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Integrated use of organic and inorganic fertilizers on the growth and yield parameters of carrot (*Daucus carota* L.) cv. Pusa Vristi

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Abstract
The current entitled "Integrated use of organic and inorganic fertilizers on the growth and yield parameters of carrot (*Daucus carota* L.) cv. Pusa vristi" was conducted on the experimental field, Department of Horticulture, Lovely Professional University, Phagwara, Punjab, during rabi season 2022-23. The seeds of carrot were sown on the ridges in the last week of November with a spacing of 45 X 10 cm. The trail was laid out in Randomized Block Design (RBD) with fourteen treatments replicated thrice. The experiment uses fourteen different treatment combinations, including 100% NPK, vermi compost, poultry manure, FYM, 75% NPK+VC, 75% NPK+PM, 75% NPK+FYM, 50% NPK+VC, 50% NPK+PM, 50% NPK+FYM, 25% NPK+VC, 25% NPK+PM, 25% NPK+FYM, and control with Pusa Vrishti, respectively. According to the experiment's findings, 75% NPK+VC had the maximum values for plant height (45.20 cm), number of leaves (17.73), fresh and dry root weight (121.50g and 8.97g), root yield/plot (13.06kg), root yield per hectare (17.42t), and root diameter (4.28cm), among the various treatment combinations.

Keywords: Carrot, organic manures, nitrogen, phosphorus, potassium, growth

Introduction
Carrot (*Daucus carota* L.) is the one of the most significant root crops, a member of the Apiaceae (Umbelliferae) family with the chromosomal number 2n=18 (X=9). The carrot is farmed as a biannual crop for the production of its seeds and as an annual crop for the production of its roots. Most often grown as a cool-season crop, carrots. Over 25 °C soil temperatures cause poor growth rates, fibrous roots, and low levels of beta-carotene.

Carrot is indigenous to Afghanistan and the surrounding areas of Russia, Iran, India, Pakistan, and Antolia in southwest Asia. The carrot's taproot (conical shape), which was produced beneath the soil and has a vertical root system, is its economic or edible section. The inflorescence is called a "Compound Umbel." According to Singh *et al*. (2015), the fruit type of carrots is an oblong-ovoid schizocarp that is 2-4 mm long and contains 500–1000 seeds per gramme.

Carotenoids, often known as pro-vitamin A, are abundant in carrots. The anthocyanins in the root are what give eastern, purple carrots their colour. Lycopene is abundant in several Japanese cultivars with red flesh. In general, carrots produced in cool climates are sweeter than those grown in hot climates. Carrots' astringent flavour is brought on by their high terpolene concentration and low sugar level.

Regular N, P, and K doses can affect carrot seed emergence as well as the growth and yield of high-quality carrots. Nitrogen overdose causes the roots to split more easily, which directly affects the carrot crop's marketable production. This demonstrates that the amounts of N, P, and K are significant factors in the formation of high-quality carrots. The administration of the required NPK fertilizer dose can produce the best yield.

Organic manures such as farmyard manure, vermicompost, and poultry manure are increasingly used today due to the need of maintaining the soil's fertility and productivity. Micro and macronutrients, vitamins, growth hormones, and enzymes are all abundant in vermicompost. FYM is a source of organic carbon that will enhance the physical characteristics of the soil. According to Vishal Kumar Pal *et al*. (2019), one of the ingredients used primarily in the production of vegetable crops is poultry manure.

Material and Methodology

The current investigation was carried out at experimental field at, Department of Horticulture, School of agriculture, Lovely Professional University, Phagwara, Punjab, India during rabi season in the year 2022-23. The seeds of carrot cv. Pusa vristi was procured from Indian Agricultural Research Institute (IARI), New Delhi. The climacteric condition of Punjab is tropical with three distinct seasons *i.e;* winter, summer and rainy. The average temperature in cool season between 15-20 °C and relative humidity varies from 80% to 95% with an annual rainfall of 450-550mm. The carrot seeds was sown on the ridges at a spacing 45 X 10cm of uniform distance in the last week of November. All the fertilizers and manures are applied to concerned as per the treatments. The treatments *viz.*

Table 1: Combination of treatments

1	NPK 100%	T_1
2	Farm Yard Manure (FYM)	T_2
3	Vermicompost (VC)	T_3
4	Poultry manure (PM)	T_4
5	75% NPK + Farm Yard Manure	T_5
6	75% NPK + Vermicompost	T_6
7	75% NPK + Poultry manure	T_7
8	50% NPK + Farm Yard Manure	T_8
9	50% NPK + Vermicompost	T_9
10	50% NPK + Poultry manure	T_{10}
11	25% NPK + Farm Yard Manure	T_{11}
12	25% NPK + Vermicompost	T_{12}
13	25% NPK + Poultry manure	T_{13}
14	Control	T_{14}

