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Studies on the effect of integrated nutrient management and bio enhancer on yield and yield attribute of *Rabi* onion (*Allium cepa* L.)

Manju Sahu and SS Singh

Abstract
The present investigation entitled "Studies on the effect of integrated nutrient management and bio enhancer on yield and yield attribute of *Rabi* onion (*Allium cepa* L.)" was carried out during the year 2015-16 in *Rabi* season at present investigation was carried out at the Agricultural Farm Razaula, M.G.C.V.V. Chitrakoot (M.P.) The experiment was laid out in randomized block design with 14 treatments and three replications. Significantly higher values were recorded for polar diameter (5.23 cm), equatorial diameter of bulb was noted (5.41 cm), neck thickness was recorded (1.65 cm) and maximum weight of bulb was (66.98 g) in the treatment T_1 consisting of 100 per cent of recommended RDF (100:80:80 kg/ha) which was at par with T_{13} (51.68 cm), While lowest growth was recorded in $T_{14,}$. The higher marketable bulb yield of 35.04 t/ha and total bulb yield 39.57 t/ha was obtained in T1 and lowest total bulb yield was recorded in T14 (21.44 t/ha).

Keywords: Onion (*Allium cepa* L.), INM, equatorial and marketable bulb yield

1. Introduction
Onion (*Allium cepa* L.) is the most common member of the family Amaryllidaceae (*Alliaceae*) (Hanlet, 1990). It is one of the most important vegetable crops grown throughout the world, that being said to be native of Central Asia and Mediterranean region (McCollum, 1976). It is widely grown herbaceous biennial vegetable crop with cross-pollinated and monocotyledonous behaviour having diploid chromosomes number 2n=16 (Bassett, 1986) [3].

India is the second largest producer of onion in the world and occupies 756200 hectare area with a production of 12158800.00 t and productivity is 16.10 t/ha. Maharashtra is leading state in area and production whereas, productivity is highest in Gujarat. Madhya Pradesh is second largest producer of Onion occupied 1117000 ha area with total 2691000 t production and 24.08t/ ha productivity in year 2010-11

Agricultural soil has been adversely affected by chemical fertilizers, pesticides, and heavy machinery resulted by organic carbon and microbial pool, which create a unique environment for biologically active soil which has sprinkled since green revolution and it has been observed that most of the soil are not responding towards productivity. Under such circumstances build up of soil health is urgent need. To minimize the cost of cultivation which is beyond the farmer's reach, low cost organic inputs respondent to soil health and crop productivity must be advocated. (Anon., 2014) [2].

Due to the prohibitive cost of chemical fertilizers, majority of Indian farmers who are mostly marginal and small, do not apply the recommended dose of fertilizers. They are using indigenous organic manures as sources of nutrients. These organics are bulky in nature but, contain reasonable amount of nutrients. Our experiences reveal that the supply of nutrients through organics alone has failed to maintain yield level in a short period. The combined application of organics such as FYM, compost, green leaf manure, vermicompost *etc*. and liquid organics *viz.*, Jeevamrut, Beejamrut, Panchagavya, Gomutra, Angara, Vermiwash *etc*., which contain microbial count and plant growth promoting substances (PGPR) stimulate growth, yield and quality of crops. Further it helps to build soil organic matter status besides minimizing the cost of cultivation. Panchagavya promising natural liquid manure is being used by many organic farmers in many crops in different parts of our country (Anon., 2005).

Various traditional inputs such as Panchagabya, Enriched Panchgabya, jivamrit, Amrit Pani, Cow Urine, and Vermiwash, Shady soil of banyan tree, liquid manure - Dasparni, neem seed

kernel extract, garlic, ginger and chilly, tobacco extract, and *Tricoderma viride* etc well working in organic farming. In view of mainstreaming of organic farming to reduce the cost of cultivation, and minimize the subsidies on chemical fertilizers, adoption and promotion of national resources are based on organic agriculture by keeping the soil health, sustainability and productivity as prime focus.

