Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(1): 1918-1920
Received: 21-11-2018
Accepted: 25-12-2018

Wankhade SD
Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Kale VS
Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Correspondence
Wankhade SD
Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Effect of organic nutrient management on growth and yield of onion (*Allium cepa* L.) cv. Akola Safed

Wankhade SD and Kale VS

Abstract
A field experiment was carried out to assess the effect of organic nutrient management on growth and yield of onion cv. Akola Safed at Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.H. India during the year 2015-16 and 2016-2017. Results revealed that significantly maximum Plant Height, leaf length and number of leaves at 30,60 and 90 days after transplanting was recorded under the treatment with application of 50% RDN through FYM (qha^{-1}) + 50% RDN through Vermicompost (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1}) in both the seasons under investigation. The results also indicated that the same treatments recorded the highest bulb diameter, neck thickness, average bulb weight, bulb yield per plot and yield per ha. in both years as compared to other treatments.

Keywords: Biofertilizers, growth, onion, organic manures, growth and yield

Introduction
Onion is one of the most important profitable vegetable crops grown in India and being exported to other countries. However, the productivity of onion in India is quite low as compared to world's productivity. Nutrient management practices play an important role for good crop of onion like other crops. Fertilizer is one of the most important inputs for increasing onion production. But the continuous and liberal use of inorganic fertilizer alone affects soil health and thus resulting in lower yield with poor quality produce (Mamatha, 2006) [5] consequently it is felt necessary to advocate the use of the organic sources of nutrients for sustainable production. Recently organic nutrient management has got rapid momentum due to consciousness of health hazard and environmental safety also the increasing cost of chemical fertilizers and their harmful effects on the soil health is an important consideration for the use of organic nutrients (Patel *et al.*, 2005) [3] with this objective in mind, the experiment was conducted to study the effect of organic, inorganic nutrient sources, bio-fertilizers and their combinations on growth and yield of onion**.**

Material and methods
A field experiment was carried out at Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, M.H. India during the year 2015-16 and 2016-2017 to study the influence of different sources of nutrients on growth and yield of onion. The experiment comprised of thirteen treatments. The treatments were replicated thrice in Randomized Block Design. Raised nursery beds of 4.0 m x 1.5 m were prepared thoroughly and were maintained systematically till the seedlings were ready for transplanting. Healthy and uniform seedlings were transplanted on cool period of the day at a spacing of 15 cm x 10 cm. The treatments were consisting of different combination of organic manures, biodynamic manure, biofertilizer and biodynamic solution. Soil application of NPK was done in the form of farm yard manure, neem cake, vermicompost, poultry manure and biodynamic manure at 100% recommended dose of fertilizer and all treatment were applied 1 month before transplanting biofertilizers were applied @ 10 kg ha^{-1} (5 kg each Azatobactor and PSB). Observations like plant height, leaf length, number of leaves, neck thickness, splitting(%) bulb diameter, weight and yield per plot and yield per ha were recorded was worked out from each plot. The data were analyzed statistically and result was interpreted by using methods suggested by Panse and Sukhatme (1967) [4].

Treatment details

T_1	50% RDN through FYM (q ha^{-1}) + 50% RDN through Neem cake (q ha^{-1})
T_2	50% RDN through FYM (q ha^{-1}) + 50% RDN through Poultry manure (q ha^{-1})
T_3	50% RDN through FYM (q ha^{-1})+ 50% RDN through Vermicompost (q ha^{-1})
T_4	50% RDN through FYM (q ha^{-1})+ Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1})
T_5	50% RDN through Neem cake (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1})
T_6	50% RDN through Poultry manure (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1}
T_7	50% RDN through FYM (q ha^{-1}) + 50% RDN through Neem cake (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1})
T_8	50% RDN through FYM (q ha^{-1}) + 50% RDN through Poultry manure (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1})
T_9	50% RDN through FYM (q ha^{-1}) + 50% RDN through Vermicompost (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1})
T_{10}	Biodynamic 501& 500 + solution (S9) + Biodynamic manure (q ha^{-1})
T_{11}	Biodynamic 501& 500 + solution (S9)
T_{12}	Recommended dose of fertilizer (100:50:50 kg ha^{-1})
T_{13}	Control

Result and Discussion

Perusal of the data clearly indicated that application of organic manures and biofertilizers alone or in combination were found to have significant positive effect on growth characters as compared to control (Table-1). Application of 50% RDN through FYM (q ha^{-1}) + 50% RDN through Vermicompost (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1}) (T_9) recorded maximum plant height (30.23, 58.85 and 76.44 cm at 30, 60, 90 DAT respectively), number of leaves $plant^{-1}$(5.55, 7.04 and 8.08 at 30, 60 and 90 DAT respectively) and leaf length of plant (26.32, 51.94 and 71.56 cm at 30, 60, 90 DAT respectively). The lowest values of growth characters were recorded in control.

