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Effect of Integrated Nutrient Management on Growth, Yield and Quality of Carrot (*Daucus carota* L.) cv. New Kuroda

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Abstract: The experiment entitled **"Effect of Integrated Nutrient Management on Growth, Yield and Quality of Carrot (*Daucus carota* L.) cv. New Kuroda"** was conducted during Rabi season of the year 2020-2021 on Department of Horticulture, Sam Higginbottom University of Agriculture, Technology, Prayagraj. The experiment was laid out in Randomized Block Design comprising of 13 treatments each replicated three times. Treatments were randomly arranged in each replication, divided into thirty nine plots. The experiment was carried out with the thirteen integrated nutrient management treatments**.** Among the treatments, T_{11} FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK registered significantly higher plant height (82.95), number of leaves per plant (14.66), root length (10.82), root diameter (3.42), fresh weight of root (67.01), dry weight of root (4.13), root yield plot^{-1}(17.80kg), root yield (455.00q ha^{-1}) and Total soluble solid (9.45 ^{0}Brix). Whereas the maximum benefit cost ratio (1: 5.24 & 5.29) was found in T_{10} and T_{12}.

Keywords:- Integrated nutrient management, Carrot, Growth, Yield and quality.

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INTRODUCTION

Carrot (*Daucus carota* L.) is an important root vegetable, belongs to the family umbelliferae with diploid chromosome number 2n = 18. It is cultivated all over the world, during spring-summer in temperate countries and winter in tropical and subtropical countries. Carrot is an excellent source of carotene a precursor of vitamin A and fibre in the diet **(Handelman, 2001).**

Daucus carota is a biennial plant in the Umbellifer family Apiaceae. Fast- growing cultivars mature within three months (90 days) of sowing the seed, while late maturing cultivars are harvested four months later (120 days).After germination, carrot seedlings show a distinct demarcation between taproot and leaf. Carrot plant is an erect, biennial plant. Leaves have long petiole compound and pinnate **(Kochhar, 2011).**

Carrot cultivars are majorly of two groups, eastern carrots and western carrots **(Grubben, 2016).** Eastern carrots that survive to the present day are commonly purple or yellow, and often have branched roots. The purple colour common in these carrots comes from anthocyanin pigments (**Tiwari *et al*., 2012).**

MATERIALS AND METHODS

1- Experimental site:

The experiment entitled **"Effect of Integrated Nutrient Management on Growth, Yield and Quality of Carrot (*Daucus carota* L.) cv. New Kuroda"** was conducted during Rabi season of the year 2020-2021 on Department of Horticulture, Sam Higginbottom University of Agriculture, Technology, Prayagraj..

2- Climate and weather condition:

Prayagraj has subtropical climate, which prevails in the South East part of U.P., with the both extremes of temperature i.e. the winters and the summers. In fairly cold winters (during Oct-Feb), the temperature falls to 3-4^{0}C, sometimes below -1^{0}C. During summer (March-June), the temperature rises

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upto 45^0C, sometimes 47-48^0C with low relative humidity (20%) and dust laden winds. During monsoon (June-Sept) 85% of average rainfall of 1100mm with fall in temperature 40-45^0C on rainy days.

RESULTS AND DISCUSSION

The present investigation entitled **"Effect of Integrated Nutrient Management on Growth, Yield, and Quality of Carrot (*Daucus carota* L.) cv. New Kuroda"** was undertaken at the Department of Horticulture, Naini Agriculture Institute, SHUATS, Praygraj during the rabi season 2020-2021, to find out the most suitable treatment for plants growth, root yield and quality parameters of carrot have been represented with tables and bars-diagrams wherever required.

1. Effect of Integrated Nutrient Management on Plant height (cm) of carrot (*daucus carota*l.) cv. New Kuroda

In the present study, plant height as influenced by integrated nutrient management was significant results at the successive stages of growth till harvest. The statistically analysed data are presented in table 4.1 and graphically shown in fig.4.1.

Effect of integrated nutrient management had shown significant difference on plant height at 30, 60 days and 90 days after sowing.