Materials and Methods

The present investigation entitled "Studies on the effect of integrated nutrient management and bio enhancer on yield and yield attribute of *rabi* onion (*Allium cepa* L.)" was carried out during the year 2015-16 in *Rabi* season at present investigation was carried out at the Agricultural Farm Razaula, M.G.C.V.V. Chitrakoot (M.P.) The materials used and methodology adopted in the investigation are described below. Chitrakoot is situated in the Northern part of Madhya Pradesh, agro- climatologically known as "Kymore Plateau " and lies between latitude 24º' 31 N', longitude 81º 15 E' Longitude with an altitude of 306 m above the mean sea level. Chirakoot comes under dry, sub-humid agro-climatic region. Climate of Chitrakoot region is semi-arid and sub-tropical having hot and dry summer followed by rainy season and cold winter. In general the highest and lowest temperature reaches above 47 ºC and below 20 ºC, respectively. The average rainfall varies from 3.5 mm to 79.96 mm. The rainfall is observed mainly from July to September and sometimes winter showers are also received.

The experiment was laid out in Randomized Block Design having 14 treatments comprising of organic manures (farmyard manure and vermicompost), inorganic fertilizers (nitrogen, phosphorus and potassium) and foliar spray of Panchgavya, Matka Khad applied either alone or in combination, each replicated three times, making a total of 42 plots. Treatments were randomly arranged in each replication. The treatment description is presented in, T_1 RDF (100:80:80 kg/ha), $T_2$50% RDF+ FYM @15 t/ha, T_3 50% RDF + VC@5t/ha, T_4 25% RDF+ FYM @20 t/ha, T_5 25% RDF + VC@7.5t/ha, T_6 FYM @ 30 t/ha T_7Varmi compost @ 10 t/ha, T_8 FYM @ 10 t/ha + foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP, T_9 Varmi compost @ 5 t/ha + FYM @ 10 t/ha + foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP, T_{10}FYM @ 10 t/ha + Madka khad + foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP, T_{11}Varmi compost @ 5 t/ha + FYM @ 10 t/ha +Matka Khad+ foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP T_{12}Varmi compost @ 2.5 t/ha+ Seed treatment + Bijamrit+ irrigation with Jevamrit+ foliar spray of Panchgavya, T_{13}Varmi compost @ 2.5 t/ha+ Seed treatment + Bijamrit+ irrigation with Jevamrit+ foliar spray of Panchgavya + Varmi wash T_{14} Farmer practice NPK 80:60:60 kg/ha The growth parameters were measured by randomly selecting five plants from each net plot. All the cultural and management practices like hoeing, weeding, irrigation and sprays for insect pests and disease control etc were carried out uniformly for all treatments. Total yield (t/ha) The bulb grade A+, A, B, C and D grade bulbs all were considered under total yield and Neck thickness of bulb produced in observation plants were measured after harvesting with the help of vernier calliper.

Results and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads:

Yield and Quality Characters

Polar diameter of bulb (cm)

The polar diameter of bulb showed significant difference for different treatments. Among the evaluated treatments numerically maximum polar diameter was recorded in T1 (5.23 cm) which was statistically at par with T3 (5.19 cm) and T13 (5.19 cm). However minimum polar diameter was recorded in the T14 (3.42 cm).

Equatorial diameter of bulb (cm)

The result indicated that the maximum equatorial diameter of bulb was noted in T1 (5.41 cm), which was found at par with T3 (5.33 cm) & T13 (5.18 cm). Whereas, minimum equatorial diameter of bulb was noted in T5 (4.76 cm). Higher levels of inorganic substances/fertilizers significantly influenced the bulb equatorial and polar diameter which determines the bulb weight. Similarly, increased bulb equatorial diameter with the application of higher levels of inorganic was obtained by Chowdappan (1972) [6], Thimmaiah (1989) [13], Singh *et al.* (1993), Varu *et al.* (1997), Sankar *et al.* (2009) [9, 10] and Reddy and Reddy (2005) [8] and the bulb polar diameter by Setty (1988), Sankar *et al.* (2009) [9, 10] and Reddy and Reddy (2005) [8].

Neck thickness of bulb (cm)

The maximum neck thickness was recorded in T1 (1.65 cm), which was at par with T3 (1.52 cm) & T14 (1.49 cm). Whereas, minimum neck thickness was recorded in T14 (0.98 cm).

