM, T4 - 75% NPK+25% Poultry Manure, T5 - 75% NPK+25% Sheep manure, T6 - 50% NPK+50% Vermicompost, T7 - 50% NPK+50% FYM, T8 - 50% NPK+50% Poultry Manure, T9 - 50% NPK+50% Sheep manure, T10 - 25% NPK+75% Vermicompost, T11 - 25% NPK+75% FYM, T12 - 25% NPK+75% Poultry Manure, T13 - 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 338.47 cm) 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, 228.43 cm) 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 $T_{10}$ 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 per 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 $T_{10}$ 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 $T_{10}$ 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 $T_1$ 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). 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 by T6 50% NPK+50% Vermicompost, T11 25% NPK+75% FYM, T7 50% NPK+50% FYM and T2 75% NPK+25% Vermicompost. The minimum number of fruit per plant (5.22) was recorded in the treatment T1 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).

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) (59.90) was recorded in the treatment T1 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). 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 T6 50% NPK+50% Vermicompost, T7 50% NPK+50% FYM and T12 25% NPK+75% Poultry Manure. The minimum TSS (2.05) was recorded in the treatment T1 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    | T₁        | CONTROL(RDF)100N:50P:50K              | 78.76  | 118.66 | 228.43                      | 47.99                           | 382.48                         |
| 2    | T₂        | 75%NPK+25%VERMICOMPOST                | 121.59 | 242.33 | 341.38                      | 92.47                           | 630.39                         |
| 3    | T₃        | 75%NPK+25%FYM                         | 116.92 | 241.63 | 348.72                      | 93.51                           | 648.59                         |
| 4    | T₄        | 75%NPK+25%POULTRY MANURE              | 123.92 | 246.73 | 348.63                      | 83.4                            | 558.37                         |
| 5    | T₅        | 75%NPK+25%SHEEP MANURE               | 110.77 | 232.59 | 333.44                      | 72.54                           | 480.38                         |
| 6    | T₆        | 50%NPK+50%VERMICOMPOST              | 131.89 | 252.58 | 355.09                      | 97.54                           | 674.72                         |
| 7    | T₇        | 50%NPK+50%FYM                        | 127.86 | 248.44 | 352.73                      | 96.84                           | 660.42                         |
| 8    | T₈        | 50%NPK+50%POULTRY MANURE             | 107.74 | 229.81 | 334.45                      | 79.82                           | 611.89                         |
| 9    | T₉        | 50%NPK+50%SHEEP MANURE              | 110.83 | 237.63 | 338.47                      | 88.48                           | 580.51                         |
| 10   | T₁₀       | 25%NPK+75%VERMICOMPOST             | 132.83 | 258.64 | 358.52                      | 98.55                           | 682.42                         |
| 11   | T₁₁       | 25%NPK+75%FYM                        | 118.99 | 240.85 | 341.72                      | 91.51                           | 595.73                         |
| 12   | T₁₂       | 25%NPK+75%POULTRY MANURE            | 113.92 | 234.34 | 334.97                      | 85.51                           | 579.68                         |
| 13   | T₁₃       | 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    | T1        | CONTROL(RDF)100N:50P:50K | 47.99             | 382.48           | 5.22                      | 2.00                     | 59.9                        |
| 2    | T2        | 75%NPK+25%VERMICOMPOST | 92.47             | 630.39           | 12                        | 7.56                     | 226.94                      |
| 3    | T3        | 75%NPK+25% FYM         | 93.51             | 648.59           | 10.67                     | 6.92                     | 207.56                      |
| 4    | T4        | 75%NPK+25%POULTRY MANURE | 83.4              | 558.37           | 8.67                      | 4.84                     | 145.18                      |
| 5    | T5        | 75%NPK+25%SHEEP MANURE | 72.54             | 480.38           | 7                         | 3.36                     | 100.87                      |
| 6    | T6        | 50%NPK+50%VERMICOMPOST | 97.54             | 674.72           | 15                        | 10.12                    | 303.63                      |
| 7    | T7        | 50%NPK+50%FYM          | 96.84             | 660.42           | 12.33                     | 8.15                     | 244.36                      |
| 8    | T8        | 50%NPK+50%POULTRY MANURE | 79.82             | 611.89           | 8.67                      | 5.31                     | 159.42                      |
| 9    | T9        | 50%NPK+50%SHEEP MANURE | 88.48             | 580.51           | 9.67                      | 5.61                     | 168.35                      |
| 10   | T10       | 25%NPK+75%VERMICOMPOS  | 98.55             | 682.42           | 18.33                     | 12.51                    | 375.32                      |
| 11   | T11       | 25%NPK+75% FYM         | 91.51             | 595.73           | 13.67                     | 8.13                     | 244.04                      |
| 12   | T12       | 25%NPK+75%POULTRY MANURE | 85.51             | 579.68           | 12.33                     | 7.15                     | 214.48                      |
| 13   | T13       | 25%NPK+75%SHEEP MANURE | 77.62             | 542.51           | 8                         | 4.34                     | 130.2                       |