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Table 4.1 Effect of integrated nutrient management on plant height (cm) of carrot (*daucus carota*l.) cv. New Kuroda

Treatments No.	Treatments Symbols	Plant height (cm)		
		30 DAS	60 DAS	90 DAS
T_0	Control	12.07	21.47	55.14
T_1	FYM 20t ha-1	14.90	26.18	60.94
T_2	Vermicompost 5 t ha-1	15.67	27.32	66.23
T_3	FYM 10 t ha-1 + Vermicompost 2.5 t ha-1 + NPK 25%	16.96	28.06	62.02
T_4	FYM 10 t ha-1+50% NPK+ Biofertilizer (2kg ha-1)	15.48	30.36	64.10
T_5	Vermicompost 2.5 t ha-1+50%NPK Biofertilizer (2 kg ha-1)	17.23	32.08	70.24
T_6	FYM 10 t ha-1+ 75% NPK + Biofertilizer (2kg ha-1)	17.80	33.51	71.61
T_7	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1)	18.90	33.32	71.81
T_8	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1)	19.31	31.30	79.58
T_9	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1) + 75 %NPK	20.17	30.99	69.62
T_{10}	Vermicompost 2.5 t ha-1+ NPK50% + Biofertilizer (2 kg ha-1)	19.43	29.75	79.96
T_{11}	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK	22.88	36.98	82.95
T_{12}	100% NPK (60:80:75 kg ha-1)	17.37	26.99	77.11
	F-Test	**S**	**S**	**S**
	C.D. at 0.5%	**2.552**	**3.683**	**2.834**
	S.Ed. (±)	**1.236**	**1.784**	**1.373**
	CV	**8.662**	**7.313**	**2.399**

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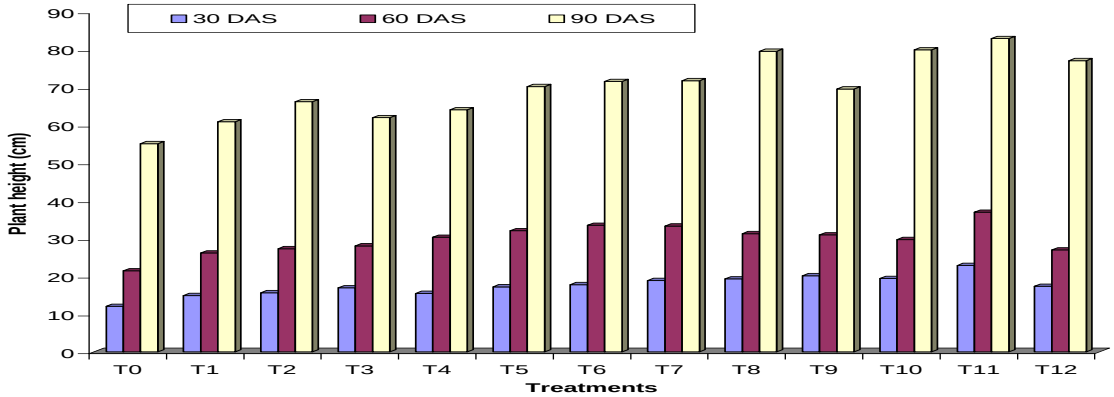

Fig. 4.1 Effect of integrated nutrient management on plant height (cm) of carrot (*daucus carota*l.) cv. New Kuroda

2. Effect of integrated nutrient management on root length (cm) of carrot (*daucus carota* L.) cv. New Kuroda

Effect of integrated nutrient management had shown significant difference on the root length of carrot at harvest. The statistically analysed data have been presented in the table 4.2 and graphically shown in the fig. 4.2.

The maximum root length (23.48) was recorded with treatment T_{11} FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK.Whereas the minimum root length (10.82) was obtained with the treatment T_1 (Control).