Average weight of bulb (g)

The maximum weight of bulb was noted in T1 (66.98 g), which was found statistically at par with T3 (64.15g) and T13 (62.12 g). Whereas, minimum weight of bulb was recorded in T_{14} (37.98 g). The average bulb weights were recorded higher under T1, T3 and T13 and it may be due to recorded higher polar and equatorial diameter in the same treatments which determines the bulb weight. Increased bulb weight with increased inorganic levels was also reported by Bagali *et al.* (2012) [5].

Marketable bulb yield (t/ha)

The marketable bulb yield differed significantly and varied from 16.44 t/ha to 35.04 t/ha. The maximum marketable bulb yield was recorded in T1 (35.04 t/ha), followed by T3 (33.98t/ha) and T13 (33.36 t/ha). However minimum marketable bulb yield was recorded in T14 (16.44t/ha).

Total yield (t/ha)

The total bulb yield varied significantly from 21.44 t/ha to 39.57 t/ha. The maximum total yield was recorded in T1 (39.57 t/ha), which was at par with T7 (31.87 t/ha) followed by T6 (28.85 t/ha). Whereas, minimum total yield was recorded in T14 (21.44 t/ha). The combination of two nutrient sources helped to increased growth parameters and yield contributing characters resulting good bulb yield. Similar result was also obtained by Lal *et al.* (2002) [7] and Sankar *et al.* (2005) in onion crop. Similar results are also found by Patil (1995), who reported that the yield was found highest with 100 kg nitrogen/ha.

Table 1: Effect of integrated nutrient management and bio enhancer yield and yield attribute of onion.

Treatment no.	Treatment	Yield Parameters			
		Polar diameter (cm)	Equatorial diameter (cm)	Neck thickness (cm)	Average weight of bulb (g)
T1	RDF (100:80:80 kg/ha)	5.23	5.41	1.65	66.98
T2	50% RDF+ FYM @15 t/ha	5.00	5.23	1.43	58.48
T3	50% RDF + VC@5t/ha	5.19	5.31	1.52	64.15
T4	25% RDF+ FYM @20 t/ha	4.73	5.11	1.24	50.39
T5	25% RDF + VC@7.5t/ha	4.90	5.13	1.04	52.48
T6	FYM @ 30 t/ha	3.63	4.60	0.94	36.81
T7	Varmi compost @ 10 t/ha	3.86	4.98	0.98	39.54
T8	FYM @ 10 t/ha + foliar spray of Panchgavya @ 3% at 30, 45, 60, 75 and 90 DAP	4.29	4.80	1.01	48.8
T9	Varmi compost @ 5 t/ha + FYM @ 10 t/ha + foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP	4.90	4.90	1.08	54.23
T10	FYM @ 10 t/ha + Madka khad + foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP	4.93	4.90	1.17	56.92
T11	Varmi compost @ 5 t/ha + FYM @ 10 t/ha +Matka Khad+ foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP	5.00	5.03	1.23	58.12
T12	Varmi compost @ 2.5 t/ha+ Seed treatment + Bijamrit+ irrigation with Jevamrit+ foliar spray of Panchgavya	5.09	5.09	1.3	59.27
T13	Varmi compost @ 2.5 t/ha+ Seed treatment + Bijamrit + irrigation with Jevamrit + foliar spray of Panchgavya+ varmiwash	5.18	5.18	1.49	64.76
T14	Farmer practice NPK 80:60:60 kg/ha	3.42	4.76	0.98	37.98
	SEm±	00.12	00.09	00.06	03.63
	CD (P=0.05)	00.36	00.27	00.20	11.02

Table 2: Effect of integrated nutrient management and bio enhancer on Marketable bulb yield (t/ha) and Total yield (t/ha) at different interval of onion.

