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Response of Organic Manures with Macro and Micro Nutrients on Growth and Yield of Onion cv. N-53

RAJANEESH SINGH[1]*, NIKITA SINGH[1] AND BIJENDRA KUMAR SINGH[2]

ABSTRACT

An experiment was conducted to find out the combined effect of organic manures [farm yard manure (FYM), vermicompost, poultry manure and bone meal], macro nutrient (Sulphur) and micro nutrients (Boron and Zinc) on growth and yield of onion cv. N-53 in a Randomized Block Design with three replications. The results showed that maximum plant height (56.85 cm), maximum number of leaves (13.26), leaf length (50.45 cm), leaf width (1.51 cm), neck diameter (1.917), bulb length (7.06), bulb scale (8.300), bulb diameter before curing (6.167), bulb diameter after curing (5.263), bulb weight per plant (99.32 gm), bulb yield per plot (2.979 kg) and bulb yield per ha. (297.93 q) was recorded under the T_{10} [FYM + Vermicompost + Poultry manure + Bone meal + Sulphur + Boron + Zinc]. While minimum plant height (44.13 cm), number of leaves (9.36), leaf length (39.39 cm), leaf width (1.31 cm), neck diameter (1.103), bulb length (4.18 cm), bulb scale (5.287), bulb diameter before curing (3.637), bulb diameter after curing (3.080), bulb weight per plant (45.470 gm), bulb yield per plot (1.364 kg) and bulb yield per ha. (136.36 q) was recorded in treatment T_1 (Control).

KEYWORDS

Organic manures, Vermicompost, Micronutrients, Poultry manure, Bone meal

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INTRODUCTION

Onion (*Allium cepa* L.) is a bulbous biennial herb of Amaryllidaceae family that has great economic importance and the second most important vegetable crop in the world. In India onion is grown in 1.22 million ha area with annual production is 20.39 million tones and productivity 21.20 tons per ha (Anonymous, 2017). It is a short duration and quick growing crop having various uses such as vegetables, spices and medicinal. Onion is liked for its flavour and pungency which is due to the presence of a volatile oil 'allyl propyl disulphide' organic compound that rich in sulphur. Onion bulb is a rich source of carbohydrate, protein, vitamin C and minerals like phosphorus, calcium and sulphur. The main edible portion of onion is the bulb, which is a modified organ consisting of thickened fleshy scale leaves and stem. It contains anti-inflammatory, anti-cholesterol, anti-cancer and anti-oxidant components, such as quercetin.

This crop can be grown in wide range of Agro-climate condition. Irrespective of prices, the demand remain almost constant in the market as it is primarily, used as seasoning for a wide variety of dishes in almost every home, widely consumed as salad as culinary purpose for flavouring as spice in pickles and sauce. The green leaves, immature and mature bulbs are eaten raw or used in vegetable preparations.

Organic manure improves soil physical chemical properties that are important for plant growth (Snyman *et al*, 1998) . Organic fertilizers has positive effect on root growth by improving the root rizosphere conditions (structure, humidity, etc) and also plant growth is encouraged by increasing the population of microorganisms. Organic acids which occur in decomposition of organic matters increase the benefits of nutrients.

Through many experiments conducted on onion, it has been realized that the better growth and quality and higher yield of onion can be obtained with the adequate and balanced application of both macronutrients and micronutrients under suitable agro climatic condition. Micronutrients play an active role in the plant metabolic process from cell wall development to respiration, photosynthesis, chlorophyll formation, enzymes activity, nitrogen fixation etc. Micronutrients work as a co- enzyme for a large number of enzymes. It also plays an essential role in improving yield and quality and highly required for better plant growth and yield of many crops (Alam *et al*, 2010).

Combined use of organic manures, macro-nutrients and micro-nutrients provides excellent opportunities to overcome all the imbalances, besides improve the soil health and enhancing crop production. This optimizes the benefit from all possible sources of plant nutrients in an integrated manner. Hence, this investigation was planned to identify the best combination for soil health and onion production.