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Table 4.2 Effect of integrated nutrient management on root length (cm) of carrot (*daucus carota* L.) cv. New Kuroda

Treatments No.	Treatments Symbols	Root length (cm)
T_0	Control	10.82
T_1	FYM 20t ha-1	12.57
T_2	Vermicompost 5 t ha-1	15.38
T_3	FYM 10 t ha-1 + Vermicompost 2.5 t ha-1 + NPK 25%	14.93
T_4	FYM 10 t ha-1+50% NPK+ Biofertilizer (2kg ha-1)	16.82
T_5	Vermicompost 2.5 t ha-1+50%NPK Biofertilizer (2 kg ha-1)	18.03
T_6	FYM 10 t ha-1+ 75% NPK + Biofertilizer (2kg ha-1)	18.95
T_7	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1)	19.97
T_8	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1)	20.74
T_9	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1) + 75 %NPK	17.63
T_{10}	Vermicompost 2.5 t ha-1+ NPK50% + Biofertilizer (2 kg ha-1)	16.33
T_{11}	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK	23.48
T_{12}	100% NPK (60:80:75 kg ha-1)	20.10
	F-Test	**S**
	C.D. at 0.5%	**1.073**
	S.Ed. (±)	**0.520**
	CV	**3.666**

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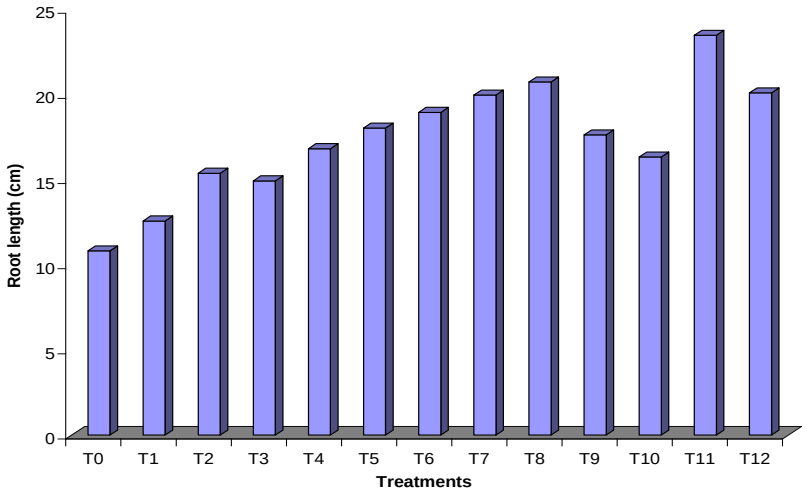

Fig. 4.2 Effect of integrated nutrient management on root length (cm) of carrot (*daucus carota* L.) cv. New Kuroda

3. Effect of integrated nutrient management on Root yield plot^{-1} (kg) of carrot (*daucus carota* L.) cv. New Kuroda

Effect of integrated nutrient management had shown significant difference on the root yield plot^{-1}(kg) of carrot at harvest. The statistically analysed data have been presented in the table 4.3 and graphically shown in the fig. 4.3.

The maximum root yield plot^{-1}(17.80kg) was recorded with treatment T_{11} Whereas the minimum root yield plot^{-1}(10.72kg) was obtained with the treatment T_1 (Control).

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Table 4.3 Effect of integrated nutrient management on Root yield plot^{-1} (kg) of carrot (*daucus carota* L.) cv. New Kuroda

Treatments No.	Treatments Symbols	Root yield plot^{-1} (kg)
T_0	Control	10.72
T_1	FYM 20t ha-1	11.70
T_2	Vermicompost 5 t ha-1	13.04
T_3	FYM 10 t ha-1 + Vermicompost 2.5 t ha-1 + NPK 25%	13.34
T_4	FYM 10 t ha-1+50% NPK+ Biofertilizer (2kg ha-1)	14.40
T_5	Vermicompost 2.5 t ha-1+50%NPK Biofertilizer (2 kg ha-1)	13.82
T_6	FYM 10 t ha-1+ 75% NPK + Biofertilizer (2kg ha-1)	13.49
T_7	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1)	15.02
T_8	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1)	16.83
T_9	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1) + 75 %NPK	16.29
T_{10}	Vermicompost 2.5 t ha-1+ NPK50% + Biofertilizer (2 kg ha-1)	16.49
T_{11}	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK	17.80
T_{12}	100% NPK (60:80:75 kg ha-1)	15.12
	F-Test	S
	C.D. at 0.5%	1.207
	S.Ed. (±)	0.585
	CV	4.799

