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# Effect of Different Levels of Organic and Inorganic Fertilizers on Growth, Yield and Quality of Brinjal (*Solanum melongena* L.)

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## ABSTRACT

**Background:** Brinjal or eggplant (*Solanum Melongena* L.), a member of solanacea family, is one of the most common vegetable crops grown in India. Brinjal is staple vegetable in almost all tropical countries in the world and liked by both poor and rich. Its nutritive value varies among varieties. It contains vitamin A and B. Since there is a common belief that it is not good vegetable more while brinjal may have the medicinal property like white brinjal which is used for Diabetics patients. The basic concept underlying the principles is the maintenance and improvement of soil fertility for sustaining crop productivity on a long-term basis, which can be achieved through the combined use of various sources of nutrients and by managing them scientifically along with optimum growth, yield and quality of crop. Considering the above facts, the present study was therefore under taken to investigate the intergraded management on yield and yield contributing characters of brinjal and on soil properties.

**Methods:** An experiment was conducted at Horticulture Experimental field Department of Horticulture, Naini Agriculture Institute, SHUATS, Allahabad during Rabi season of 2016-17. The experiment was laid out in randomized block design with 8 treatments and each replicated thrice. Thirty days old healthy and uniform seedlings were transplanted on 24th Sep. 2016.

**Result:** Overall vegetative parameters were influenced due to application of Nutrient through combination of organic manure and inorganic fertilizers were proved beneficially for increasing growth of brinjal crop. The fruit and yield parameters like Average fruit weight, Length of fruit, Diameter of Fruit, Fruit per plot, Fruit per plant and Fruit per hectare was influenced significantly by the combination of organic and inorganic fertilizers in different treatments which were recorded after harvesting of fruits.

**Key words:** Brinjal, Growth, Inorganic, Organic, Quality, Yield.

## INTRODUCTION

Brinjal or egg plant (*Solanum Melongena* L.), a member of solanacea family, is one of the most common vegetable crops grown in India. Brinjal is staple vegetable in almost all tropical countries in the world and liked by both poor and rich. Its nutritive value varies among varieties. It contains vitamin A and B. Since there is a common belief that it is not good vegetable. However it is quite high in nutritive value and can be compared with tomato (Choudhary, 1976). As per the report of (Aykroyd, 1963) brinjal fruit contains moisture 92.7g, protein 1.4g, minerals 0.3g, fiber 1.3g, carbohydrate 4.0g, oxalic acid 18mg, phosphorus 47mg, iron 0.9mg, vitamin C 10mg, riboflavin 0.11mg, thiamine 0.04mg and vitamin-A 124I.U and more while brinjal may have the medicinal property like white brinjal which is used for Diabetics patients.

It has been under cultivation in the sub-continent since ancient times and is available in the market year-around in these days (Malik, 1994). The present farming system totally depends on use of chemical fertilizers, pesticides and growth regulators for enhancing crop productivity which gradually culminated in a situation where there is a need to reconsider the alternative to chemical agriculture developed in the western world. The basic concept underlying the principles is the maintenance and improvement of soil fertility for sustaining crop productivity on a long–term basis, which can be achieved through the combined use of various sources of nutrients and by managing them scientifically along with optimum growth, yield and quality of crop. The efficiency of cultivars, in regards to nutrients (NPK) uptake in the form of organic and inorganic fertilizers, varies with respect to location. Hence before the recommendation of a variety for commercial cultivation and for organic farming, determination of nutrients (NPK) requirement of the varieties for particular agro-ecological zone is of prime importance. Considering the above facts, the present study was therefore under taken to investigate the intergraded management on yield and yield contributing characters of brinjal and on soil properties.

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## MATERIALS AND METHODS

An experiment was conducted at Horticulture Experimental field, Department of Horticulture, Naini Agriculture Institute,SHUATS,