MATERIALS AND METHODS

The present investigation was carried out at the Experimental Unit of the Department of Horticulture, Tilak Dhari Post

[1] Department of Horticulture, Tilak Dhari Post Graduate College, Jaunpur – 222002, Uttar Pradesh, India, 210 001
[2] Department of Fruit Science, College of Horticulture, BUA&T, Banda- 210 001, Uttar Pradesh, India
*Corresponding author email: rajaneeshhort@gmail.com

Graduate College, Jaunpur, Uttar Pradesh, India during year 2018-19. The climatic condition of Jaunpur is subtropical with three distinct seasons i.e., winter, summer and rainy. During the winter season (December-January) temperature fall, 5°C or even low, while in summer season (May-June) it reaches as high as 45^0C. Occasional spell of frost and precipitation may occur during winter. The mean temperature is minimum 15-20 ^{0}C and maximum 18-32 ^{0}C, maximum relative humidity 95% and minimum 55% with annual rainfall of 850-1100 mm. The experiment consist of four organic manures viz., farm yard manure (FYM), vermicompost, poultry manure and bone meal, one macro nutrients, viz., Sulphur and two micro nutrients viz., Boron and Zinc and their combinations viz., FYM + Sulphur + Boron, Vermicompost + Sulphur + Boron, Poultry manure + Sulphur + Boron, Bone meal + Sulphur + Boron, FYM + Sulphur + Zinc, Vermicompost + Sulphur + Zinc, Poultry manure + Sulphur + Zinc, Bone meal + Sulphur + Zinc, FYM + Vermicompost + Poultry Manure + Bone meal + Sulphur + Boron + Zinc and Control. The experiment was laid out in Randomized Block Design with three replications. The entire experimental field was divided into three blocks of equal size and each block possessed 10 plots. The seed of onion cv. N-53 was raised on flat beds. The eight week old seedling of onion cv. N-53 was transplanted.

All the intercultural operations and plant protection measures recommended for the successful crop growth were followed and weekly irrigation was given to maintain the proper moisture in the field for better growth and development of the plants. Randomly five plants from each plot were selected to record the data on the following observations viz., plant height (cm), number of leaves/ plant, leaf width (cm), leaf length (cm), bulb neck diameter (cm), fresh weight of bulb (g), bulb length (cm), bulb diameter before curing (cm), bulb diameter after curing (cm), number of bulb scale, Fresh weight of bulb (g), bulb yield per plot (kg) and bulb yield per ha (q). The obtained data were analyzed using analysis of variance (ANOVA) under RBD following the procedure as stated by Panse and Sukhatme, 1967.

RESULTS AND DISCUSSION

The data presented in Tables 1 and 2 showed the maximum plant height (56.85 cm) was observed in T_{10} [FYM + Vermicompost + Poultry Manure + Bone meal + Sulphur + Boron + Zinc] and minimum (44.13 cm) in T_1 (control). The data showed that the maximum number of leaves (13.26) were recorded in T_{10} [FYM + Vermicompost + Poultry Manure + Bone meal + Sulphur + Boron + Zinc] followed by T_7 [Vermicompost + Sulphur + Zinc] (12.74) and minimum (09.36) under T_1 (control).

Table 1: Response of Organic Manures with Macro and Micro Nutrients on Plant height, Number of leaves/plant, Leaf length, Leaf width, Bulb neck diameter, Bulb length in Onion.

Treatments	Plant height (cm)	Number of leaves/plant	Leaf length (cm)	Leaf width (cm)	Bulb neck diameter (cm)	Bulb length (cm)
T1- Control	44.13	09.36	39.39	1.31	1.103	4.18
T2- FYM + Sulphur + Boron	48.73	10.73	43.46	1.38	1.320	5.87
T3-Vermicompost + Sulphur + Boron	52.52	12.43	46.50	1.46	1.507	6.54
T4-Poultry manure + Sulphur + Boron	50.57	11.13	44.68	1.42	1.493	6.48
T5-Bone meal + Sulphur + Boron	46.55	09.67	41.84	1.35	1.230	5.67
T6-FYM + Sulphur + Zinc	49.61	11.14	44.06	1.40	1.363	5.81
T7- Vermicompost + Sulphur + Zinc	53.70	12.74	47.52	1.47	1.600	6.52
T8-Poultry manure + Sulphur + Zinc	51.86	11.40	45.33	1.43	1.550	6.02
T9-Bone meal + Sulphur + Zinc	48.21	10.17	42.95	1.36	1.267	5.58
T10-FYM + VC + PM + BM + S + B + Zn	56.85	13.26	50.45	1.51	1.917	7.06
CD at 5%	**01.71**	**0.16**	**1.370**	**0.02**	**0.033**	**0.46**
SEm ±	**0.571**	**0.05**	**0.458**	**0.00**	**0.011**	**0.15**