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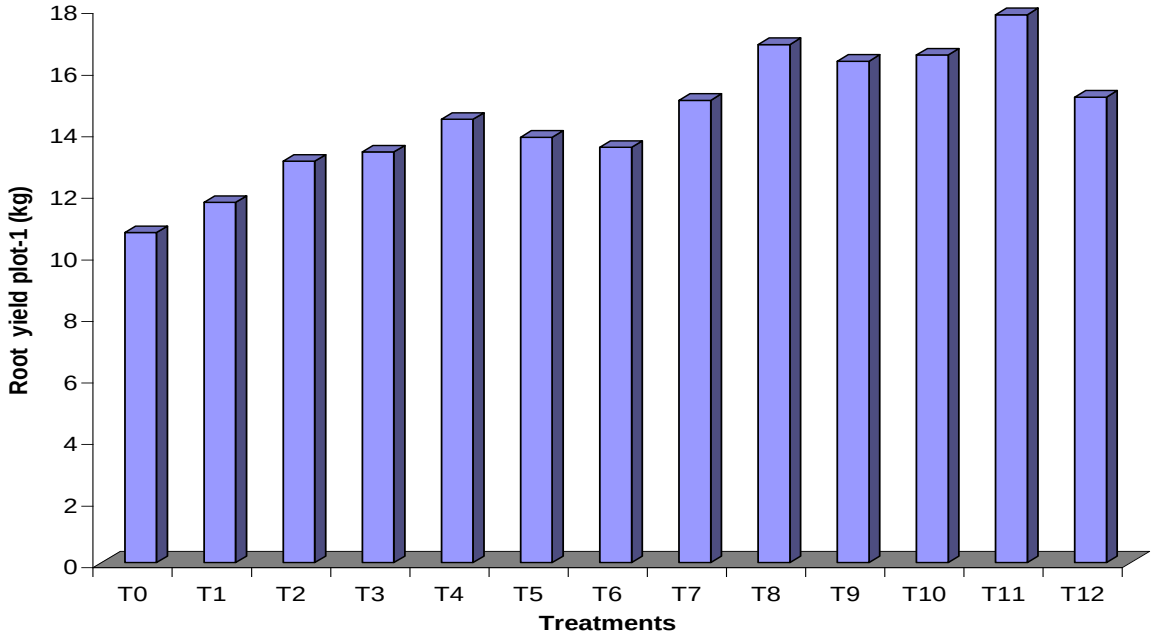

Fig. 4.3 Effect of integrated nutrient management on Root yield plot^{-1} (kg) of carrot (*daucus carota* L.) cv. New Kuroda

4. Effect of integrated nutrient management on TSS of carrot (*daucus carota* L.) cv. New Kuroda

Effect of integrated nutrient management had shown significant difference on the TSS of carrot at harvest. The statistically analysed data have been presented in the table 4.4 and graphically shown in the fig. 4.4

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The maximum total soluble solid (9.45 ^{0}Brix) was recorded with treatment $T_{11,}$ Whereas the minimum total soluble solid (^{0}Brix) was obtained with the treatment T_1 (Control)

Table 4.4Effect of integrated nutrient management on TSS of carrot (*daucus carota* L.) cv. New Kuroda

