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Studies in Growth and development of Onion crop (*Allium cepa* L.) cv. N-53 as influenced by integrated nutrient management

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Abstract

A field experiment was carried out during the rabi season of 2018-19 at experimental farm Department of Horticulture College of Agriculture Parbhani (Maharashtra). Eleven treatments were applied with three replications and laid out under randomized block design (RBD). The result revealed that the application of 50 N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients was recorded as best treatment for majority of characters. Therefore basis of present study it is concluded that application of Biofertilizers *Azospirillum* and *PSB* in combination with 50% compost, 50% N through chemical fertilizer, sulphur and micronutrient can be suggested cost effective combination for enhanced growth of onion production.

Keywords: nutrient management on growth of onion

Introduction

Most of the Indian population is vegetarian and vegetable plays vital role in Indian diet. India is the second largest producer of vegetables in the world next to china. Vegetables are vital sources of proteins, vitamins, phosphorus, calcium, minerals, dietary fibers, micronutrients, antioxidants and phyto-chemicals in our daily diet. Onion (*Allium cepa* L.) is one of the most important vegetable crop grown in India having both the food and medicinal values. Onion is member of *Amryllidaceae* family. It contain 2n=16 chromosome. Onion is "Queen of the kitchen" is one of the most important and commercially valuable vegetable as well as spice crop grown in India. Onion is known to check the deposition of cholesterol in blood vessels, thus protect against cure heart diseases resulting from blockage of arteries. Apart from nutrition, they also contain a wide array of potential phyto-chemicals like anti-carcinogenic principles and anti-oxidants. Onion has its own distain the world, area under onion is 4.30 million hectare with 74.26 million metric tons production in respect to 19.4 MT/ha productivity. In India, onion is grown on 1270 million hectare accounting for 21564 million tons of bulb production with 19.10 MT/ha productivity. Contribution of India in onion production in the world is around 20.2 per cent and Maharashtra is leading state in onion production in India, accounting 1064 hectare area and 218 lakh tonnes tons of total onion production and productivity of 17.9 MT/ha. (Anonymous, 2017). The Maharashtra state has exported 13, 09,863.26 thousand Tonnes of fresh onion for the worth of Rs. 1,722.85 crores during year 2017 (Anonymous, APEDA Report, 2017). Therefore to increase export it is necessary to increase the productivity and quality standards of onion. The contribution of Maharashtra in onion production in India is 30.48 per cent, and specific pocket area of onion production are Nasik (Lasalgaon), Nagar (Karjat), Pune, Solapur, Satara, Dhule and Jalgaon districts on commercial scale. Nasik is the leading district for production of onion in the country.

The concept of sustainable agriculture envisages primary emphasis on manipulation and management of biological systems not only to maximize yield but also to stabilize the agro-systems and to minimize industrial input demands which may endure the adverse effect of climate change. Therefore, the experiment was conducted for sustainable production of onion with combine use of biofertilizers and chemical fertilizers. (Singh *et al.* 2017) ^[9].

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Therefore, considering the need of time and as onion is the most important vegetable of our daily diet, it is highly essential to generate the information about the effect of different organic inorganic and biofertilizers on growth, yield and quality of onion. However, such type of work is scanty in onion on grown under Marathwada conditions. Hence, by keeping these points in view, the systematic investigation has been planned to evaluate the integrated nutrient management in onion. (*Allium cepa* L.)

Material and methods

The field experiment entitled “Integrated nutrient management in Onion (*Allium cepa* L)” was carried out at Instructional-cum-Research farm of Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra during Rabi-2018-19. The experiment consisted of eleven treatment which were laid out in randomized block design with three replication. The nursery Raised beds were prepared having size 3 x 1 x 0.15 m and upper layer of each raised bed was mixed with a mixture of well rotten and sieved FYM and sand. Raised beds were drenched with copper oxychloride. Then fungicide treated onion seeds of variety N-53 were sown on raised beds in rows at row spacing of 10 cm by mixing with fine sand. The raised beds were maintained systematically till the seedlings were ready for transplanting. Healthy, uniform 50 days old onion

seedlings were transplanted at a spacing of 15 cm x 10 cm. Light irrigation was given immediately after transplanting. Compost 5 t/ha was applied before transplanting of crop to plots of all treatments. NPK were applied through urea, single super phosphate and muriate of potash by calculating as per plot size respectively. The biofertilizer were applied to onion seedlings by preparing slurry of soil with an addition of 500g of *Azospirillum* and phosphate solubilizing bacteria of each. The root of clipped onion seedling were dipped in bioinoculant for 10 minutes and then immediately transplanted in experimental field. After sulphur and boron applied foliar spraying. Matured crop was harvested. Five plants were selected randomly from each replication to record the observations on growth and yield attributes.

