Int.J.Curr.Microbiol.App.Sci (2021) *10*(01): 560-564

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 10 Number 01 (2021)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2021.1001.068

Effect of Organic Manures and Inorganic Fertilizers on Growth and Yield of Turnip (*Brassica rapa* L.) in Prayagraj Region

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Keywords

NPK, FYM, Vermicompost, Poultry Manure, Growth, Yield and Turnip

Article Info

Accepted:
08 December 2020
Available Online:
10 January 2021

A B S T R A C T

A field experiment entitled "Effect of organic manures and inorganic fertilizers on growth, yield of Turnip (*Brassica rapa*l.)" was carried out at research field, Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, during the Rabi season of (2019-2020). Five plants were selected randomly from each plot and were tagged and maintained as observational plants for recording their growth and yield characters of turnip. The Experiment was laid out in a Randomized Block Design with 11 treatments and 3 replications. Results revealed that the application of T_{10}:25% RDN (20:12.5:12.5)+75% PM (7.5 t ha^{-1}) influenced most of the characteristics significantly and recorded the highest values of plant height (46.74cm), number of leaves per plant (22.30), leaf length (cm) (30.23), shoot weight (23.87g), root weight (117.48g), root length (5.61cm), root diameter (6.67cm), root yield per plot (14.92kg^{-1}) and root yield (355.17q/ha).

Introduction

Turnip *(Brassica rapa*L.), 2n=20 belongs to family Cruciferae/ Brassicaceae. It is a winter crop but also a popular root vegetable crop. it is botanically herb, but is cultivated as annual root crop for both human and animal consumption. The storage organ is swollen hypocotyl. Turnips are high in Vitamin C, Calcium, Iron and other minerals, the tops (turnip greens) can be used as green vegetable which have high levels of Vitamin A, B, but the crop is generally grown for its roots. The nutritive value for 100 g of edible turnip root has Moisture 91.6 g, Protein 0.5 g, Fat 0.2 g, Minerals 0.6 g, Fibre 0.9 g, Carbohydrates 6.2 g, Energy 29 K Cal, Calcium 30 mg, Phosphorous 40 mg, Iron 0.4g, Thiamine 0.04 g, Riboflavin 0.04 g, Niacin 0.5 mg, Vitamin C 43 mg, whereas., in leaves of turnip has Moisture 81.6 g, Protein 4.0 g, Fat 1.5 g, Minerals 2.2 g, Fibre1.0 g, Carbohydrates 9.4 g, Energy 67 K Cal, Calcium 710 mg, Phosphorous 60 mg, Iron 28.4 mg, Carotene 9296µg, Thiamine 0.31 g, Riboflavin 0.57 g, Niacin 5.4 mg, Vitamin C 180 mg. India is the world's second largest producer of vegetables next to China. According to

estimation, India produces 87.50 million tonnes of vegetables from an area of 5.80 million hectares. Thus, India shares about 12% of world's output of vegetables (Thamburaj and Singh, 2001). In India, turnip is cultivated in an area of 2500 hectares with an annual production of 50,000 tonnes.

The organics are the indigenous source of nutrients which can help in increasing production and productivity along with improvement in soil physical conditions. Use of such organic materials, which are being wasted in large amounts without proper use can help in reducing cost of cultivation, increasing productivity and improving soil as well as human and livestock health. Various organic manures so far recognized in this group are green manures, rural/urban compost, farm yard manure, vermicompost, liquid organic manure etc.,

In India, all the organic manures together have a potential to supply approximately 33 million tonnes of N,P,K per year (Gaur *et al.*, 1992). Among organic manures, vermicompost is wieldy accepted by farmers and is produced due to the activity of earthworms. It is rich in all plant nutrients, beneficial microorganisms like N-fixers, biologically active metabolites, particularly gibberellins, cytokinins, auxins and group B vitamins and several enzymes like lipase, cellulose, chitase, urease, dehydrogenase and nitrogenase (Bano *et al*., 1987). The vermicompost can be applied alone or in combination with inorganic fertilizers to get better yield and quality of diverse crops.

Materials and Methods

The present experiment effect of organic manures and inorganic fertilizers on growth and yield of turnip (*Brassica rapa*L.) was donein Horticulture research field, Department of Horticulture, Naini Agriculture Institute, SHUATS, Prayagraj region was conducted during the year 2019-2020. The variety used for the experiment is purple top white globe, which were collected from local Prayagraj market. The observations were recorded on five randomly selected plants per replication was conducted in Randomized block design (RBD) with 10 treatments and 3 replications T_0 Control,$T_1$100% Recommended dose of nutrient (80:50:50)+25 t ha^{-1}, T_2:75% RDN (60:37.5:37.5) +25% FYM (6.25 t ha^{-1}), T_3:50% RDN (40:25:25) +50% FYM (12.5 t ha^{-1}), T_4: 25% RDN (20:12.5:12.5) +75% FYM (18.75 t ha^{-1}), T_5:75% RDN (60:37.5.5:37.5) +25% Vermicompost (1.5 t ha^{-1}), T_6: 50% RDN (40:25:25) +50% Vermicompost (3 t ha^{-1}), T_7:25% RDN (20:12.5:12.5) +75% Vermicompost (4.5 t ha^{-1}) T_8:75% RDN (60:37.5:37.5) +25% PM (2.5 t ha^{-1}), T_9: 50% RDN (40:25:25) +50% PM (5 t ha^{-1}), T_{10}: 25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}). The data collected on different parameters during the course of investigation were subjected to statistical analysis as per method of analysis of variance (Panse and Sukhatme 1957).The significance and non – significance of the treatment effect was judged with the help of 'F' variance ratio test. Calculated 'F' value was compared with the table value of 'F' at 5 % level of significance. If calculated value exceeds the table value, the effect was considered to be significant. The significant differences between the means were tested critical differences at 5% level of significance.

