

## Effect of integrated nutrient management on growth and yield of onion (*Allium Cepa* L.) Cv. Nasik red

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### ABSTRACT

The field experiment entitled Effect of integrated nutrient management on growth and yield of onion (*Allium Cepa* L.) Cv. Nasik red was planned and conducted during Rabi season 2013-2014 and at Research Farm of Department of Horticulture at Sam Higginbottom Institute of Agriculture Technology and Sciences, Allahabad, (Deemed-to-be-University), Allahabad Uttar Pradesh India, with combination of different source of integrated nutrient management (FYM+VC+NPK) on growth and yield of onion. Experiment consisted of 7 treatments with 3 replications laid in RBD. The result obtained from the experiment showed that different treatment combination of integrated nutrient management significantly affected the growth and yield parameters of onion such as plant height (57.33cm), length of leaf sheath (35.23cm), number of leaf sheath / per plant (10.00), stem girth of plant (2.31cm), fresh weight of plant (137.37g), dry weight of plant (14.37g), fresh weight of bulb (120.39g), dry weight of bulb (14.82g), diameter of bulb (6.95cm), bulb yield/plot (3.10kg), and bulb yield t/ha (29.6), significantly by combination of different integrated nutrients management (FYM+VC+NPK). The maximum value of bulb yield / ha were under the treatment T<sub>5</sub> (10t ha<sup>-1</sup> Vermicompost + 75% RDF).

**Key point :** FYM, NPK, Onion and VC.

### INTRODUCTION

Onion (*Allium cepa* L.) is an important underground vegetable bulb crop of tropical and subtropical part of the world. Onion is considered to be the second most important vegetable crop grown in the world after tomatoes. It is an indispensable item in every kitchen used as vegetable and condiment used to flavor many of the food stuffs. Therefore, onion is popularly referred to the 'Queen of the kitchen'. In addition, onion is used as salad and pickle. Recently, onion is being employed by processing industry to a greater extent for preparing dehydrated onion forms like powder and flakes. In the world, India stands first in area and ranks second in production after China; the total area in India under onion during 2008-09 was 5.34 lakh ha with a production of 76.37 lakh tonne. Maharashtra, Uttar Pradesh, Orissa, Karnataka and Rajasthan are the major onion producing states in India. Maharashtra stands first in area (1.25 lakh ha) and production (27.07 lakh t) of onions with a productivity of 21.55 t per ha (NHRDF, 2009). Due to increasing production levels of onion, overseas trade is also growing. During 2007-08, the onion export was 11.01 lakh t of worth Rs. 1285.82 crores. Presently the major export markets for Indian onions are Middle East and Gulf countries, Singapore, Malaysia, Sri Lanka, Bangladesh, and Japan (MSAMB, 2008). Onion gives higher yield per unit area. India is gifted with a wide range of agro-climatic conditions, which enables the production of vegetables throughout the year in one part of the country or the other and also maintaining continuous supply of fresh vegetables. (Jaynthilake, 2003). In Karnataka, onion is produced throughout the year. During kharif - 2006-07 the area cultivated with onion was 1.31 lakh ha with the production of 7.56 lakh tonne (Indiastat, 2008) which illustrates the poor productivity and the shelf life of onions produced during kharif has been found to be poor. Several factors viz., lack of suitable variety (ies), poor nutrient management practices and improper storage techniques, have been identified as major cause