The growth parameters was measured at interval starting from 30, 60, 90 days after transplanting. Diameter of the onion bulb is the maximum distance between the opposite side of right angles to the polar diameter. It was measured by Vernier calliper in centimeter. The average length of bulb was calculated from randomly selected five fruit of each treatment with vernier calliper and value were recorded in centimetre. The polar diameter was measured from the junction of root plate to the top of the bulb from the same, which was used for recording neck thickness and mean polar diameter was worked out with the help of vernier caliper.

The treatment details

No. of Treatment	Treatments combination
T ₁	RDF (100:50:50 kg ⁻¹) (control)
T ₂	RDF + Biofertilizers (<i>Azospirillum</i> + <i>PSB</i> @ 500 g ha ⁻¹)
T ₃	RDF + Sulphur (25 kg ha ⁻¹)
T ₄	RDF + Micronutrients (Zinc 20 kg and Boron 5 kg ha ⁻¹)
T ₅	RDF + Biofertilizer + Sulphur
T ₆	RDF + Sulphur + Micronutrients (Zinc & Boron)
T ₇	RDF + Biofertilizers + Sulphur + Micronutrients
T ₈	Organic(100 % N- Enriched through compost 5 t ha ⁻¹ + Biofertilizers)
T ₉	50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers
T ₁₀	50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur
T ₁₁	50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients

Result and discussion

1. Growth parameter

1.1 Plant height

The data regarding plant height are presented in Table 1 indicated that maximum plant height (65.20 cm) were recorded with the treatment T₁₁ i.e. 50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients, which were statistically at par with the treatment T₁₀ (59.88 cm). It was statistically followed by the treatments T₉ (59.40 cm), T₇ (58.60 cm), T₈ (58.06 cm), T₄ (57.13 cm), T₂ (56.46 cm), T₃ (55.83 cm), T₃ (55.86 cm), T₆ (53.40 cm) and T₅ (53.33 cm), which were statistically at par with each other. The minimum plant height (45.60 cm) was found in the treatment T₁ (RDF 100:50:50) control. The results were also in conformity with the findings of V.K. Singh *et al.* (2017) ^[9] in onion and D.N.

Damse (2014) ^[2] in garlic.

1.2 Number of leaves

The data regarding number of leaves are presented in Table 1 indicated that maximum number of leaves (18.8) respectively was recorded in the treatment of T₁₁ i.e. 50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients, and it was statistically superior over rest of the treatments. Which was followed by the treatment T₁₀ (16.66), T₉ (14.00), T₈ (13.20), T₃ (13.00), T₇ (12.86), T₅ (12.66), and T₄ (12.46), were, the minimum number of leaves (10.8) was found in the treatment T₁ (RDF 100:50:50 kg ha⁻¹) control treatment, which were statistically at par with treatments T₂ (12.33), and T₆ (12.00). The results were also in conformity with the findings of V.K. Singh *et al.* (2017) ^[9] in onion and D.N. Damse (2014) ^[2] in garlic.

Table 1: Growth parameters as influenced by integrated nutrient management in onion crop

Tr. No	Treatments details	Plant height (cm)	No of leaves	Neck Thickness (cm)	Bulb diameter (cm)	Leaf length (cm)
T ₁	RDF(100:50:50 kg ha ⁻¹) (control)	45.60	10.80	1.20	3.33	48.30
T ₂	RDF + Biofertilizers (<i>Azospirillum</i> + <i>PSB</i> @ 500 g ha ⁻¹)	56.46	12.33	1.28	3.86	49.00
T ₃	RDF + Sulphur (25 kg ha ⁻¹)	55.86	13.20	1.32	3.50	51.70

T ₄	RDF + Micronutrients (Zinc 20 kg and Boron 5 kg ha ⁻¹)	57.13	12.46	1.36	3.63	51.40
T ₅	RDF + Biofertilizer + Sulphur	53.33	12.66	1.43	3.80	51.00
T ₆	RDF + Sulphur + Micronutrients (Zinc & Boron)	53.40	12.20	1.55	4.30	48.50
T ₇	RDF + Biofertilizers + Sulphur + Micronutrients	58.60	12.86	1.67	4.90	53.10
T ₈	Organic (100 % N- Enriched through compost 5 t ha ⁻¹ + Biofertilizers)	58.06	13.20	1.39	4.40	52.50
T ₉	50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers	59.40	14.00	1.70	5.20	53.40
T ₁₀	50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur	59.86	16.66	1.75	5.53	55.00
T ₁₁	50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients	65.20	18.80	1.80	5.90	58.10
	SE _±	1.83	0.55	0.04	0.29	1.54
	CD at 5%	5.42	1.63	0.12	0.87	4.57

1.3 Neck thickness (cm)

The data regarding neck thickness are presented in Table 1 indicated that, maximum neck thickness (1.80 cm) respectively were recorded in the treatment T₁₁ i.e. 50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients, which were statistically at par with the treatments T₁₀ (1.75cm) and T₉ (1.70cm). It was followed by the treatments T₇ (1.67cm), T₆ (1.55cm), T₅ (1.43cm), T₈ (1.39cm) and T₄ (1.36cm). The minimum neck thickness (1.20 cm) was found in soil application of T₁ (RDF 100:50:50 kg ha⁻¹) control. Which was statistically T₂ (1.28 cm) and T₃ (1.32 cm) the results were also in conformity with the findings Umesh Acharya *et al.* (2015)^[8] in onion and D.N. Damse (2014)^[2] in garlic.