Table 2: Response of Organic Manures with Macro and Micro Nutrients on Number of bulb scale, Bulb diameter before curing, Bulb diameter after curing, Bulb weight/plant, Bulb yield/plot, Bulb yield/ha in Onion.

Treatments	Number of bulb scale	Bulb diameter before curing (cm)	Bulb diameter after curing (cm)	Bulb weight/plant (gm)	Bulb yield/plot (kg)	Bulb yield/ha (q)
T1- Control	5.287	3.637	3.080	45.470	1.364	136.36
T2- FYM + Sulphur + Boron	7.667	5.197	4.420	87.267	2.618	261.76
T3-Vermicompost + Sulphur + Boron	7.880	5.893	4.693	95.833	2.875	287.46
T4-Poultry manure + Sulphur + Boron	7.800	5.467	4.530	91.487	2.744	274.30
T5-Bone meal + Sulphur + Boron	6.977	4.767	4.080	85.573	2.567	256.66
T6-FYM + Sulphur + Zinc	7.660	4.937	4.163	85.757	2.572	255.23
T7- Vermicompost + Sulphur + Zinc	7.850	5.647	4.543	93.943	2.814	281.43
T8-Poultry manure + Sulphur + Zinc	7.740	5.120	4.277	90.607	2.718	278.76
T9-Bone meal + Sulphur + Zinc	6.723	4.343	3.687	83.763	2.513	251.26
T10-FYM + VC + PM + BM + S + B + Zn	8.300	6.167	5.263	99.320	2.979	297.93
CD at 5%	**0.366**	**0.041**	**0.084**	**1.722**	**0.053**	**4.948**
SEm ±	**0.122**	**0.014**	**0.014**	**0.575**	**0.018**	**1.653**

Maximum leaf length (50.45 cm) and leaf width (1.51 cm) was also recorded in T_{10} [FYM + Vermicompost + Poultry Manure + Bone meal + Sulphur + Boron + Zinc] followed by T_7 [Vermicompost + Sulphur + Zinc] (47.52 cm) and (1.47 cm) respectively and T_3 [Vermicompost + Sulphur + Boron] (46.50 cm) and (1.46 cm) respectively. Whereas, minimum leaf length (39.39 cm) and leaf width (1.31 cm) was observed under T_1 (control).

It was found that combination of Organic manures and micro nutrients (Sulphur, zinc and boron) plays an active role in vegetative growth of onion plant. These results are in accordance with the investigation of Alam *et al* (2010), Adeyeye *et al* (2017), Ballabh *et al* (2013), Chavan *et al* (2016)

The favourable effect of micronutrients on plant growth might be due to its role in many physiological processes and cellular functions within the plants. In addition, they play an essential role in improving plant growth, through biosynthesis of endogenous hormones which is responsible for promoting of plant growth (Hansch and Mendel, 2009). These results were also reported by Ballabh *et al* (2013).

The maximum bulb neck diameter (1.917 cm) was recorded in T_{10} [FYM + Vermicompost + Poultry Manure + Bone meal + Sulphur + Boron + Zinc] followed by T_7 [Vermicompost + Sulphur + Zinc] (1.600 cm). Whereas, minimum (1.103 cm) in T_1 (control). The maximum bulb length (7.06 cm), Number of bulb scale (8.300), bulb diameter before curing (6.167 cm), bulb diameter after curing (5.263), bulb weight per plant (99.320 gm), bulb yield per plot (2.979 kg) and bulb yield per ha. (297.93 q) were recorded in T_{10} [FYM + Vermicompost + Poultry Manure + Bone meal + Sulphur + Boron + Zinc] followed by T_3 [Vermicompost + Sulphur + Boron] (6.54 cm), (7.880), (5.893 cm), (4.693 cm), (95.833gm), (2.875 kg) and (287.46 q) respectively. Whereas, minimum (4.18 cm), (5.287), (3.637 cm), (3.080 cm), (45.470 gm), (1.364 kg) and (136.36 q) respectively in T_1 (control).