Treatments No.	Treatments Symbols	TSS
T_0	Control	6.64
T_1	FYM 20t ha-1	8.67
T_2	Vermicompost 5 t ha-1	9.15
T_3	FYM 10 t ha-1 + Vermicompost 2.5 t ha-1 + NPK 25%	8.86
T_4	FYM 10 t ha-1+50% NPK+ Biofertilizer (2kg ha-1)	8.38
T_5	Vermicompost 2.5 t ha-1+50%NPK Biofertilizer (2 kg ha-1)	7.50
T_6	FYM 10 t ha-1+ 75% NPK + Biofertilizer (2kg ha-1)	8.75
T_7	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1)	9.14
T_8	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1)	9.22
T_9	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1) + 75 %NPK	7.77
T_{10}	Vermicompost 2.5 t ha-1+ NPK50% + Biofertilizer (2 kg ha-1)	8.34
T_{11}	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK	9.46
T_{12}	100% NPK (60:80:75 kg ha-1)	8.45
	F-Test	S
	C.D. at 0.5%	0.882
	S.Ed. (±)	0.427
	CV	6.169

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5. Economics of different treatments and cost: benefit ratio

Treatments		Yield (q/ha)	Selling price (Rs./q)	Cost of Cultivation	Gross return	Net return	Cost benefit ratio
T_0	Control	120.66	1000	62900	120660	57760	1.92
T_1	FYM 20t ha-1	292.53	1000	122900	292530	169630	2.38
T_2	Vermicompost 5 t ha-1	325.92	1000	82900	325920	243020	3.93
T_3	FYM 10 t ha-1 + Vermicompost 2.5 t ha-1 + NPK 25%	333.61	1000	105030	333610	228580	3.18
T_4	FYM 10 t ha-1+50% NPK+ Biofertilizer (2kg ha-1)	359.93	1000	98672.1	359930	261257.9	3.65
T_5	Vermicompost 2.5 t ha-1+50%NPK Biofertilizer (2 kg ha-1)	345.41	1000	78672.1	345410	266737.9	4.39
T_6	FYM 10 t ha-1+ 75% NPK + Biofertilizer (2kg ha-1)	337.21	1000	100811.5	337210	236398.5	3.34
T_7	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1)	375.49	1000	74400	375490	301090	5.05
T_8	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1)	420.80	1000	104400	420800	316400	4.03
T_9	Vermicompost 2.5 t ha-1 + Biofertilizer (2 kg ha-1) + 75 %NPK	407.20	1000	80811.5	407200	326388.5	5.04
T_{10}	Vermicompost 2.5 t ha-1+ NPK50% + Biofertilizer (2 kg ha-1)	412.13	1000	78672.1	412130	333457.9	5.24
T_{11}	FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK	445.00	1000	108672.1	445000	336327.9	4.09
T_{12}	100% NPK (60:80:75 kg ha-1)	378.05	1000	71454.3	378050	306595.7	5.29

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CONCLUSION

The treatment combination T_{11} [FYM 10 t ha-1+Vermicompost 2.5t ha-1 + Biofertilizer (2 kg ha-1) 75% NPK] was appropriate for Carrot in Prayagraj. Conditions for getting maximum growth and yield. Whereas the maximum benefit cost ratio (5.24 & 5.29) was found in T_{10} and T_{12} , but there is need further of investigation to confirm the result at various locations.

REFERENCES

[1]. Handelman. G.J. 2001. The evolving role of carotenoids in human biochemistry. Nutrition, 17:818-822.

[2]. Kochhar, S. L (2011). Economic Botany in the Tropics. Fourth Edition, pp245-246. Macmillan.

[3]. Mehwish Kiran, Muhammad Saleem Jilani, Kashif Waseem and Sarfaraz Khan Marwat (2016). Response of Carrot (*Daucus carota* L.) Growth and Yields to Organic Manure and Inorganic Fertilizers . American-Eurasian J. Agric. & Environ. Sci., 16 (6): 1211-1218

[4]. (**Tiwari *et al.*, 2012).** Integrated nutrient management on growth, yield and quality of carrot. *Karnataka J. Agric. Sci.* 23 (3): 542-543

[5]. Singh D.P., Kumar Sanjay, Maji Sutanu and Pandey Vijay Kumar (2017). Studies on integrated nutrient management on growth, yield and quality of carrot (*Daucus carota* L.). International Journal of Agriculture Sciences, 8:(51), pp.-2187-2188