Treatment no.	Treatment	Yield parameters	
		Marketable bulb yield (t/ha)	Total yield (t/ha)
T_1	RDF (100:80:80 kg/ha)	35.04	39.57
T_2	50% RDF+ FYM @15 t/ha	28.85	31.02
T_3	50% RDF + VC@5t/ha	31.87	36.98
T_4	25% RDF+ FYM @20 t/ha	26.98	30.07
T_5	25% RDF + VC@7.5t/ha	27.08	30.58
T_6	FYM @ 30 t/ha	17.95	26.53
T_7	Varmi compost @ 10 t/ha	20.96	27.87
T_8	FYM @ 10 t/ha + foliar spray of Panchgavya @ 3% at 30, 45, 60, 75 and 90 DAP	23.23	28.34
T_9	Varmi compost @ 5 t/ha + FYM @ 10 t/ha + foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP	26.29	28.66
T_{10}	FYM @ 10 t/ha + Madka khad + foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP	29.02	31.63
T_{11}	Varmi compost @ 5 t/ha + FYM @ 10 t/ha +Matka Khad+ foliar spray of Panchgavya @ 3% at 30, 45, 60,75 and 90 DAP	30.16	33.78
T_{12}	Varmi compost @ 2.5 t/ha+ Seed treatment + Bijamrit+ irrigation with Jevamrit+ foliar spray of Panchgavya	31.02	33.50
T_{13}	Varmi compost @ 2.5 t/ha+ Seed treatment + Bijamrit + irrigation with Jevamrit + foliar spray of Panchgavya+ Varmiwash	33.36	35.36
T_{14}	Farmer practice NPK 80:60:60 kg/ha	16.44	21.44
	SEm±	01.42	01.03
	CD (P=0.05)	04.31	03.14

References

1. Asiegbu JE, Uzo JO. Yield and yield component response of vegetable crops to farm yard manure in the presence of inorganic fertilizers. J Agric. Univ. Puerto Rico. 1984; 68:243-252.
2. Anonymous. Indian Horticulture Database. National Horticulture Board, Ministry of Agri., Govt. of India, Gurgaon, India, 2014.
3. Bassett MJ. Breeding of Vegetable Crops. AVI Publishing Co. Inc. West Port. Connecticut, 1986, 584.
4. McCollum GD. Evolution of crop plants, ed. N. W. Simmonds, Longman, London and New York, 1976, 186-90.
5. Bagali AN, Patil HB, Chimmad VP, Patil PL, Patil RV. Effect of inorganics and organics on growth and yield of onion (*Allium cepa* L.). Karnataka J Agric. Sci. 2012; 25(1):112-115.
6. Chowdappan SR. Effect of manuring on bulb size of Bellary onion (*Allium cepa* L.). Madras Agric. J. 1972; 59:175-176.

7. Lal S, Yadav AC, Mangal JL, Singh A, Batra VK. Effect of FYM and irrigation levels on growth and yield of onion cv. Hisar-2. Haryana J Hort. Sci. 2002; 31(3, 4):256-258.
8. Reddy KC, Reddy KM. Differential levels of vermicompost and nitrogen on growth and yield in onion (*Allium cepa* L.) and radish (*Raphanus sativus* L.) cropping system. J Res. ANGRAU. 2005; 33(1):11-17.
9. Sankar V, Veeraragavathatham D, Kannan M. Studies on organic farming in onion (*Allium cepa* L.) for the production of export quality bulbs. Asian J Hort. No. 2009; 4(1):65-69.
10. Sankar V, Veeraraghavathatham D, Kannan M. Organic farming practices in white onion (*Allium cepa* L.). J Eco-friendly Agril. 2009; 4(1):17-21.
11. Shete MB, Chaudhary SM, Warade SD. A note on use of FYM and vermicompost on yield of white onion cv. Phule Safed. Allium Newslett. 1993, 36-38.
12. Singh RP, Jain NK, Poonia BL. Integrated nutrient management in rainy season onion. Indian J Agric. Sci. 2001; 71:310-312.
13. Thimmiah D. Studies on effect of nitrogen, phosphorus and potassium on growth and yield of onion (*Allium cepa* L) Bellary Red. M. Sc. (Ag.) Unpublished Thesis, Univ. Agric. Sci., Dharwad, (India), 1989.
14. Veerabadraiah, Chamegowda, Badrinath. Grass land and fodder news India Organic News, OFNL. 2006; 11(2):23-d24.