Results and Discussion

The detail pertaining to the research finding were presented and summarized below in this chapter. Organic manures and inorganic fertilizer were given at 25, 35 And 45 days after sowing. The results of present investigation are as follow and presented in table 01.

Table.1 Performance of Organic manures and inorganic fertilizers on growth and yield attributes of Turnip

Treatment Symbol	Treatment combination	Plant height 60 DAS	No.of leaves 60 DAS	Leaf length (cm)	Shoot weight (g)	Root weight (g)	Root length (cm)	Root diameter (cm)	Root yield per plot (kg) 4m^2	Root yield (q/ha)
T_0	Control	38.57	13.56	20.42	18.81	84.11	5.61	4.82	11.19	166.36
T_1	100% Recommended dose of nutrient (80:50:50)	39.51	16.64	25.56	22.19	96.40	6.73	6.02	12.82	305.27
T_2	75% RDN (60:37.5:37.5) +25% FYM (6.25 t ha^{-1})	41.50	18.51	25.44	22.02	95.67	6.16	5.56	12.72	302.94
T_3	50% RDN (40:25:25) +50% FYM (12.5 t ha^{-1})	42.46	17.42	26.44	20.12	104.01	7.10	5.63	13.85	329.82
T_4	25% RDN (20:12.5:12.5) +75% FYM (18.75 t ha^{-1})	41.63	19.53	21.52	21.31	111.81	6.62	5.57	14.31	335.07
T_5	75% RDN (60:37.5.5:37.5) +25% VC (1.5 t ha^{-1})	40.45	19.58	23.49	21.63	116.10	7.39	5.76	14.14	338.08
T_6	50% RDN (40:25:25) +50% `VC (3 t ha^{-1})	41.52	20.22	24.50	21.34	114.22	6.84	5.59	14.07	340.76
T_7	25% RDN (20:12.5:12.5) +75% VC (4.5 t ha^{-1})	38.57	19.20	23.52	23.07	113.44	7.34	5.65	14.20	336.61
T_8	75% RDN (60:37.5:37.5) +25% PM (2.5 t ha^{-1})	43.11	20.49	27.33	23.45	116.61	7.55	6.11	14.43	3 43.50
T_9	50% RDN (40:25:25) +50% PM (5 t ha^{-1})	43.41	21.53	28.43	23.69	117.43	7.66	6.21	14.48	344.83
T_{10}	25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1})	46.74	22.30	30.23	23.87	117.48	8.15	6.67	14.92	355.17
F-Test		S	S	S	S	**S**	**S**	**S**	**S**	S
S.Ed. (+)		0.197	0.188	0.122	1.260	1.842	0.279	0.214	0.445	10.843
C. D. at 0.5		0.412	0.392	0.254	2.628	3.842	0.582	0.446	0.950	22.619

The maximum plant height (46.74) was observed in the treatment T_{10}:25% RDN (20:12.5:12.575% PM (7.5 t ha^{-1}) and the minimum plant height (38.57) was observed in Treatment $T_{0:}$ (control). The maximum leaf length (cm) (30.23) was observed in the treatment T_{10}:25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}) and the minimum leaf length (20.42) was observed in Treatment $T_{0:}$ (control).The highest shoot weight was found in treatment (23.87) and other treatments found next in order in this regard as T_{10}:25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}) and the lowest shoot weight was found in treatment T_0 (18.81g) control. The highest root weight was found in treatment T_{10}:25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}) (117.48) and the lowest root weight was found in treatment T_0:(84.11) control. The highest root length was found in treatment T_{10}:25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}) (5.61) and the lowest root length was found in treatment $T_{0:}$ (5.61) control. The highest root diameter was found in treatment T_{10}:25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}) (6.67) and the lowest root diameter was found in treatment $T_{0:}$ (4.82) control. Highest root yield per plot (kg) was recorded in treatment T_{10}:25% RDN (20:12.5:12.5)+75% PM (7.5 t ha^{-1}) (14.92kg^{-1}) and the and minimum root yield per plot was obtained in treatment $T_{0:}$control (11.19 kg^{-1}). Highest root yield (355.17q/ha) was recorded in treatment T_{10}:25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}) and minimum root yield per plot was obtained in treatment $T_{0:}$ control (266.36q/ha)

On the basis of present investigation it is concluded that the treatment T_{10}:25% RDN (20:12.5:12.5) +75% PM (7.5 t ha^{-1}) was found to be the best treatment combination in respect of plant growth and root yield parameter of turnip grown under Prayagraj Agro-climatic conditions. The treatment T_8:75% RDN (60:37.5:37.5) +25% PM (2.5 t ha^{-1}), showed maximum gross return, net return and benefit: cost ratio i.e. (1: 2.53) respectively. These finding are based on one season trail, therefore, further evaluation trails are needed to substantiate the findings.

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How to cite this article:

Suma Gracia Pamula and Anita kerketta. 2021. Effect of Organic Manures and Inorganic Fertilizers on Growth and Yield of Turnip (*Brassica rapa* L.) in Prayagraj Region. *Int.J.Curr.Microbiol.App.Sci.* 10(01): 560-564. doi: https://doi.org/10.20546/ijcmas.2021.1001.068