1.4 Bulb diameter (cm)

The data regarding bulb diameter are presented in Table 1, indicated that, maximum bulb diameter (5.9 cm) was recorded with the treatment T₁₁ i.e. 50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients, which were statistically at par with the treatments T₁₀ (5.53cm) and T₉ (5.20cm). It was statistically followed by the treatments T₇ (4.90cm), T₈ (4.40cm), T₆ (4.30cm), T₂ (3.86cm), T₅ (3.80cm), T₄ (3.63cm) T₃ (3.50cm). The minimum bulb diameter (3.33cm) was found in the treatment of T₁ (RDF 100:50:50 kg ha⁻¹) control. Similar results were reported by Umesh acharya *et al.* (2015)^[8] and Ram Vachan *et al.* (2018) in onion and D.N. Damse (2014)^[2] in garlic.

1.5 Leaf length (cm)

The data regarding leaf length are presented in Table 1, indicated that, maximum leaf length (58.10 cm) respectively were recorded with the treatment of T₁₁ i.e. 50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrient and which were statistically at par within the treatment T₁₀ (55.00cm). Which was statistically followed by with treatments T₉ (53.40cm), T₇ (53.10cm), T₈ (52.50cm), T₃ (51.70cm), T₄ (51.40cm), T₅ (51.00cm), T₂ (49.00cm) While, the minimum leaf length of bulb (48.30cm) was found in the treatment T₁ (RDF100:50:50 kg ha⁻¹) control. The results were also in conformity with the findings Ram Vachan *et al.* (2018) in onion.

Conclusion

The overall assessment of the results of present investigation entitled “Integrated nutrient management in onion (*Allium cepa* L.) Cv. N-53” concluded that the treatment T₁₁ (50 % N Enriched through compost + Biofertilizers + 50 % N through chemical fertilizers + Sulphur + Micronutrients) significantly influenced the growth attributes of onion. The growth parameter *viz.* plant height, number of leaves, neck thickness, bulb diameter, leaf length.

References

1. Anil Kumar, Ram RB, Sutanumazi. Effect of organic manures, biofertilizers and micronutrients on growth, yield and quality of onion (*Allium cepa* L.) International Journal of Agricultural Sciences. 2017; 13(2):236-241.
2. Damse DN, Bhalekar MN, Pawar PK. Effect of integrated nutrient management on growth and yield of garlic. The bioscan. 2014; 9(4):1557-1560.
3. Heerendra Prasad, Paramjeet Sajwan, Meena Kumari, SPS Solanki. Effect of Organic Manures and Biofertilizer on Plant Growth, Yield and Quality of Horticultural Crop: A Review- International Journal of Chemical Studies. 2017; 5(1):217-221.
4. Prusty M, Mishra N, Kar DS, Pal S. Effect of integrated nutrient management on growth and yield of onion (*Allium cepa* L.) cv Bhima super International Journal of Agriculture Sciences. 2019; 11(4):7910-7912.
5. Ram Vachan, Tripathi SM. Study on the effect of bio-fertilizer with chemical fertilizer on plant growth, Yield and economics of Rabi season onion (*Allium cepa* L.) cv. NHRDF Red 2. Journal of Pharmacognosy and Phytochemistry.2017; 6(5):1496-1499.
6. Ghanti S, Sharangi AB. Effect of bio-fertilizers on growth, yield and quality of onion cv. Sukhsagar Journal of Crop and Weed. 2009; 5(1):120-123.
7. Swati Brinjh, Sanjay Kumar, Devendra Kumar, Manoj Kuamar. Effect of integrated nutrient management on growth yield and quality in onion cv. Pusa madhavi Plant Archives. 2014; 14(1):557-559.
8. Umesh Acharya, Narayan Sharma Rimal, Venkatesan K, Saraswathi T, Subramanian KS. Response on growth, yield and quality parameters of Multiplier Onion (*Allium cepa* L. varaggregatum Don.) var. CO (On) 5 with different doses and method of Zinc and Boron application. International Journal of Agronomy and Agricultural Research.2015; 6(4):59-67.
9. Singh VK, Amrita Kumari, Chaudhary VK, Shree S. Role of Biofertilizer and Chemical Fertilizer for Sustainable Onion (*Allium cepa* L.) Production. International Journal of Current Microbiology and Applied Sciences. 2017; 6:2034-2040.