Three replications of the Randomised Block Design (RBD) were used to evaluate the treatments. When the field was being prepared, the necessary amount of organic manures according to the treatment combinations was administered. In accordance with the treatments, NPK fertilizers are also administered to the ridges. The sowing was finished the following day, and irrigation followed right after. Other cultural practices, such as managing insect pests and diseases, hoeing, watering, and weeding, were carried out as needed. The responses of NPK and organic manures on growth and yield character in carrot (*Daucus carota* L.) cv. Pusa Vristi were observed on five randomly chosen plants from each treatment. The statistical programme was used to perform an analysis of variance (ANOVA) on the data that were gathered throughout the inquiry and the crucial difference was checked against the significance difference between the means at the 5% chance level.

Results and Discussion

The current study, "Integrated use of organic and inorganic fertilizers on the growth and yield parameters of carrot (*Daucus carota* L.) cv. Pusa vristi," produced the findings that are presented here. This data was statistically Analysed and explained as follows:

Growth parameters

Table 2 shows the observations that were made in the days leading up to the appearance of the carrot. Regarding the number of days till emergence, there was a significant variation between the various treatments. T_6 (12.67) had the statistically significant early emergence among the different treatments, followed by T_9 (14.67), T_{12} (15.33), and T_3 (15.00), while T_{14} (19.67) with the application of no fertilizer and T_{13} (18.33) with the application of 25% NPK+PM had the late emergence. The observation for the percentage of carrots that emerged is shown in Table 2. Regarding emergence %, there was a considerable disparity between the various treatments. T_6 (86.66%) demonstrated the highest rate of emergence among the various treatments; it is *at par* with T_9 (85.77%). The highest percentage of emergence was seen in T_{12} (85.11%), followed by T_3 (85.11%), which was statistically significant compared to other treatments, and T_{14} (67.77%) with no fertilizer application.

Table 2 displays the observations for the height of the carrot plant at 30 DAS. There was a considerable difference in plant height 30 DAS between the various treatments. The plant with the lowest height at 30 DAS was T_{14} (8.73 cm), which, when no fertilizers and chicken manure were applied, was equal to T_4 (9.40 cm). Among the different treatments, T_6 (15.60cm) had the tallest plants at 30 DAS, followed by T_9 (14.00cm), T_{12} (13.73cm), and T_3 (13.50cm). The observations for the carrot plant height at 60 DAS are shown in Table 2. Regarding plant height 60 DAS, there was a considerable variation between the various treatments. The lowest plant height measured at 60 DAS was found in T_{14} (13.63 cm), which is on par with T_4 (13.84 cm) when no fertilizers and chicken manure are applied. Among the different treatments, T_6 (28.20 cm) had the tallest plants at 60 DAS, followed by T_9 (26.50 cm), T_{12} (23.10 cm), and T_3 (23.10 cm). Table 2 displays the observations for the height of the carrot plant at 90 DAS. There was a considerable difference in plant height 90 DAS between the four treatments. The treatment with the lowest plant height 90 DAS was T_{14} (30.53cm), which was equal to treatment T_4 (31.50cm) with no fertilisers and chicken manure applied. Among the different treatments, T_6 (45.20 cm) had the tallest plants at 90 days, followed by T_9 (43.37 cm) and T_{12} (43.53 cm). This difference from other treatments was statistically significant.

Table 2 displays the observation on the carrot's number of leaves at 30 DAS. At 30 DAS, there was a substantial difference between the various treatments in terms of the number of leaves per plant. The treatment T_6 (4.87) had the most leaves at 30 days after sowing (DAS), which is comparable to the treatment T_9 (4.67), and the treatment T_{14} (3.3), which applied no fertiliser and was comparable to the treatment T_4 (3.40), which applied poultry manure, had the fewest leaves at 30 days after sowing (DAS). Table 2 displays the observation on the carrot's number of leaves at 60 DAS. At 60 DAS, there was a substantial difference between the various treatments in terms of the number of leaves per plant. T_6 (12.87), which is comparable to T_9 (12.27), and T_{12} (11.03) and T_3 (9.40), which were statistically significant in comparison to other treatments, both had the largest number of leaves at 60 DAS. T_{14} (7.80), which used no fertilizer and was on par with T_4 (7.93), had the fewest leaves at 60 DAS. Table 2 displays the observation on the number of carrot leaves at 90 DAS. There was a considerable difference in leaves per plant 90 DAS between the different treatments. T_6 (17.73), which was comparable to T_9 (17.33), and T_{12} (16.73) and T_3 (16.17), which were statistically significant in comparison to other treatments, had the largest number of leaves 90 DAS. T_{14} (11.00), which had no fertilizer application, had the fewest leaves 90 DAS.