All these vegetative characters are primary characters which decide the vigor of the crop and influence the yield through enhanced dry matter production. The enhanced plant growth characters might be due to higher nutrient availability as well as better nutrient uptake by the crops (Pitchai *et al*., 2001) [8]. Increased number of leaves per plant may be due to the improvement in growth related attributes because of certain growth promoting substances secreted by biofertilizerss, better uptake of water, nutrients and their transportation. Similar studies were also conducted by Yogita *et al*. (2012) [13] and Kumar *et al*. (2010) [2]. Varu *et al*. (1997) [11] recorded higher number of leaves per plant with the application of Azotobactor, PSB. Similar results were also obtained by Sankar, *et al*. (2005) [1] in onion crop. The higher availability of nutrients and uptake by the crop would have improved the cell elongation and cell differentiation which could have increased the growth of the crop as indicated in tomato (Poopathi, 1994) [9].

Table 1: Effect of organic nutrient management on growth parameters of onion (Pooled data over 2 years)

Treatment	Plant Height			Number of leaves			Leaf length of plant		
	30	60	90	30	60	90	30	60	90
T_1	27.01	40.78	68.17	4.62	5.66	7.09	22.93	36.56	63.61
T_2	28.09	42.81	70.43	4.79	6.37	7.34	23.67	38.63	66.35
T_3	25.58	39.19	63.92	4.21	5.04	6.9	22.61	36.11	61.87
T_4	22.92	36.67	58.30	3.91	4.71	6.07	19.22	34.36	53.03
T_5	24.18	37.2	61.03	3.95	4.83	6.45	20.5	37.23	56.45
T_6	26.46	40.07	66.76	4.48	5.78	6.99	21.69	37.14	60.13
T_7	28.56	46.88	71.73	4.47	6.31	7.66	24.23	41.31	66.69
T_8	29.1	51.69	72.35	5.1	6.76	7.75	24.91	45.96	67.91
T_9	30.23	58.85	76.44	5.55	7.04	8.08	26.32	51.94	71.56
T_{10}	24.86	38.01	61.75	4.05	4.98	6.84	20.15	35.88	57.64
T_{11}	22.51	32.195	55.06	4.29	4.69	5.98	18.13	35.29	49.96
T_{12}	29.67	57.29	75.32	5.25	6.98	7.92	25.11	50.77	71.17
T_{13}	20.76	29.135	51.23	3.66	4.37	5.97	17.48	34.98	49.8
SE(m)±	0.05	0.05	0.03	0.1	0.14	0.14	0.05	0.08	0.06
CD@5%	0.16	0.15	0.09	0.30	0.42	0.41	0.16	0.23	0.19

The yield contributing characters like Average bulb weight, neck thickness, splitting (%) and bulb diameter varied significantly with different treatments in both years of experimentation. In the present investigation, the pooled data indicated the minimum neck thickness (1.00 cm) maximum bulb diameter (5.32 cm) and maximum average weight of bulb (77.07 g) was observed with application of 50% RDN through FYM (q ha^{-1}) + 50% RDN through Vermicompost (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1}) and minimum value regarding this noted in control, whereas, minimum splitting of bulb (6.39%) was recorded with 50% RDN through FYM (q ha-1) + 50% RDN through Neem cake (q ha-1) + Azatobactor (kg ha-1) + PSB (kg ha-1) However maximum double bulb (12.13%) noted in control.

This might be due to higher availability of nitrogen, phosphorus, potash and micronutrients in soils due to increased decomposition of FYM and vermicompost affected the continuous and slow release of nutrients and Azatobactor and PSB also might have contributed by supplying growth promoters (Okon, 1985) [7]. (Mamatha, 2006) [5] observed the highest bulb diameter with the application of FYM + vermicompost in onion. Similar effect was also observed in bhendi and bitter gourd (Samuvel, 1984) [6].

It is clear from the data that the bulb yields were significantly influenced by different treatments of organic nitrogen. Pooled data indicated the significantly maximum bulb yield per plot (11.46 kg $plot^{-1}$) and yield per ha. (272.43 q ha^{-1}) was recorded with the application 50% RDN through FYM (q ha-1) + 50% RDN through Vermicompost (q ha-1) + Azatobactor (kg ha-1) + PSB (kg ha-1) which was significantly better than control. The increase in yield may be due to better root proliferation, enhanced nutrients uptake and

water, higher leaf number, more photosynthesis and accelerated rate of food assimilation (Yadav *et al*. 2005) [12]. Increasing levels of organic nitrogen also increase bulb and haulm yields irrespective of sources. This could be attributed to increased vegetative growth possibly a result of effective utilization of nutrients absorbed and a result of improved nourishment through N-fertilization (Bhakher *et al*., 1997) [1] Minimum number of bulbs per plot was recorded in control which may be due to lack of proper nutrition.

