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Effect of Integrated Nutrient Management on Growth, Yield and Quality of *Kharif* Onion under Terraced Condition of Nagaland

KENISETO CHUDA, S.P. KANAUJIA, V. B. SINGH AND A. K. SINGH[1]

Department of Horticulture,[1]Department of Soil Science & Agricultural Chemistry
School of Agricultural Sciences & Rural Development, Medziphema
Nagaland University, Nagaland 797106, India

Abstract

A field experiment was carried out in 2004 to study the effect of integrated nutrient management on growth, yield and quality of *kharif* onion under terraced condition of Nagaland. Eight treatments (control, FYM at 20 t/ha, pig manure at 10 t/ha, vermicompost at 5 t/ha, 100% NPK, 50% NPK + 50% FYM, 50% NPK + 50% pig manure, 50% NPK + 50% vermicompost) were included in the experiment. Results revealed that T_6 (50% NPK + 50% FYM) recorded significantly higher plant height (45.45 cm), number of leaves/plant (12.67), neck thickness (2.95 cm), bulb size (5.84 cm), doubling (1.78%), bulb yield (141.47 q/ha), dry matter (12.85%) and TSS (12.11 ^{0} Brix). However, effect of integrated nutrient management on days of maturity for marketing and bolting were found to be non-significant.
Key words : Onion, Integrated nutrient management, Growth, Yield, Quality.

Onion (*Allium cepa* L.) of the family Amaryllidaceae is commercially important bulb crop used by both vegetarians and non-vegetarians due to its nutritional and flavoring properties. Onion is stimulant, diuretic and having expectorant and antibacterial properties (Sharangi and Datta 2005). It is useful to cure bruises, boil and wounds. It also prevent heart disease by lowering blood cholesterol and lipid level (Dixit 1997). Entire requirement of North Eastern Region is being meet by procurement from out side the region and huge amount of money is being spent on onion procurement in the absence of onion production in this region. The agro-climatic condition of the North Eastern Region is not so conducive because of day length and moisture supply in winter season and heavy rainfall in summer season. In this region, it can be grown by planting onion sets during August—September which can be harvested for the market during the highest pricing period of onion from December—January. Onion responds well to added nutrients in the soil. But continuous use of chemical fertilizer adversely affects the micro-flora and soil health. Therefore integrated use of organic and inorganic sources of nutrient is promising in obtaining sustainable productivity by improving soil environment without causing detrimental effects on soil, besides meeting the nutrients turnover in soil plant systems. But no information is available on this aspect in Nagaland. Hence, the present investigation was undertaken to study the effect of integrated nutrient management on growth, yield and quality of *kharif* onion under the prevailing agro-climatic condition of Nagaland.

Methods

A field experiment was conducted at experimental farm of Horticulture, School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, Medziphema Campus, during August—December, 2004. It is situated at an altitude of 304.8 m above mean sea level, bearing sub-tropical climate. The soil of the experimental site was sandy loam, well drained with mean pH of 4.5, high in organic carbon (2.01%). Low in available N (217.20 kg/ha), low in available P_2O_5 (13.35 kg/ha) and medium in available K_2O (201.60 kg/ha). The experiment was conducted in randomized block design with three replications. Eight treatments (control, FYM at 20 t/ha, pig manure at 10 t/ha, vermicompost at 5 t/ha, 100% NPK (recommended does of NPK is 100 : 50 : 50 kg/ha), 50% NPK + 50% FYM, 50% NPK + 50% pig manure, 50% NPK +

Table 1. Effect of integrated nutrient management on growth, yield and quality of *kharif* onion.