Yield parameters

Table 3 displays the observation for the carrot's fresh root

weight. There was a significant difference in fresh root weight between the various treatments. T_6 (121.50g) had the largest fresh root weight, which was followed by T_9 (110.57g), T_{12} (103.50g), and T_3 (95.53g). These results were all statistically significant when compared to the other treatments. T_{14} (89.27g), which didn't receive any fertilizer, had the smallest fresh root weight. The data for the observation of carrot dry root weight is provided in Table 3. The various treatments varied greatly with regard to dry root of weight. The treatment T_6 (8.97g), which applied 75% NPK+VC, had the lowest dry root weight, and it was comparable to the treatment T_9 (8.65g), which applied 50% NPK+VC. The treatment T_{14} (4.18g), which was statistically significant compared to other treatments, demonstrated the highest dry root weight among the various treatments, followed by T_{13} (4.92g) and T_{10} (4.95g). The measurement of the diameter of the carrot roots has been made and is displayed in Table 3. There was a considerable difference in root diameter between the various treatments. T_6 (4.28 cm) and T_9 (4.01 cm) had the largest root diameters, respectively, and were followed by T_{12} (3.51 cm) and T_3 (3.40 cm), both of which were statistically significant in comparison to other treatments. T_{14} (2.18 cm) had the smallest root diameter and no fertilizer had been applied.

Table 3 displays the measurement of the carrot's fresh root length. There was a considerable difference in root of length between the various treatments. Treatment T_6 had the longest roots, measuring 22.87 cm. Treatments T_9 (21.27 cm), T_{12} (20.67 cm), and T_3 (19.83 cm) were next in length. The treatment T_{14} (16.33 cm), which did not apply fertilizer, had the shortest root length; it was comparable to treatment T_4 (16.77 cm), which did apply poultry manure. The observations for root yield per carrot plot are shown in Table 3. There was a significant difference in root yield per plot across the different treatments. The lowest root yield per plot was seen in T_{14} (7.40kg), where no fertilizer was applied, which is comparable to T_{13} (7.70kg), where 25% NPK+PM was applied. Among the different treatments, T_6 (13.07kg) had the largest root yield per plot, followed by T_9 (11.57kg), T_{12} (10.63kg), and T_3 (9.93kg).

The observations gathered on the root yield per hectare of carrots are presented in Table 3. There was a significant difference in root yield per hectare among the different treatments. The treatment T_{14} (9.87t), which applied no fertilizer and had the lowest root yield per hectare, was comparable to the treatment T_{13} (10.27t), which applied 25% NPK+PM. Among the different treatments, T_6 (17.42t) had the highest root yield per hectare, followed by T_9 (15.42t), T_{12} (14.18t), and T_3 (13.25t), which was statistically superior to other treatments.

Table 2: Response of NPK and organic manures on growth attributes of carrot.

Treatments	Days to emergence	Emergence percentage	Plant height (cm)			Number of leaves		
			30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
T_1	18.67	18.33	11.20	18.47	38.50	4.27	9.13	15.73
T_2	17.33	17.33	12.27	22.77	35.50	4.00	8.13	13.87
T_3	15.00	15.00	13.50	23.10	40.53	4.53	9.40	16.17
T_4	19.00	19.00	9.40	13.83	31.50	3.40	7.93	11.93
T_5	17.33	17.33	12.67	24.70	42.17	4.27	10.53	15.93
T_6	12.67	12.67	15.60	28.20	45.20	4.87	12.87	17.73
T_7	17.67	17.67	11.50	14.70	33.60	3.80	8.40	14.20
T_8	15.67	15.67	12.50	22.90	40.10	4.47	10.27	15.73
T_9	14.67	14.67	14.00	26.50	43.37	4.67	12.27	17.33
T_{10}	18.67	18.67	10.50	14.20	32.40	4.13	8.07	13.27
T_{11}	16.33	16.33	12.43	18.53	37.60	3.67	10.00	15.13
T_{12}	15.33	15.33	13.73	25.87	39.47	4.60	11.03	16.73
T_{13}	18.33	18.33	9.60	14.07	32.17	4.07	8.00	12.80
T_{14}	19.67	19.67	8.73	13.63	30.50	3.33	7.80	11.00
CD (P=0.05)	1.39	1.31	1.00	1.00	1.66	0.33	0.82	0.88
CV (%)	4.88	4.59	4.95	2.95	2.63	4.66	5.05	3.52

Table 3: Response of NPK and organic manures on yield attributes of carrot.

