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EFFECT OF DIFFERENT ORGANIC MANURES ON GROWTH AND YIELD OF ONION (*ALLIUM CEPA* L.)

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ABSTRACT
An experiment on effect of different organic manures on growth and yield of onion was carried out during *kharif* season-2014 at the Instructional-Cum-Research Farm, Department of Horticulture, College of Agriculture, Latur. The results of the present investigation indicated that, the maximum values of growth parameters like plant height (57.18 cm) and number of leaves (9.90) at harvest were recorded in treatment 50% N through poultry manure + 50% N through neem cake (T_{11}). The onion variety 'N-53' was used for the study. The experiment was laid out in Randomized Block Design (RBD) with eleven treatments of different organic manures and replicated thrice.The yield contributing characters like weight of bulb (126.64 g), diameter of bulb (65.47 mm), yield per plot (19.49 kg), and yield per hectare (54.13 t) were found significantly maximum in treatment 50% N through vermicompost + 50% N through poultry manure (T_9). Hence, it can be concluded that, for getting optimum growth and higher yield in respect of organic manures from the onion, the crop should be supplied with the recommended dose of N,P,K, fertilizers (100:50:50 kg/ha), in which the 50% quantity of N should applied through vermicompost and 50% N through poultry manure.

INTRODUCTION

Onion (*Allium cepa* L.) is one of the most important commercial vegetable crops grown extensively throughout the country. It is belongs to the family Alliaceae and known as "Pyaj" in Hindi. The annual production of onion in the world is about 35 tonnes and India accounts 16% of the total world production and ranks second after China. Besides, 70% of foreign exchange earnings among fresh vegetables come from only onion (Fageria, 2003). The onion crop is widely consumed throughout the year as salad and culinary purpose for flavouring as spices in pickles, sauce and vegetables. In recent year's use of these organic manures for improving productivity of crops and maintaining soil fertility and productivity of soil are gaining prominences. The organic manuring has positive influence on soil texture and water holding capacity (Kale *et al.,* 1991). It also provides food for soil microorganisms. It increases the activity of microbes which is in turn helps to convert unavailable plant nutrients into available form. Organic manures releases nitrogen slowly and leaching and volatilization losses are also very less as compared to inorganic fertilizers. The continuous chemical fertilizer use deteriorated crop while organic manures improved these properties (Watson *et al*., 2002). The farmers can in turn obtained good remuneration from the organically produced vegetables due to their heavy demands in national and international markets (Singh, 2005). Nutrient management is one of the most important considerations under organic production system. The increasing cost of chemical fertilizers and their harmful effects on the soil health is also an important consideration for the use of organic nutrients (Patel *et al*., 2005). In recent times, consumers are demanding higher quality and safer food and highly interested in organic products. At present, very scanty work has been made on organic farming of onion which is grown on large scale. Keeping this in view, an investigation was undertaken to effect of different organic manures on growth and yield of onion.

MATERIALS AND METHODS

The present investigation entitled "Studies on effect of different organic manures on growth and yield of onion (*Allium cepa* L.)" was carried out during *kharif* season-2014 at the Instructional-Cum-Research Farm, Department of Horticulture, College of Agriculture, Latur. The experiment framed was intended to study the effect of different organic manures on growth and yield of onion. The onion variety 'N-53' was used for the study. The experiment was laid out in Randomized Block Design (RBD) with eleven treatments of different organic manures comprises Control 100% N through urea (T_1), 100% N through FYM (T_2), 100% N through vermicompost (T_3), 100% N through poultry manure (T_4), 100% N through neem cake (T_5), 50% N through FYM + 50% N through vermicompost (T_6), 50% N through FYM + 50% N through poultry manure (T_7), 50% N through FYM + 50% N through neem cake (T_8), 50% N through vermicompost + 50% N through poultry manure (T_9), 50% N through vermicompost + 50% N through neem cake (T_{10}) and 50% N through poultry manure + 50% N through neem cake (T_{11}) replicated thrice. The periodical observations on growth and yield parameters were recorded. The final data of each characters recorded during the investigation were analyzed statistically by the method of "Analysis of variance". The significance of various

treatments was judged as suggested by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The data presented in Table 1 regarding growth parameters in different organic manures in onion revealed significant variations. At 15, days after transplanting, the maximum height (25.99 cm) of plant was recorded in the treatment 100% N through poultry manure (T_4). At 30 days after transplanting, the maximum height (45.63 cm) of plant was recorded in the treatment 50% N through vermicompost + 50% N through poultry manure (T_9). At 45 days after transplanting, the maximum height (51.92 cm) of plant was recorded in the treatment 50 % N through poultry manures + 50 N through neem cake (T_{11}). At 60 and 75 days after transplanting, the maximum height (54.10 cm and 55.90 cm, respectively) of plant was recorded in the treatment of 50% N through FYM + 50% N through poultry manure (T_7).At harvest, the maximum height (57.18 cm) of plant was recorded in the treatment 50 % N through poultry manures + 50 N through neem cake (T_{11}). Regarding significantly maximum number of leaves per plant (3.63, 6.87 and 9.10) at 15, 30 and 45 days after transplanting respectively, was recorded in the treatment 100% N through