Treatments	Plant height (cm)	Number of leaves/ plant	Days of maturity	Bolting (%)	Neck thickness (cm)	Bulb size (cm)	Doubling (%)	Yield (q/ha)	Dry matter (%)	TSS (^{0}Brix)
T_1 (Control)	29.67	8.93	125.33	0.27	1.89	2.87	0.94	62.05	8.56	8.31
T_2 (FYM 20 t/ha)	41.84	11.40	129.00	0.94	2.59	5.42	1.75	127.57	12.53	11.95
T_3 (Pig manure 10 t/ha)	34.18	9.73	127.00	0.45	2.08	3.72	1.54	87.18	11.70	11.19
T_4 (Vermicompost 5 t/ha)	32.06	9.67	126.67	0.42	2.02	3.15	1.21	77.22	9.68	11.02
T_5 100% NPK	35.97	10.73	127.67	0.57	2.20	4.86	1.18	105.58	11.27	11.22
T_6 (50 % NPK + 50% FYM)	45.45	12.67	128.00	1.05	2.95	5.84	1.78	141.47	12.85	12.11
T_7 (50% NPK + 50% pig manure)	38.79	11.00	128.00	0.68	2.35	5.08	1.67	112.27	12.46	11.75
T_8 (50% NPK + 50% Vermicompost)	35.6	10.47	126.67	0.53	2.25	4.23	1.27	97.45	10.68	10.22
CD (P=0.05)	4.18	1.60	NS	NS	0.80	0.47	0.27	9.16	1.71	0.69

50% vermicompost) were included in the experiment. NPK were applied through urea, single super phosphate and muriate of potash, respectively. Full dose of phosphorus, potassium and half dose of nitrogen were applied based on treatment 3 days before planting and remaining half dose of nitrogen was applied 30 days after planting. Whereas full dose of different manures were incorporated based on treatment 15 days before planting . The cultivar N-53 was used in the experiment. Onion bulblet were planted with spacing of 25× 10 cm in a plot measuring 2 m × 2 m. Observations were recorded on plant height, number of leaves/ plant, days of maturity, bolting, neck thickness, bulb size, doubling, bulb yield, dry matter and TSS.

Results and Discussion

Table 1 shows that different types of organic manures and inorganic fertilizer and their combination had significant effect in altering the growth, yield and quality attributes. The maximum plant height of 45.45 cm was recorded by T_6 (50% NPK + 50% FYM) followed by T_2 (FYM at 20 t /ha). The treatment T_6 (50% NPK + 50% FYM) proved to be significantly superior over all the treatments except T_2 (FYM 20 t/ ha) where it was found at par. The shortest plant height was found in the control (T_1). Similar trend was also noted in number of leaves/ plant. Similar results were reported by Dixit (1997). It might be due to improvement in physico-chemical properties of the soil, which enhanced nutrient supply to the plants. combined application of NPK and FYM also increased the growth of plant which might be due to increasing chlorophyll production and rate of photosynthesis. On the other hand, days of maturity for marketing and bolting were found to be non-significant. Treatment T_6 (50% NPK + 50% FYM) recorded significantly larger bulb size (5.84 cm) over other treatments except T_2 (FYM 20 t/ha) which was found to be statistically at par. Similar trend was noted in doubling per cent. Doubling percentage may be due to low rainfall during latter stage of its growth and suitable microclimatic factors. Maximum yield (141.47 q/ha) was recorded with treatment T_6 (50% NPK +50% FYM) followed by 127.57 q/ha in T_2 (FYM 20 t/ha). The treatment T_6 (50% NPK + 50% FYM) was superior over other treatment combinations. The increase in bulb yield might be due to favorable effect of organic manures in supplying essential nutrients in balanced ratio and improved the physio-chemical and biological properties of the soil which helps in better nutrient absorption by plant and resulting in higher yield. The results were also in conformity with the findings of Yadav and Yadav (2001).

Integrated nutrient management had significant effect on the dry matter and TSS contents . The highest dry matter content (12.85%) and TSS content (12.11 ^{0}Brix) were recorded in T_6 (50% NPK + 50% FYM) followed by T_2 (FYM 20 t/ha). Treatment difference between T_6 (50% NPK + 50% FYM) and T_2 (FYM 20 t/ha) was found to be statistically at par. The results were also in conformity with the findings of Singh et al. (1997) who observed better qualities like

dry matter and TSS by application of FYM combined with 100 : 25 : 25 kg NPK/ha. The increase in quality characters might be due to the chelating effect of organic matters resulted in enhanced nutrient supply, uptake and their accumulation in onion.

Based on these findings it is concluded that integration of organic and inorganic fertilizer is more effective in enhancing the yield and quality of onion compared to their sole application. The treatment 50% NPK + 50% FYM is considered as the best treatment in term of yield and quality of onion under foot hill condition of Nagaland.

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