for poor productivity, quality and storability of kharif onion. Onion being semi perishable crop gets deteriorated during storage, transportation and marketing. Due to excessive use of chemical (especially nitrogenous) fertilizers onion gets spoiled very soon in storage (NHRDF, 2012). In this regard, it becomes essential to study the influence of different (both organic and inorganic) sources of nitrogen on productivity and storability of the onion during kharif season. Onion (*Allium cepa* L.) is an important member of the genus *Allium* of family Amaryllidaceae. (Goto and Kimeto, 1992). Onion and Garlic are most important bulb crops grown in India. Bio-fertilizers are the culture of bacteria which benefit the plants by providing nitrogen used mostly to release plant nutrients available from rhizosphere and stimulate plant growth and is therefore known as biological-nitrogen fixation (Vanmathi, 2012). It is fixed in soil by chemically fixed nitrogen and biologically fixed nitrogen both. Accurate estimated annual turnover of nitrogen in the biosphere vary from 100 to 200 million tones. Microbial inoculants are carrier based preparations containing beneficial microorganism in a as vegetable crops and other crops has been reported by several workers. Keeping in view the above facts on the growth and yield of onion (*Allium cepa* L.) The present investigation entitled "Effect of Integrated Nutrient management (FYM+VC+NPK) on growth and yield of onion (*Allium Cepa* L.) cv. Nasik Red" undertaken during the year 2013-2014, at Horticulture Research Farm, Sam Higginbottom Institute of Agriculture Technology and Sciences, Allahabad with the following objectives : To find out the most suitable combination of fertilizers and manures for growth and yield in onion. To work out the economics of the various integrated nutrient management.

### MATERIALS AND METHODS

The details of the materials used and different methods adopted in the present investigation are presented in the following pages.

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## Experimental Site:

The experiment was conducted in the Horticulture Vegetable Research Farm, Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad (Uttar Pradesh) during 2013-2014. All the facilities necessary for cultivation, including labor were made available in the department. The details of the materials used and the methods adopted for this study are presented in this chapter.

## Climate of the region:

### Geographical Location of the Experimental Site

The experimental site is situated at a latitude of 20° and 15° North and longitude of 60° 03' East and at altitude of 78 meters above mean sea level (MSL).

### Climatic Condition of the Experimental Area.

The area of Allahabad district comes under sub-tropical belt in the South eastern Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46°- 48°C and seldom falls as low as 4°-5°C. The relative humidity ranged between 20 to 94 percent. The average rainfalls in this area are around 900 mm annually.

### Soil Characteristics of the experimental site

The experimental site was a fairly level land with sandy loam soil of uniform fertility status with low clay and high sand percentage. Soil sample were collected at random spots from depth of 0-30 cm and the soil was analyzed for pH, electrical conductivity (EC), organic carbon, available nitrogen, available phosphorus and available potassium at Indian Farmers and Fertilizers Co-operative Limited (IFFCO), Allahabad.

### Treatment combinations:

7 treatment combinations are mentioned as below;

#### Legend:

- RDF - Recommended dose of fertilizer.  
 FYM - Farm yard manure.  
 VC - Vermicompost.  
 T<sub>0</sub> - Control 100% RDF (100: 60:100 Kg NPK/ha).  
 T<sub>1</sub> - FYM (20t/ha) + 100% RDF  
 T<sub>2</sub> - FYM (20t/ha) + 75% RDF  
 T<sub>3</sub> - FYM (20t/ha) + 50% RDF  
 T<sub>4</sub> - VC (10t/ha) + 100% RDF  
 T<sub>5</sub> - VC (10t/ha) + 75 % RDF  
 T<sub>6</sub> - VC (10t/ha) + 50% RDF

## Application of Fertilizers:

A basal dose of FYM 20 tonnes per hectare, uniform to all treatment was applied at the time of preparatory tillage and that fertilizers were applied at the rate of 100 kg N, 60 kg, P<sub>2</sub>O<sub>5</sub> and 100 kg K<sub>2</sub>O per hectare. Half of the dose of nitrogen and total doses of phosphorus and potash were applied as basal dressing before transplanting and mixed with soil. The rest of the nitrogen was applied as top dressing at 40 DAT. The fertilizers were applied in the form of urea, SSP (single super phosphate) and murate of potash. The amount of fertilizers required for each plot was weighed separately and broadcasted after irrigation. The total amount of urea required was 260 kg and the total amount of SSP required was 500 kg and the amount of murate of potash required 133.4 kg applied in experimental plots.