Table 1: Plant height (cm) and number of leaves of onion as influenced by different treatments of organic manures

Tr. No.	Treatment details	Plant height (cm) Days after transplanting						Number of leaves Days after transplanting					
		15	30	45	60	75	At harvest	15	30	45	60	75	At harvest
T_1	Control (100% N through Urea)	21.40	36.38	49.50	53.86	55.29	55.32	3.10	6.20	8.40	11.43	9.73	8.87
T_2	100% N through FYM	24.65	37.65	45.09	51.39	51.73	55.25	3.07	6.13	8.20	10.52	9.60	8.40
T_3	100% N through vermicompost	22.75	37.41	45.93	50.72	51.01	54.37	3.10	6.33	8.61	9.87	9.77	8.60
T_4	100% N through poultry manure	25.99	45.23	50.05	53.85	53.97	55.19	3.63	6.87	9.10	10.40	10.27	9.30
T_5	100% N through neem cake	21.71	38.73	44.68	47.63	47.94	51.48	3.07	6.27	8.20	9.40	8.87	7.90
T_6	50% N through FYM + 50% N through vermicompost	20.83	35.47	41.03	46.73	48.05	51.26	2.87	5.87	8.00	9.80	8.73	7.67
T_7	50% N through FYM + 50% N through poultry manure	22.07	40.13	47.62	54.1	55.90	55.41	2.93	6.40	8.20	9.67	10.47	9.03
T_8	50% N through FYM + 50% N through neem cake	20.23	39.17	45.24	47.49	49.17	50.67	3.07	6.40	8.17	9.63	9.13	8.37
T_9	50% N through vermicompost + 50% N through poultry manure	23.45	45.63	49.65	53.21	54.13	56.12	3.60	6.80	8.97	10.97	8.93	7.93
T_{10}	50% N through vermicompost + 50% N through neem cake	22.15	41.33	44.38	48.97	49.88	50.48	3.40	6.80	8.53	10.23	9.13	8.27
T_{11}	50% N through poultry manure + 50% N through neem cake	19.48	43.13	51.92	53.51	55.52	57.18	3.07	6.47	8.93	10.80	10.97	9.90
	S.E. ±	1.16	1.89	2.08	1.86	1.13	1.53	0.16	0.19	0.23	0.36	0.46	0.43
	C.D. at 5%	3.43	5.59	6.14	5.49	4.16	4.50	0.48	0.57	0.68	1.06	1.37	1.26
	G.M.	22.25	40.03	46.83	51.02	52.06	53.89	3.17	6.41	8.48	10.25	9.60	8.57

Table 2: Number of days required for maturity, crop duration and yield parameters of onion as influenced by different treatments of organic manures

Tr. No.	Treatment details	Maturity from trans planting (days)	Crop duration (days)	Diameter of bulb (mm)	Diameter of neck (mm)	Weight of Bulb (g)	Bulb yield (kg/plot)	Bulb yield (t/ha)
T_1	Control (100% N through Urea)	94	150	63.47	11.67	117.39	17.77	49.36
T_2	100% N through FYM	91	147	59.67	13.73	107.79	13.79	38.30
T_3	100% N through vermicompost	89	145	62.73	12.27	116.68	17.35	48.19
T_4	100% N through poultry manure	84	140	61.47	13.53	112.21	15.65	43.47
T_5	100% N through neem cake	90	146	57.67	14.52	95.14	13.18	36.61
T_6	50% N through FYM + 50% N through vermicompost	92	148	64.93	11.40	120.77	18.01	50.02
T_7	50% N through FYM + 50% N through poultry manure	90	146	62.67	12.63	112.77	16.88	46.88
T_8	50% N through FYM + 50% N through neem cake	91	147	62.53	13.47	112.45	16.01	44.47
T_9	50% N through vermicompost + 50% N through poultry manure	86	142	65.47	11.40	126.64	19.49	54.13
T_{10}	50% N through vermicompost + 50% N through neem cake	89	145	61.53	13.65	109.44	14.25	39.58
T_{11}	50% N through poultry manure + 50% N through neem cake	91	147	58.31	13.80	106.63	13.42	37.27
	S.E. ±	1.02	1.35	0.88	0.63	4.89	0.83	1.68
	C.D. at 5%	3.00	3.98	2.60	1.86	14.42	2.45	4.88
	G. M.	90	146	61.86	12.92	112.54	15.98	44.39