Treatments	Fresh root weight(g)	Dry root weight(g)	Root diameter(cm)	Root length(cm)	Root yield per plot(kg)	Root yield per hectare(t)
T_1	92.37	7.13	3.39	17.93	8.40	11.20
T_2	93.23	7.05	3.46	17.60	8.60	11.47
T_3	95.53	7.31	3.40	19.83	9.93	13.25
T_4	91.30	5.16	2.60	16.77	8.13	10.84
T_5	99.03	7.22	3.46	18.73	9.47	12.62
T_6	121.50	8.97	4.28	22.87	13.07	17.42
T_7	93.37	5.17	2.93	17.33	8.40	11.20
T_8	96.10	7.15	3.22	17.93	8.43	11.24
T_9	110.57	8.65	4.01	21.27	11.57	15.42
T_{10}	92.03	4.95	3.04	17.90	7.80	10.40
T_{11}	94.83	6.97	3.21	17.97	7.83	10.44
T_{12}	103.50	7.82	3.51	20.67	10.63	14.18
T_{13}	91.33	4.92	3.32	18.57	7.70	10.27
T_{14}	89.27	4.18	2.18	16.33	7.40	9.87
CD (P=0.05)	1.80	0.41	0.27	0.57	0.50	0.67
CV (%)	1.09	3.69	4.86	1.79	3.31	3.30

References

1. Avitoli K, Singh AK, Kanaujia SP, Singh VB. Quality production of kharif onion (*Allium cepa* L.) in response to biofertilizers inoculated organic manures. Indian Journal of Agricultural Science. 2012;82:236-40.
2. Brinjh S, Kumar S, Kumar D, Kumar M. Effect of integrated nutrient management on growth, yield and quality in onion (*Allium cepa* L.) cv. Pusa Madhvi. Plant Archives. 2014;14(1):557-559.
3. Choudhary MK, Kavita A, Maurya IB, Singh B, Sharma MK, Hatwal PK. Effect of biofertilizers and micronutrients on growth and yield of garlic (*Allium sativum* L.) var. 'G-282'. Progressive Horticulture. 2013;46(2):367-371.
4. Dash SK, Pathak M, Tripathi L, Barik S. Studies on effect of integrated nutrient management on growth and yield attributes in radish (*Raphanus sativus* L.) and its residual effect in coriander (*Coriandrum sativum* L.) in radish-coriander cropping sequence. Journal of Pharmacognosy and Phytochemistry. 2019;8(1):319-322.
5. Fikadu-Lebeta W, Diriba-Shiferaw G, Mulualem-Azene M. The need of integrated nutrient management for coriander (*Coriandrum sativum* L.) production. International Journal of Food & Nutrition. 2019;4(1):1-13.
6. Gatsinzi K, James H, Gatsinzi A. Nutritional quality of carrot (*Daucus carota* L.) as influenced by farm yard manure. African Journal of Agricultural Economics and Rural Development. 2016;4(3):322-327.
7. Hore JK, Das S, Chanchan M. Effect of inorganic and biofertilizer on growth, and yield of garlic (*Allium sativum* L.).2nd International Conference on Agricultural & Horticultural Sciences, Hyderabad, India; c2014.
8. Jhariya S, Jain A. Effect of integrated nutrient management on essential oil (volatile oil) of coriander (*Coriandrum sativum* L.) International journal of Current Review. 2017, 9(17).
9. Kaushik P, Andújar I, Vilanova S, Plazas M, Gramazio P, Herraiz FJ, *et al*. Breeding vegetables with increased content in bioactive phenolic acids. Molecules. 2015;20(10):18464-18481.
10. Mishra A, Singh S, Greene A. Effect of Integrated Fertilization on Qualitative and Quantitative Traits of Radish (*Raphanus sativus* L.). International Journal of Current Microbiological Applied Sciences. 2020;9(8):987-995.
11. Mishra P, Sahoo TR, Rahman FH, Garnayak LM, Phonglosa A, Mohapatra N, *et al*. Yield and Economics of Brinjal (*Solanum melongena* L.) as affected by different mulching types and its effect on soil moisture content and weed dynamics in post-flood situation of coastal Odisha, India. International Journal of Environmental and Climate Change. 2020;10(12):264-270.
12. Yusuf E, Tkacz K, Turkiewicz. Analysis of chemical compounds in various carrot varieties, including sugars, organic acids, minerals, and bioactive compounds, with qualification and quantification; c2021. p. 3053-3062.