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Studies on the effect of integrated nutrient management on growth attributing characters of radish (*Raphanus sativus L.*)

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Abstract: The experiment was carried out in the field of the Department of Horticulture, Janta College, Bakewar, Etawah (U.P.) during Rabi season of the year 2013-14. The layout of experimental field was laid down in Randomized Block Design with 9 treatments. These treatments randomized in three time replications with total number of 27 plots. The observations were recorded for growth attributing characters of radsh. Observations gathered with respect to increased over the height (66.02 cm) of plant, number of leaves (13.47) per plant, length of leaves (41.39 cm), width of leaves (12.98 cm), leaves size (537.89 cm^2) and fresh weight of leaves/plant (146.07 g) was obtained with the treatment T_{8-} NPK + FYM + PSB (80:60:60 kg/ha) + (10t/ha) + (5kg/ha) while, minimum values was obtained to control.

Keyword: NPK + FYM + PSB, Height of plant, Leave size, Number of leaves per plant and Weight of leave/ plant

Introduction

Among the root crop Radish (*Raphanus sativus* L.) belongs to the family Brassicaceae, genus *Raphanus* and species *sativus* having chromosome number (2n=18). Radish is grown for its young tender tuberous root, which is consumed either cooked or raw and potential source of non-drying fatty oil suitable for soap making illuminating. In homeopathy, it is used for neurological problems, headache, sleeplessness and chronic diarrhea. The leafy top is very rich in minerals, particularly Ca and Fe. Radish leaves are excellent source of vitamins as 100 g, leaves contain 9570 I.U. vitamin-A, 0.18 mg thiamine, 0.35 mg riboflavin, 5.5 mg nicotinic acid and 16 mg ascorbic acid (Aykroyd, 1966). The characteristics pungent flavour of radish is due to the presence of volatile thiocyanates (trans-4-methyl-thiobutenyl, isothiocynate) and the colour of pink cultivar due to the presence of anthocynin pigments.

Farmyard manure is conspicuous organic compost of an integrated nutrient supply system, which improves soil health and releases macro and micro nutrient. *Azotobacter* is free living nitrogen fixing bacteria, fixing nitrogen equivalent 30-40 kg /ha N_2 which increases 15-20 per cent yield and growth. Phosphate solubilizing bacteria play a significant role in solubilizing insoluble phosphate. As well as supplementary of chemical fertilizer like N, P and K given by Urea, DAP and Murate of potash. Ying *et al.* (2006) reported was effect of Integrated Nutrient Management in carrot, FYM and bio-fertilizer 75 per cent N, P and K + 10 tone FYM + *Azotobacter*.

Materials and Methods

The field experiment was conducted at the main experiment station, department of horticulture, Janta College, Bakewar, Etawah during the year 2013-14 in Rabi season. The experimental was laid down in randomized block design with 9 treatments as follow: T_{1-} Control, T_{2-} FYM (20t/ha), T_{3-} FYM + *Azotobacter* + PSB (10t/ha) + (5kg/ha) + (5kg/ha), T_{4-} FYM + *Azotobacter* (10t/ha) + (5kg/ha), T_{5-} NPK (80:60:60 kg/ha), T_{6-} NPK + FYM (80:60:60 kg/ha + 10t/ha), T_{7-} NPK + FYM + *Azotobacter* (80:60:60 kg/ha) + (10t/ha) + (5kg/ha), T_{8-} NPK + FYM + PSB (80:60:60 kg/ha) + (10t/ha) + (5kg/ha) T_{9-} NPK + FYM + *Azotobacter* +PSB (80:60:60 kg/ha) + (10t/ha) + (5kg/ha) + (5kg/ha), replicated three times with total 27 plots. The observations revealed with respect to length of leaves (cm) was conducted after harvesting the length of leaves of five plants were measured from the base scale to end of the leaves by the measuring scale, width of leaves (cm) measured with the help of meter scale from the middle leaf at horizontal level and was noted in centimeters, fresh weight of leaves (g) measured by an electronic balance and the mean weight of the leaves were calculated of each plot, number of leaves per plants the five plants were counted and the mean number of leaves per plant was calculated for each plot, height of plants at harvest of whole plant were measured by a measuring scale and then the mean height of plants and leaves size (cm^2) leaf size was obtained by multiplication of leaf length and leaf width. The recorded data was subjected to analysis of variance appropriate to the randomized block design as given by (Chandel, 1984).

Results and Discussion

In this chapter, Endeavour has been made to exam pain the result of various sources of tables. Emphasis has been given on the statistical analysis in order to compare one treatment with another, so that the validity of treatment may be clarified with confidence. It is evident from data revealed in table-1 that:

Plant height (cm): In this investigation, the variety of radish (Kashi Sweta) was tried. Among the growth parameters studied**,** the maximum height of plant (66.02 cm) was observed with the

Table-1: Studies on the effect of integrated nutrient management on growth attributing characters of radish cv. Kashi Sweta

Treatments	Height of plant (cm)	No. of leaves per plant	Length of leaves (cm)	Width of leaves (cm)	Size of leaves (cm^2)	Fresh weight of leaves (g)
T_1: Control	53.29	10.40	26.93	8.63	232.92	55.60
T_2: FYM	57.13	11.47	30.87	9.73	304.35	69.80
T_3: FYM+ Azotobacter+PSB	55.08	10.86	27.99	9.68	271.06	58.40
T_4: FYM + *Azotobacter*	57.79	11.47	27.97	9.05	253.30	60.47
T_5: NPK	65.89	12.53	36.49	12.02	439.89	146.07
T_6: NPK+ FYM	59.78	12.73	36.79	11.93	438.12	111.67
T_7: NPK+FYM+Azotobacter	63.72	12.33	36.62	12.35	453.12	120.13
T_8: NPK + FYM + PSB	66.02	13.47	41.39	12.98	537.89	120.27
T_9: NPK+FYM+Azotobacter+PSB	60.52	12.13	37.91	12.05	457.05	105.13
S. Em ±	4.09	0.72	1.52	0.92	41.34	16.19
CD at 5%	8.69	1.53	3.22	1.96	87.63	34.34

application of NPK + FYM + PSB (80:60:60 kg/ha + 10 t/ha + 5 kg/ha) under T_8 followed by (65.89 cm) with T_5 (NPK @ 80:60:60 kg/ha) and T_7 (NPK + FYM + *Azotobacter* @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha), the minimum plant height was recorded under T_1 namely control (53.29 cm).