Table 3: Per cent incidence of pest and disease of onion as influenced due to different treatments of organic manures

Treatment	Treatment details	Per cent incidence Pest : Thrips	Disease : Purple blotch
T_1	Control (100% N through urea)	8.93	9.50
T_2	100% N through FYM	11.04	11.28
T_3	100% N through vermicompost	9.22	9.75
T_4	100% N through poultry manure	4.77	4.46
T_5	100% N through neem cake	3.77	3.36
T_6	50% N through FYM +50% N through vermicompost	8.15	8.72
T_7	50% N through FYM +50% N through poultry manure	6.80	8.21
T_8	50% N through FYM + 50% N through neem cake	6.54	6.93
T_9	50% N through vermicompost +50% N through poultry manure	6.53	6.40
T_{10}	50% N through vermicompost+ 50% N through neem cake	6.23	5.61
T_{11}	50% N through poultry manure +50% N through neem cake	5.17	5.23
	S.E. ±	0.32	0.80
	C.D. at 5%	0.95	2.36
	G. M.	7.01	7.22

poultry manure (T_4). At 60 days after transplanting, the maximum number of leaves (11.43) per plant was recorded in treatment 100% N through urea (T_1). At 75 days after transplanting and at harvest the maximum number of leaves (10.97 and 9.90, respectively) per plant was recorded in treatment 50% N through poultry manures + 50 N through neem cake (T_{11}). The poultry manure release the nitrogen rapidly in comparison to other organic manures to the contains of N, P, K, Ca, Mg, Sulphur, Mn, Cu, Zn, Cl, B, Fe, Mo and also arsenic acid and uric acid. The uric acid having 60 per cent N which changes rapidly to ammonical forms and hence, efficient utilized for better growth (Smith, 1950), also Wiedenfeld (1984) stated that slow release nitrogenous fertilizers increased the number of leaves in cabbage as compared to quick release pattern of inorganic nitrogenous fertilizers. The variation in number of leaves among different treatments of organic manures was reported by Jayathilake *et al*. (2003), Shankar *et al*. (2009), Ghassan (2011), Bangali *et al*. (2012 and Ahmed *et al*. (2013) and Naik *et al*. (2014) in onion.

The data presented in Table 2 regarding growth and yield parameters in different organic manures in onion revealed significant variations. The minimum number of days was required (84) for maturity in treatment of 100% N through poultry manure (T_4) while, the maximum (94) days were required in control treatment 100% N through urea (T_1). The minimum crop duration required (140)days in treatment of 100% N through poultry manure (T_4) while the maximum (150) days were required by control treatment 100% N through urea (T_1). The poultry manure contains N, P, K, Ca, Mg, Sulphur, Mn, Cu, Zn, Cl, B, Fe, Mo, arsenic acid and uric acid. The uric acid having 60 per cent N which changes rapidly to ammonical forms and hence, the readily available and easy absorption of plant roots, hence there was a boost in the morphological growth of the plant. The maximum (150) days required in control treatment of 100% N through urea (T_1) could be either there were some nutrients are present in the soil or the plants need were satisfied with that quantity of nutrient. These results are in accordance with the findings of Ajari *et al*. (2003) in okra and Chaterjee *et al*. (2005) in suproting broccoli.

The data maximum diameter of bulb (65.47 mm), weight of bulb (126.64 g), bulb yield (19.49 kg) per plot and (54.13) tons per ha with minimum diameter of neck (11.40 mm) was recorded in treatment 50% N through vermicompost + 50% N through poultry manure (T_9) which was found statistically at par with treatment 50% N through FYM + 50% N through vermicompost (T_6) and Control treatment 100% N through Urea (T_1), whereas the minimum diameter of bulb (57.67 mm), weight of bulb (95.14 g), bulb yield (13.18 kg) per plot and (36.61) tons/ha with maximum diameter of neck (14.52 mm) was recorded in treatment of 100% N through neem cake (T_5). It might be due to the contribution to the balanced C: N ratio and enhanced availability of essential plant nutrients hence increased rate and efficiency of metabolic activities resulting in high assimilation of protein and carbohydrates. Increase in yields can also be attributed to sustained availability of nutrients throughout the growing season also the efficacy of inorganic fertilizers is much pronounced when they are combined with organic manures. The results obtained are corroboratory with the findings of Jayathilake *et al*. (2003), Shankar *et al*. (2009), De *et al*. (2013) and Hamma *et al*. (2013) in onion. The data presented in Table 3 regarding per cent incidence of purple blotch and thrips varied significantly among different treatments of organic manure in onion. The maximum incidence of pest (11.04 per cent) and disease (11.28 per cent) in treatment of 100% N through FYM (T_2). The minimum incidence of pest (3.77 per cent) and disease (3.36 per cent) was found in treatment of 100% N through neem cake (T_5).

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