| F-test | S | 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 |

655
### 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    | T₁        | CONTROL(RDF)100N:50P:50K)               | 2.05 | 3.2           |
| 2    | T₂        | 75%NPK+25%VERMICOMPOST                   | 2.43 | 3.76          |
| 3    | T₃        | 75%NPK+25% FYM                          | 2.68 | 3.63          |
| 4    | T₄        | 75%NPK+25%POULTRY MANURE                 | 2.79 | 3.56          |
| 5    | T₅        | 75%NPK+25%SHEEP MANURE                   | 2.43 | 4.66          |
| 6    | T₆        | 50%NPK+50%VERMICOMPOST                   | 2.62 | 3.6           |
| 7    | T₇        | 50%NPK+50%FYM                           | 2.61 | 4.33          |
| 8    | T₈        | 50%NPK+50%POULTRY MANURE                 | 2.4  | 4.54          |
| 9    | T₉        | 50%NPK+50%SHEEP MANURE                   | 2.31 | 4.74          |
| 10   | T₁₀       | 25%NPK+75%VERMICOMPOST                   | 3.11 | 5.28          |
| 11   | T₁₁       | 25%NPK+75% FYM                          | 2.79 | 5.14          |
| 12   | T₁₂       | 25%NPK+75%POULTRY MANURE                 | 2.75 | 4.95          |
| 13   | T₁₃       | 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 ratio |
|------------|-------------------------|--------------|-----------------------|----------------------|---------------------|-----------------|-------------------|
| T1         | CONTROL (RDF) (100N:50P:50K kg/ha) | 59.9 | 2100 | 125790 | 120645 | 5146 | 1.04 |
| T2         | 75% NPK+25% Vermicompost | 226.94 | 2100 | 476574 | 179166 | 297408 | 2.66 |
| T3         | 75% NPK+25% FYM | 207.56 | 2100 | 435876 | 149166 | 286710 | 2.92 |
| T4         | 75% NPK+25% Poultry Manure | 145.18 | 2100 | 304878 | 130416 | 174462 | 2.34 |
| T5         | 75% NPK+25% Sheep manure | 100.87 | 2100 | 211827 | 130416 | 81411 | 1.62 |
| T6         | 50% NPK+50% Vermicompost | 303.63 | 2100 | 637623 | 157687 | 479936 | 4.04 |
| T7         | 50% NPK+50% FYM | 244.36 | 2100 | 513156 | 137687 | 375469 | 3.73 |
| T8         | 50% NPK+50% Poultry Manure | 159.42 | 2100 | 334782 | 125187 | 209595 | 2.67 |
| T9         | 50% NPK+50% Sheep manure | 168.35 | 2100 | 353535 | 125187 | 228348 | 2.82 |
| T10        | 25% NPK+75% Vermicompost | 375.32 | 2100 | 788172 | 136208 | 651964 | 5.79 |
| T11        | 25% NPK+75% FYM | 244.04 | 2100 | 512484 | 126208 | 386276 | 4.06 |
| T12        | 25% NPK+75% Poultry Manure | 214.48 | 2100 | 450408 | 119958 | 330450 | 3.75 |
| T13        | 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 T11 25% NPK+75% FYM, T12 25% NPK+75% Poultry Manure, T13 25% NPK+75% Sheep manure, T9 50% NPK+50% Sheep manure and T5 75% NPK+25% Sheep manure. The maximum ascorbic acid (3.20) was recorded in the treatment T1 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.

References

Haque MM, Uddin MS, Mehraj H, Uddin AJ. Evaluation of snake gourd (Trichasanthes anguina L.) test hybrids comparing with four popular checks. International Journal of science and Biotechnology. 2014; 2(4): 525-528.

Mahale, AG, SB Dodake , MC Kasture, SC Jadhav, Snehal V Raut and Nayan A Kambale (2016). “Effect of Integrated Nutrient Management on Snake gourd (Trichosanthes anguina L.)

Mohan Kumar, K., E. Somasundaram, S. Marimuthu1 and C. Meenambigai (2017). Growth, Yield and Quality of Snake Gourd (Trichosanthes anguina L.) as Influenced by Organic Nutrient Management Practices.

Sheeba, R I. and Janova, V. (2015). Influence of nutrient sources on the seed yield and quality in snake gourd (Trichosanthes anguina L.). Intl. J. Agric. Sci. and Res., 5(2): 99-104.

Thriveni Vangapandu, Mishra H.N., Mandal Purandar, Chhuria SwarnaPrabha And Biswal Monalisha (2017). Influence Of Integrated Nutrient Management On Yield, Secondary Nutrients Content And Uptake Of Bitter Gourd (Momordica charantia L.). International Journal of Agriculture Sciences.

Walkely, A. and Black, G.A (1956). Critical exam of rapid method for determining organic carbon in soils, effect of variation in digestive condition and inorganic soil constituents. Soil sci., 251:632.

Zeka, N, Mero, G, Skenderasi, B, and Gjançi, S. 2014. Effects of nitrogen sources and levels on yield and nutritive values of spinach (Spinacea oleracea L.). J. Int. Acad. Res. Multidisciplinary, 2(2): 327-337.