Number of leaves: The maximum number of leaves per plant (13.47) was observed with the application of NPK + FYM + PSB (80:60:60 kg/ha + 10 t/ha + 5 kg/ha) under T_8 followed by (12.73) with T_6 (NPK + FYM @ 80:60:60 kg/ha + 10 t/ha) and T_5 (NPK @ 80:60:60 kg/ha), the minimum number of leaves per plant was recorded under T_1 namely control (10.40).

Length of leaves: The maximum length of leaves (41.39 cm) was observed with the application of NPK + FYM + PSB (80:60:60 kg/ha + 10 t/ha + 5 kg/ha) under T_8 followed by (37.91 cm) with T_9 (NPK + FYM + *Azotobacter* + PSB @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha + 5 kg/ha) and T_6 (NPK + FYM @ 80:60:60 kg/ha + 10 t/ha), the minimum length of leaves was recorded under T_1 namely control (26.93cm).

Width of leaves: The maximum width of leaf (12.98 cm) was observed with the application of NPK + FYM + PSB (80:60:60 kg/ha + 10 t/ha + 5 kg/ha) under T_8 followed by (12.35 cm) with T_7 (NPK + FYM + *Azotobacter* + @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha) and T_9 (NPK + FYM + *Azotobacter* + PSB @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha + 5 kg/ha), the minimum width of leaves was recorded under T_1 namely control (8.63 cm).

Size of leaves: The maximum leaves size (537.89 cm^2) was observed with the application of NPK + FYM + PSB (80:60:60 kg/ha + 10 t/ha + 5 kg/ha) under T_8 followed by (457.05 cm^2) with T_9 (NPK + FYM + *Azotobacter* + PSB @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha + 5 kg/ha) and T_7 (NPK + FYM + *Azotobacter* @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha), the minimum leaves size was recorded under T_1 namely control (232.92 cm^2).

Fresh weight of leaves: The maximum fresh weight of leaves (146.07g) was observed with the application of NPK (80:60:60 kg/ha) under T_5 followed by (120.27g) with T_8 (NPK + FYM + PSB @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha) and T_7 (NPK + FYM + *Azotobacter* @ 80:60:60 kg/ha + 10 t/ha + 5 kg/ha),the minimum fresh weight of leaves was recorded under T_1 namely control (55.60g).

Since integrated nutrient management supply all essential elements of the plants in a proper amount it's promote the growth of the plant which increased the vegetative growth and maintain the soil fertility and sustainability. They are nutrient increased the plant height, number of leaves, length and width of leaves, size of leaves and fresh weight of leaves in radish.

The results are in conformity with the findings of Sharma *et al.* (2007) who also recorded maximum plant height treated with N_{50}, P_{25}, K_{25} g/m^2. Similar results were also found by Navale and Wani (2006), Ruben (2007) and Tesfaye, *et al.* (2007) in onion and other vegetables crops the similar result was found by Rao and Sanker (2000). These results also corroborate with that of Singh *et al.* (2002).

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References

Aykroyd, W.R.: The Nutritive *value* of Indian Foods and the planning of satisfactory diets, *ICMR*, New Delhi (1966).

Ying, A. and Kumar, M.: Effect of integrated nutrient management in carrot. *Haryana J. Hort. Sci.,* **68**: 170-172 (2006).

Chandel, S.R.S.: Principals of experimental design. A Hand book of Agriculture statistics. p. 14-53 (1984).

Naval, A.M. and Wani, P.V.: Effect of *Glomus mosseae* and or *Azospirillum* ipoferum inoculation under graded levels of nitrogen fertilizer on growth and yield of onion (*Allium cepa* L.) cv. B-780 under field condition *Intern .J. Pl. Sci. Muzaffarnagar,* **1**: 222-226 (2006).

Sharma, G. and Singh, P.: Response of N, P and K on vegetative growth, flowering and corm production in gladiolus under mango orchard. *Journal of Ornamental Horticulture*, **10**: 52 -54 (2007).

Ruban, J.S.: Effect of bio-fertilizers on vegetative growth of onion (*Allium cepa* L.). *Pl. Archives,* **7**: 201-202 (2007).

Tesfaye, B., Pal, N and Saxena, A.K.: Response of onion*(Allium cepa* L.) to combined application of biological and chemical nitrogenous fertilizers. *Acta Agri. Slovenica,* **89**: 107-114 (2007).

Rao, P.S.S.S. and Sankar, C.R.: Effect of organic manure on growth and yield of brinjal *South Ind. Hort.,* **49**: 288-291 (2000).

Singh, B., Pal, A.K., Tiwari, K.K., Pandey, S. Singh, G. and Banerjes, M.K.: Genetic association analysis in Asiatic Radish (Raphanus sativus L.) *Indian journal of plant Genetic Resources*, **15**: 121-124 (2002).