A significant variation was found in respect of yield and yield attributing characters due to the effect of different treatments combination of organic manures and micronutrients. The yield advantages of different treatment combinations were due to better growth and development. Thus higher photosynthetic accumulation in the bulbs for higher leaves per plant would ensure higher individual bulb weight, and large bulb diameter. This might be due to the main function of micronutrients in plant as a metal activator of several enzymes like dehydrogenase, proteinase and peptidases (Prasad and Kumar, 2010). The beneficial effect of

micronutrients on the yield parameters may be attributed due to the fact that soil application of micronutrients resulted in increased supply of the available micronutrients to the plants which led to proper growth and development because essential role of micronutrients has been established as a component of several enzymes which are concerned with carbohydrate and nitrogen metabolism, in addition to its involvement directly or indirectly in regulating the various physiological processes of plants (Marschner, 1995). The findings were in conformity with the findings of Acharya *et al* (2015), Khan *et al* (2007), Thakare *et al* (2007) and Ballabh *et al* (2013), Chavan *et al* (2016), Adeyeye *et al* (2017).

CONCLUSION

The literature available reveals that application of organic manures, macro and micro nutrients help in better vegetative growth, seedling stands, improved yield and quality of onion. Thus, it can be concluded that organic manures and micronutrient can be effectively used for improving growth, yield, and quality of onion if applied at proper time and manner in suitable doses or concentrations.

REFERENCES

Acharya U, Venkatesan K, Saraswathi T and Subramanian KS. 2015. Effect of zinc and boron application on growth and yield parameters of multiplier onion (Allium cepaL. var. aggregatum Don.). *International J. Res* **2**(1):757-765.

Adeyeye AS, Ishaku MA, Gadu HO, Olalekan KK and Lamid WA. 2017. Comparative Effect of organic and inorganic fertilizer treatments on the growth and yield of onion (Allium cepa L). *Journal of Botanical Sciences* **6**(2):8-11.

Alam MN, Abedin MJ and Azad MAK. 2010. Effect of micronutrients on growth and yield of onion under calcareous soil environment. *International Research Journal of Plant Science* **1**:56-61.

Anonymous 2017. Horticultural statistics at a glance in India. National horticulture board 3rd advanced estimate.

Ballabh K, Rana DK and Rawat SS. 2013. Effects of foliar application of micronutrients on growth, yield and quality of onion. *Indian Journal of Horticulture* **70**(2):260-265.

Chavan DL, Chavan NH and Choudhary SM. 2016. Effect of different organic manures on growth and yield of onion (Allium cepa L.). *The Bioscan* **11**(4):2529-2532.

Hansch R and Mendel RR. 2009. Physiological functions of mineral micronutrients. *Current Opinion on Plant Biology* **12**:259-66.

Khan AA, Zubair M, Bari A and Maula F. 2007. Response of onion (Allium cepa L.) growth and yield to different levels of nitrogen and zinc in swat valley. *Sarhad Journal of Agriculture* **23**:933-969.

Marschner H 1995. Mineral Nutrition of Higher Plants (New York: Academic Press), 347-364.

Prasad S and Kumar U 2010. Principles of Horticulture. Agrobios Publication, 1-211.

Snyman HG, Jong DE and Aveling TAS. 1998. The stabilization of sewage sludge applied to agricultural land and the effects on maize seedlings. *Water Sci Tech* **38**(2):87-95.

Thakare RG, Jadhao BJ, Nandre DR, Ghawade SM and Khewale P. 2007. Effect of zinc and iron levels on growth and yield of potato. *Indian Journal of Plant Archives* **7**(1):275-276.

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