**Table 1:** Effect of different levels of organic and inorganic fertilizers on growth parameters of brinjal.

| Treatments no. | Treatments combination | Plant height (cm) | | | No. of leaves | | | Number of (cm) | Plant height at |
|---|---|---|---|---|---|---|---|---|---|
| | | 30 DAT | 60 DAT | 90 DAT | 30 DAT | 60 DAT | 90 DAT | Branches | maturity |
| $T_1$ | Control (Recommended dose of NPK (100:50:50) | 35.14 | 37.79 | 44.15 | 4.07 | 5.13 | 6.40 | 62.40 | 72.49 |
| $T_2$ | 75% RDF + 20 tonnes Farm Yard Manure. | 47.83 | 52.50 | 56.49 | 5.47 | 6.50 | 7.50 | 68.50 | 81.11 |
| $T_3$ | 75% RDF + 5 tonnes Poultry Manure. | 56.50 | 61.49 | 64.83 | 6.30 | 7.27 | 7.57 | 73.00 | 86.18 |
| $T_4$ | 50% RDF + 10 tonnes Farm Yard Manure. | 31.15 | 34.50 | 39.17 | 3.70 | 4.80 | 5.60 | 78.67 | 68.49 |
| $T_5$ | 50% RDF + 2.5 tonnes Poultry Manure. | 39.14 | 43.15 | 48.51 | 4.50 | 5.37 | 6.37 | 86.60 | 75.87 |
| $T_6$ | 20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure. | 61.21 | 65.48 | 69.14 | 6.63 | 7.67 | 7.70 | 79.53 | 89.75 |
| $T_7$ | 10 tonnes Farm Yard manure + 5 tonnes Poultry Manure. | 52.15 | 56.45 | 60.82 | 5.80 | 6.87 | 7.60 | 84.00 | 83.27 |
| $T_8$ | 50% RDF + 10 tonnes FYM + 2.5 tonnes Poultry Manure. | 43.15 | 47.82 | 53.15 | 4.87 | 5.80 | 6.57 | 80.53 | 78.50 |
| F-test | | S | S | S | S | S | S | S | S |
| S.Ed | | 0.25 | 0.87 | 1.20 | 0.11 | 0.09 | 0.59 | 2.15 | 0.47 |
| C.D. at 0.5% | | 0.53 | 1.87 | 2.58 | 0.23 | 0.19 | 1.27 | 1.04 | 1.01 |

**Table 2:** Effect of different levels of organic manures and inorganic fertilizer on yield and fruit parameters of brinjal.

| Treatments no. | Treatments combination | Average fruit weight (gm) | Diameter of fruit (cm) | Fruit length (cm) | Fruit yield/plant (kg) | Fruit yield/ plot (kg) | Yield/ha (ton) |
|---|---|---|---|---|---|---|---|
| $T_1$ | Control (Recommended dose of NPK (100:50:50) | 178.70 | 23.89 | 13.55 | 1.43 | 12.87 | 321.75 |
| $T_2$ | 75% RDF + 20 tonnes Farm Yard Manure. | 230.07 | 26.41 | 14.56 | 1.92 | 17.25 | 431.25 |
| $T_3$ | 75% RDF + 5 tonnes Poultry Manure. | 249.70 | 28.26 | 15.55 | 1.99 | 17.78 | 444.42 |
| $T_4$ | 50% RDF + 10 tonnes Farm Yard Manure. | 139.93 | 22.44 | 13.79 | 1.12 | 9.48 | 250.50 |
| $T_5$ | 50% RDF + 2.5 tonnes Poultry Manure. | 198.67 | 23.83 | 13.36 | 1.58 | 14.25 | 358.75 |
| $T_6$ | 20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure. | 262.83 | 29.18 | 16.78 | 2.10 | 18.90 | 472.67 |
| $T_7$ | 10 tonnes Farm Yard manure + 5 tonnes Poultry Manure. | 245.70 | 27.27 | 15.46 | 1.96 | 17.64 | 441.00 |
| $T_8$ | 50% RDF + 10 tonnes FYM + 2.5 tonnes Poultry Manure. | 219.17 | 25.30 | 14.33 | 1.75 | 15.75 | 393.75 |
| F-test | | S | S | S | S | S | S |
| S.Ed | | 1.41 | 0.45 | 0.59 | 0.02 | 0.27 | 5.66 |
| C.D. at 0.5% | | 3.02 | 0.97 | 1.27 | 0.05 | 0.58 | 12.13 |

**Table 3:** Effect of different levels of organic manures and inorganic fertilizer on quality parameters of brinjal.

| Treatments no. | Treatments combination | Protein | TSS |
|---|---|---|---|
| $T_1$ | Control (Recommended dose of NPK (100:50:50) | 1.31 | 10.51 |
| $T_2$ | 75% RDF + 20 tonnes Farm Yard Manure. | 1.39 | 11.70 |
| $T_3$ | 75% RDF + 5 tonnes Poultry Manure. | 1.43 | 12.67 |
| $T_4$ | 50% RDF + 10 tonnes Farm Yard Manure. | 1.27 | 10.40 |
| $T_5$ | 50% RDF + 2.5 tonnes Poultry Manure. | 1.39 | 10.73 |
| $T_6$ | 20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure. | 1.44 | 13.30 |
| $T_7$ | 10 tonnes Farm Yard manure + 5 tonnes Poultry Manure. | 1.42 | 12.23 |
| $T_8$ | 50 % RDF + 10 tonnes FYM + 2.5 tonnes Poultry Manure. | 1.35 | 11.57 |
| | F-test | S | S |
| | S.Ed | 0.04 | 0.25 |
| | C.D. at 0.5% | 0.08 | 0.54 |