Conclusion

The investigations reported in this paper were undertaken to study the effects of organic nutrient management on growth and yield of onion bulbs.

The present investigation on effects of organic nutrient management on growth and yield of onion bulbs showed that amongst the different treatments of organic nutrient sources under study, 50% RDN through FYM (q ha-1) + 50% RDN through Vermicompost (q ha^{-1}) + Azatobactor (kg ha^{-1}) + PSB (kg ha^{-1}) was found to be most superior treatment. More important thing is that organic fertilizers are cheaper and affordable and also can be produced and in turn it reduces cost of chemical fertilizers. So a farmer can produce good quality bulb along with high yield or somewhat less according to the demand of market without degrading soil properties and health.

Table 2: Effect of organic nutrient management on yield attributing characters (Pooled data over 2 years)

Treatment	Bulb diameter(cm)	Splitting (%)	Average weight of bulb (g)	Neck thickness of bulb (cm)	Yield per $plot^{-1}$ (kg)	Yield per ha^{-1}
T_1	5.01	8.12	64.94	1.21	9.76	235.86
T_2	4.88	8.44	62.01	1.19	9.33	225.35
T_3	4.52	9.97	59.82	1.23	8.97	216.78
T_4	4.15	10.22	49.34	1.21	8.04	194.32
T_5	4.19	11.66	52.2	1.16	7.77	187.66
T_6	4.47	11.05	54.23	1.19	6.96	167.92
T_7	5.06	6.93	68.97	1.13	10.26	247.66
T_8	4.9	7.32	67.22	1.09	10.18	246.01
T_9	5.32	7.23	77.07	1	11.46	272.43
T_{10}	4.68	9.53	56.41	1.2	8.52	205.79
T_{11}	4.04	12.05	49.52	1.22	7.33	177.05
T_{12}	5.29	9.84	72.36	1.26	10.93	262.02
T_{13}	3.69	12.13	40.13	1.37	5.83	140.94
SE(m)±	0.07	0.1	0.26	0.04	0.2	5.32
CD@5%	0.21	0.3	0.78	0.12	0.6	15.61

References

1. Bhakher JR, Sharma OP, Jat BC. Effect of nitrogen and farmyard manure on yield and yield attributes of barley, 1997.
2. Kumar J, Singh O, Krishan P. Response of biofertilizers, organic and inorganic fertilizers in onion (*Allium cepa* L.). Progressive Agriculture. 2010; 10(1):170-172.
3. Patel VB, Singh SK, Ram Asrey, Sharma YK. Response of organic manures and biofertilizer o growth, fruit yield and quality of mango cv. Amrapali under high density orcharding. The Karn. J Hort. 2005; 1(3):51-56.
4. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers, Indian Council of Agricultural Research Publication, New Delhi, 1967, 152-174.
5. Mamatha HN. Effect of organic and inorganic sources of nitrogen on yield and quality of onion (*Allium cepa* L.) and soil properties in Alfisol. M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad (India), 2006.
6. Samuvel G. Studies on the interaction between VAM and phosphobacterium in certain vegetable crop plants. M. Sc. (Agri.) Thesis, Tamil Nadu Agric. Univ., Coimbatore (India), 1984.
7. Okon. Azospirillum as potential inoculant for agriculture. Tibtech. 1985; 3:223-228.
8. Pitchai SJ, Prabakaran C, Saliha BB. Evaluation of the effect of different organc nitrogen on yield and quality of tomato. Nation. Seminar, Annamalai University, 2001, 118p.
9. Poopathi. Effect of organic gardening in tomato Cv. CO-3. M.Sc. (Agri.) Thesis, Tamil Nadu Agric. Univ., Coimbatore (India), 1994.
10. Sankar V, Veeraragavathatham D, Kannan M. Post-harvest Storage life of Onion influenced by Organic farming practices. In : NRCG Report, National Symposium on current trends in Onion, Garlic, Chillies and Seed Spices- production, marketing and utilization, November, 25-27, Rajguru Nagar, Pune, 2005, 104-105.
11. Varu DK, Vhora PH, Kikani KP. Effect of organic and inorganic fertilizers on onion. Gujrat Agric. Univ. J. 1997; 22(2):116-118.
12. Yadav BD, Khandelwal RB, Sharma YK. Use of biofertilizer (*Azospirillum*) in onion. Indian Journal of Horticulture. 2005; 62(2):168-170.
13. Yogita Ram RB, Babu M. Effect of inorganic and biofertilizers on growth and yield of onion (*Allium cepa* L.) cv. Pusa Madhavi. Plant Archives. 2012; 12(2):645-648.