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Effect of organic manures and inorganic fertilizers on growth and yield of onion *(Allium cepa* L.)

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ABSTRACT

The experiment was conducted during winter season of 2004-05 at the Krishi Vigyan Kendra, Kuthulia, Rewa to study the response of inorganic fertilizers on growth and yield of onion. The treatments comprised of seven organic and inorganic fertilizer treatments (vermicompost @ 5.0 t/ha, NADEP compost @ 15.24 t/ha, FYM @ 25 t/ha, poultry manure @ 3.28 t/ha, recommended dose of N125P60K100, Agrich @ 1.25 t/ha and a control). Amongst the organic manures and inorganic fertilizers, N125P60KI00 application proved the most beneficial for growing onion var. N-53. It yielded the maximum up to 378.61 q/ha onion bulb with the highest net return of Rs.83,071/ ha and B:C ratio 3.72. However, the second best treatment was poultry manure (3.28 t/ha).

Key words : Onion, Manures, Fertilizers, Growth, Yield, *Allium cepa* L.

Onion (*Allium cepa* L.) belongs to the family Amaryllidaceae and it is known as "Pyaj" in Hindi. It occupies very important position among spices crops grown all over the world. Onion is one of the important commercial spices grown in western, northern as well as southern part of India. The onion crop is widely consumed throughout the year as salad and culinary purpose for flavouring as spices in pickles, sauce and vegetables.

In the developing countries the escalating prices of fertilizers is hitting the small and marginal farmers. Thus, integrated nutrient management is gaining importance in the recent years. According to Mohd Rafi *et al.* (2002) recent trends in farming with organic inputs, which has a inherent claim of improvement in quality and taste of the produce.

Many commercial organizations have brought some ready made organic fertilizers into the market *viz*. Agrich, Celrich and Teracare etc. These are often enriched with bio-inoculants and micronutrients. Celrich is a bio-organic soil enricher containing 30% organic matter, 20% moisture and 45% sand and inoculated with biofertilizers like Azotobacter, Azospirillum and actinomycetes. Keeping these factors in mind, experiment on the effect of these organic manures with reduced doses of inorganic fertilizers on yield and quality of onion has been undertaken.

MATERIALS AND METHODS

The experiment was laid out in Randomized Block Design with 4 replications; each replication was divided into 28 plots. The treatments were allocated at random to different plots. The seeds of onion variety "N-53" were treated before sowing in nursery with Bavistin @ 2 g/kg. The nursery of 3 m long and 1.2 m wide and 10 cm above the ground level were prepared and were manures then treated seed was sown on 25th Oct. in line. All intercultural operations were done as and when required.

The experiment was to study the response of inorganic fertilizers on growth and yield of onion. The treatments comprised of seven organic and inorganic fertilizer treatments (vermicompost @ 5.0 t/ha, NADEP compost @ 15.24 t/ha, FYM @ 25 t/ha, poultry manure @ 3.28 t/ha, recommended dose ofN125P60KlOO, Agrich @ 1.25 t/ha and a control). The experiment was laid out in randomized block design with four replications. The onion var. N-53 was sown transplanted on 8 December, 2004 @ seed rate of 8-10 kg/ha. The crop was harvested on 6 May, 2005.

Two-month-old seedlings of uniform size were transplanted on 8.12.2004. The spacing 15 cm row to row and 10 cm plant to plant was maintained. Five plants in each plot were selected randomly for recording observations and following characters were noted for study purpose during successive stage of growth.

Fresh weight of bulb, Dry matter percentage of bulb, bulb diameter, yield per plot, yield per hectare etc. recorded periodically. The cost of cultivation of each treatment was calculated per hectare on the basis of prevailing rates of labour, fertilizer, organic manures, irrigation and other expenditure. The total income per hectare was calculated as per the average wholesale price of onion in the local market. The net profit per hectare was obtained by deducting the cost of cultivation from the total income.

RESULTS AND DISCUSSION

The plant height, number of leaves and neck girth of

onion was, in general, enhanced with the successive growth and age of plant up to 90 days after transplanting (Table 1). As regards with the treatments effect, plant height, leaves per plant and width of girth were influenced significantly due to various treatments of observation. Among the organic manures and inorganic fertilizer treatments N125P60K100 application resulted in significantly higher of growth characters over control and few other treatments having organic manures. Accordingly, the maximum height was 59.05 cm, leaves 13.25/plant and width of girth was 1.92 cm due to NPK application. This was, however, equally followed by vermicompost and then poultry manure.