## RESULTS AND DISCUSSION

The present study entitled "Effect of integrated nutrient management (FYM+VC+NPK) on growth and yield of onion (*Allium cepa* L.) cv. Nasik Red. Was carried out in the Vegetable Research Farm, Department of Horticulture, Sam Higginbottom Institute of Agriculture Technology & Sciences-Deemed to be University during December - April Rabi season of 2013 - 2014. The Experiment was laid out in a Randomized Block Design with 7 treatments and 3 replications. The findings are summarized as follows:

Maximum plant height (57.33cm) was observed in treatment T<sub>5</sub> (10t VC + 75% RDF) followed by T<sub>4</sub> (55.27cm) with (10t VC + 100% RDF). The maximum number of Leaf sheath/plant (10.00) were with T<sub>5</sub> (10t VC+75% RDF) followed by T<sub>4</sub> (8.80) with (10t VC+100% RDF). The maximum stem girth of plant (2.31 cm) was in T<sub>5</sub> (10t VC+75% RDF) followed by T<sub>4</sub> (2.23 cm) with (10t VC+100% RDF). The maximum fresh weight of Plant (137.70g) and the dry weight of Plant (14.37g) was in treatment T<sub>5</sub> (10t VC + 75% RDF) followed by T<sub>4</sub> (109.24) (15.77 g) in (10t VC+100% RDF dose). The maximum fresh weight of bulb (120.39g) and the dry weight of bulb (16.06 g) was in treatment T<sub>5</sub> (10t VC+75% RDF) followed by T<sub>4</sub> (109.24) (15.77 g) in (10t VC+100% RDF dose). The maximum average size of bulb (6.95 cm) was in treatment T<sub>5</sub> with (10t VC+75% RDF) followed by T<sub>4</sub> (6.88 cm) in (10t VC+100% RDF dose). The maximum average yield per plot (3.10 kg) was in treatment T<sub>5</sub> (10t VC+75% RDF). The maximum yield/ha (296.00t/ha) was recorded in T<sub>5</sub> (10t VC+75% RDF) followed by T<sub>4</sub> (29.2 t/ha) (10t VC+100% RDF dose). Maximum gross return (Rs 962000.00) net profit (Rs.888075.00) cost benefit ratio (1:10.3) were in the treatment combination T<sub>5</sub> (10t VC+75%RDF).

Treat-ments	Plant height (cm)	Length of leaf (cm)	No. of leaf/ plant	Stem girth of plant (cm)	Fresh weight of plant (g)	Dry weight of plant (g)	Fresh weight of bulb (g)	Dry weight of bulb (g)	Diameter of bulb (cm)	Bulb yield/plot (kg)	Bulb yield (tones/ha)	Cost Benefit ratio
T <sub>0</sub>	51.17	27.47	6.30	1.71	80.45	10.21	80.17	10.33	5.63	2.03	20.3	1:7.2
T <sub>1</sub>	54.85	30.62	8.67	2.01	119.17	13.51	102.42	13.21	6.71	2.74	27.4	1:9.2
T <sub>2</sub>	54.27	30.16	8.47	1.90	111.67	13.17	91.57	11.67	6.49	2.72	27.2	1:9.1
T <sub>3</sub>	52.17	28.47	7.90	1.81	89.27	11.69	85.74	11.02	5.90	2.65	26.6	1:7.1
T <sub>4</sub>	55.27	33.70	8.80	2.23	129.27	13.71	109.24	13.71	6.88	2.96	29.5	1:9.2
T <sub>5</sub>	57.33	35.23	10.00	2.31	137.37	14.37	120.39	14.82	6.95	3.10	29.6	1:10.2
T <sub>6</sub>	52.37	29.21	8.21	1.87	101.53	12.69	89.41	11.23	6.17	2.70	26.3	1:8.9

## CONCLUSION

Among the various levels of fertilizers and manures used in the experiment, treatment T<sub>5</sub> (10t VC+75% RDF) for plant height, number of sheath, sheath length, girth of plant and fresh and dry weight of plant, fresh and dry weight of bulb and yield. T<sub>5</sub> (10tan VC+100% RDF dose) gave the net return of Rs 888075 and cost benefit ratio (1:10.3) was the best for the maximum growth and yield of onion cv.Nasik Red, under Allahabad condition when compared with control and the other treatments.

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