Allahabad during *Rabi* season of 2016-17. The experiment was laid out in randomized block design with 8 treatments and each replicated thrice. The treatments involved were $T_1$ (Control), $T_2$ (75 % RDF + 20 tonnes Farm Yard Manure), $T_3$ (75% RDF + 5 tonnes Poultry Manure), $T_4$ (50 % RDF + 10 tonnes Farm Yard Manure.), $T_5$ (50 % RDF + 2.5 tonnes Poultry Manure), $T_6$ (20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure), $T_7$ (10 tonnes Farm Yard manure + 5 tonnes Poultry Manure) and $T_8$ (50 % RDF + 10 tonnes FYM + 2.5 tonnes Poultry Manure), where is RDF: Recommended Dose of fertilizers. The plot size was 2.0 x 2.0 m and spacing followed was 60 x 60cm. The land was brought to a fine tilth through ploughing and tillage. Irrigation channels and bunds were maintained properly. Thirty days old healthy and uniform seedlings were transplanted on 24th Sep. 2016. Light irrigation was given after transplanting. The organic manures were applied one week before transplanting, for proper decomposition, full dose of phosphorus and potassium and half dose of nitrogen as per treatment were applied just before the transplanting. The remaining half dose of nitrogen was applied 30 days after transplanting. All cultural practices were followed regularly during crop growth and observations were recorded on growth characters *i.e.,* plant height, No. of branches, No. of leaves and yield parameters like average fruit weight, length of fruit, diameter of fruit, fruit yield per plant, fruit yield per plot and fruit yield per hectare and quality parameters like TSS and protein content were recorded. The data on these parameters were subjected to statistical analysis to draw logical conclusions.

## RESULTS AND DISCUSSION

The vegetative growth parameters like plant height, number of leaves per plant, number of branches at first flowering and plant height at maturity were influenced significantly due to different treatments. Overall vegetative parameters were influenced due to application of Nutrient through combination of organic manure and inorganic fertilizers were proved beneficially for increasing growth of brinjal crop. The maximum vegetative growth of plant height at 90 DAP (69.14 cm), number of leaves at 90 DAP (7.70), number branches at first flowering (8.43) and plant height at maturity (89.75 cm) were recorded in the treatment receiving FYM combined with Poultry Manure in $T_6$ (20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure). The minimum values for all above vegetative parameters were found in $T_4$ (50 % RDF + 10 tonnes Farm Yard Manure). These results are closely confined with the findings of Fugro (1996); Darley *et al.* (1998); Devi *et al.* (2002) and Ullah *et al.* (2008).

The fruit and yield parameters like Average fruit weight, Length of fruit, Diameter of Fruit, Fruit per plot, Fruit per plant and Fruit per hectare was influenced significantly by the combination of organic and inorganic fertilizers in different treatments which were recorded after harvesting of fruits. The maximum fruit Length (16.78 cm), diameter of fruit (29.18cm), average fruit weight (262.83gm), fruit yield per plant (2.10kg), fruit yield per plot (18.90kg), fruit yield per hectare (472.67q/ha.) were recorded with the treatment $T_6$ (20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure). Similar results were reported by Suge *et al.* (2011), Ullah *et al.* (2008), Yadav *et al.* (2006) and Darley *et al.* (1998).

Nutritive value of the fruit is determined by the protein content and total soluble solid content in the fruits. Significant differences were found in treatments in respect of Protein content and total soluble solids as quality parameters. The highest protein content is noticed in treatment $T_6$ (20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure) which was (1.44 %) and also produced highest TSS (13.30°Brix) which was superior over the other treatments. Findings of Raigo *et al.* (2010); Renuka *et al.* (2008) and Kumar *et al.* (2007) are also similar with the results of current study.

## CONCLUSION

From the above findings it is concluded that the combination of $T_6$ (20 tonnes Farm Yard Manure + 5 tonnes Poultry Manure) resulted in maximum yield protein content, TSS and benefit cost ratio (1:4.70) in Brinjal variety Varanasi Gola under Allahabad Agro climatic condition.

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