The fresh and dry weight of bulb and bulb diameter were recorded maximum (56.79 g, 10.40 g and 5.89 cm, respectively) due to application of recommended dose of N125P60K100. These were significantly higher to that of control treatment as well as FYM, NADEP compost and Agrich treatments. After NPK, the second and third best treatments were vermicompost and poultry manure, respectively which exerted statistically identical performance in comparison to NPK application. The fresh weight ranged from 51.09 to 53.97 g, dry weight 10.08 to 10.28 g and bulb diameter 5.26 to 5.47 cm among the second and third best treatments.

Further indicate that application of FYM, vermicompost, NADEP compost, NPK and poultry manure resulted in significantly higher yield of onion bulb over Agrich and control treatments. Among these treatments N125P60K100 produced the maximum bulb yield (378.61 q/ha), being significantly higher to all the rest of treatments. This was, however, followed by vermicompost (359.79 q/ha), poultry manure (340.59 q/ha) and then FYM (321.76 q/ha).

Consequently, the net return and B : C ratio also followed the same trend. N125P60K100 application gave the maximum net return up to Rs.83,071/ha with B:C ratio up to 3.72. This was, however, followed by poultry manure (Rs.73,560/ha), vermicompost (Rs.65,800/ha) and then FYM (Rs.64,391/ha) B:C ratio 3.57, 2.56 and 3.00, respectively.

Amongst the organic and inorganic sources of nutrients, NPK performed the best and resulted in maximum bulb yield up to 378.61 q/ha, being significantly higher to rest of the treatments. This may be due to maximum increased in growth and yield-attributing characters in NPK treatment as compared to all other treatments. These findings are in close conformity with Teran *et al.* (1994), Geetha *et al.* (2000), Lal *et al.* (2002), Alkaff *et al.* (2002), Prabu *et al.* (2003) and Mondal *et al.* (2004). After NPK, the better performance was given by vermicompost, poultry manure and then FYM applications.

Consequently, the net return and benefit: cost ratio also followed the same trend. The higher yield from these organic manures may be due to higher growth and yield attributing characters in these treatments. as compared to those of other treatments like NADEP compost and Agrich product. These findings are in close agreement with those of other workers Lal *et al.* (2002), Prabu *et al.* (2003) and Mondal *et al.* (2004).

Conclusion :

Amongst the organic manures and inorganic fertilizers, N125P60K100 application proved the most beneficial for growing onion var. N-53 in this region. It yielded the maximum up to 378.61 q/ha onion bulb with the highest net return of Rs.83,071/ha and B:C ratio 3.72. However, the second best treatment was poultry manure which although yielded lower than vermicompost but gave higher net return up to Rs.73,560/ha than vermicompost (Rs.65,800/ha).

Table 1: Growth, yield and yield-components of onion as influenced by organic manures and inorganic fertilizers

	Treatments	Plant height (90 DAT) (cm)	Leaves/ plant (90 DAT)	Width of girth (cm) at 90 DAT	Fresh weight of bulb (g)	Dry matter percentage	Diameter of bulb (g)	Bulb yield (q/ha)	Net income (Rs/ha)	B:C ratio
T_1	FYM (25 t/ha)	47.82	11.05	1.37	48.26	10.00	5.13	321.76	64,391	3.00
T_2	Vermicompost (5.0 t/ha)	54.50	12.75	1.56	53.97	10.28	5.26	359.79	65,800	2.56
T_3	NADEP (15.24 t/ha)	47.27	10.95	1.33	45.62	9.87	5.12	304.13	56,481	2.62
T_4	Agrich (1.25 t/ha)	47.92	9.80	1.27	41.64	9.70	4.77	277.61	52,646	2.72
T_5	$N_{125}P_{60}K_{100}$	59.05	13.25	1.92	56.79	10.40	5.89	378.61	83,071	3:72
T_6	Poultry manure (3.28 t/ha)	52.62	11.40	1.55	51.09	10.08	5.47	340.59	73,560	3.57
T_7	Control	44.15	9.30	1.00	39.80	9.52	4.37	230.00	41,863	2.54
	C.D. (P=0.05)	5.05	0.89	0.28	2.29	0.345	0.46	4.83	-	-

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