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Effect of FYM and vermicompost on growth and yield on strawberry (*Fragaria×ananassa* Duch.) cv. Camarosa

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Abstract

The Experiment was carried out at the research field farm unit -6, Department of Agriculture, Integral Institute of Agricultural Science & Technology (IIAST), Integral University, Lucknow (U.P.) during the period from Nov 2020 to March 2021. The experimental treatment consists of var. Camarosa. The experiment was layout in Randomized Block Design (RBD) with three replications and eight treatments. The parameter was recorded during research which is Plant height, Plant spread, Number of leaves, Number of Branches per plant, Number of fruits/plant, Fruit Yield/plant (g), Fruit Yield (q/ha). The experiment was laid out according to Randomized Block Design with eight treatment replication thrice, viz T₀(control), T₁ (100% RDF), T₂ (100% FYM (6 t/ha)), T₃ (100% Vermicompost (2 t/ha)) T₄ (100% RDF + 25% FYM (1.5 t/ha) + 75% Vermicompost (1.5 t/ha)), T₅ (100% RDF + 50% FYM (3 t/ha) + 50% Vermicompost (1 t/ha)), T₆ (100% RDF + 75% FYM (4.5 t/ha) + 25% Vermicompost (0.5 t/ha)), T₇ (100% RDF + 100% FYM (6 t/ha) + 100% Vermicompost (2 t/ha)). The results revealed that the maximum plant of height (16.19 cm), plant spread (35.06 cm), number of branches per plant (19.96), number of leaves per plant (17.77), number of fruit per plant (18.14), Yield per plant (208.07 g) and Yield q/ha (58.94 q/ha) was observed during research work.

Keywords: FYM, vermicompost, RDF, influence, organic

Introduction

Strawberry (*Fragaria×ananassa* Duch.) appertain to the family of Rosaceae. The cultivated Strawberry was originated from the hybridization of two American species viz., *Fragaria ciliogenesis* Duch and *Fragaria virginiana* Duch. All the cultivated varieties of Strawberry are octoploid (2n = 8x = 56) in nature. Strawberry is utilized as new organic product is wealthy in "Vit C" and "ellagic corrosive" which has against destructive properties in natural product. It is a herbaceous organic product crop with a prostrate development propensity, which conducts as a yearly in the Sub-tropical area and perpetual in the temperature district. Organic products are enamoring with unmistakable charming fragrance and flavor, us up as treat, and furthermore have an interest by the organic product handling units for the arrangement of Ice cream, Jam, Syrups and so on (Tripathi *et al.*, 2012) [1]. Among nutrients, it is a genuinely best wellspring of vit 'C'- 30-120 mg, Dietary Fiber 3.3 g, vit 'A'- 60 IU, Total Carbohydrate 12.7 g, Total Sugars: In the floatation method, each fecal sample was suspended in a solution of high specific gravity, which make parasite eggs to float and get concentrated at the surface. 8.1 g, Fe. 0.7 mg, Protein 1.1 g, Calcium 26.6 mg, Potassium 254 mg, Phosphorus 39.8 mg, and so on Strawberry is developed in MH, WB, Punjab, Delhi, Himachal Pradesh, Rajasthan, Haryana, and furthermore in UP arias. Sub-tropical regions in Jammu and Kashmir have additionally developed the strawberry organic product crop under inundated conditions. (Sharma *et al.*, 2000). Strawberry needs a calm environment for development albeit a portion of the assortments can fill in Subtropical environments. They are short-day plants. During blossom development, they need a photoperiod of 8 to 12 hours for around 10 days. They are inactive and they don't develop throughout the colder time of year meetings. The cool meeting is trailed by the spring season when the days develop longer. In this way, Strawberry plants get daylight for great blossoms improvement. Nonetheless, on account of Strawberry assortments filled in Sub-tropical areas wherein winters are gentle the plants keep on developing. (Kumar *et al.*, 2002). Strawberry needs an especially exhausted medium dirt soil, incredible in normal matter. The soil is for the most part imperceptibly acidic soil with a pH from 5.7 to 6.5.

At higher pH root plan isn't OK. The yellowing of the leaves causes by the presence of absurd calcium in the soil. In light soils and in those affluent in regular matter, runner game plan is great. Strawberry should not be created in a comparable land every year. Plant in green manured in the field. Stomach settling agent soils that are sullied with nematodes should be avoided. Strawberry requires moderate proportions of nitrogen. The extension of green normal have an effect to the soil, as 50 t/ha of Farm Yard Manure is profoundly attractive. It expands the water-holding limit of the dirt and furthermore gives better sprinter germination. (Kanawjia *et al.*, 2018). The most reasonable soil for Strawberry development is profound, sandy topsoil wealthy in natural matter substance. The dirt should be very much depleted regions that stay wet late into the spring water system. ahead planting, set up the dirt by consolidating a few times crawls of fertilizer or other natural compost to a profundity of somewhere around 10 to 12 inches. Natural matter better supplement accessibility just as the water-holding limit and soil structure.

The utilization of not logical manures has a superior Yield for every unit region complex, however these composts are hampered and significant in dealing with the natural equilibrium of the dirt. Irregularity and lacking compost application continuously lessen their reaction productivity. Natural excrements like Vermicompost, FYM, manure, and so forth have been utilizing in agribusiness as the best composts wellspring of natural fertilizer. These composts help not just in span the current wide hole between the supplement take out and supply yet additionally unreliable adjusted supplement part, by improving reaction proficiency and glorify crop efficiency of wanting Quality. (Arancan *et al.*, 2004). FYM

(Farm Yard Manure) is the essential wellspring of natural matter and a critical factor in moderating soil dampness to edit with dry spell, just as improving and supporting soil fruitfulness and usefulness. It is applied to begin at the hour of furrowing during field planning. All things considered, decayed FYM contains 0.2% P, 0.5% N and 0.5% K. Potash and Phosphorus are accessible in the dirt as oxides (K₂O and P₂O₅). It is the most utilized natural fertilizer in organic product crops. (Eqbal *et al.*, 2009).

Materials and Methods

Location of research

The present investigation entitled- “Effect of FYM and Vermicompost on Growth, Yield and Quality of Strawberry cv. Camarosa” was carried out at Farm unit-5, Department of Agriculture, Integral Institute of Agricultural Science and Technology (IIAST) Integral University Lucknow (U.P.) India. The details of the materials used and methodology adopted during the 2020-21 period of investigation are presented below. The observations were recorded on five randomly selected plants from different treatment to assess the impact of INM on growth, yield and fruit of Strawberry. The experiment was laid out according to Randomized Block Design with eight treatment replication thrice, viz T₀ (control), T₁ (100% RDF), T₂ (100% FYM (6 t/ha)), T₃ (100% Vermicompost (2 t/ha)) T₄ (100% RDF + 25% FYM (1.5 t/ha) + 75% Vermicompost (1.5 t/ha)), T₅ (100% RDF + 50% FYM (3 t/ha) + 50% Vermicompost (1 t/ha)), T₆ (100% RDF + 75% FYM (4.5 t/ha) + 25% Vermicompost (0.5 t/ha)), T₇ (100% RDF + 100% FYM (6 t/ha) + 100% Vermicompost (2 t/ha))

Details of Treatment	
Experimental details	Details of Treatment
Symbols used	Treatments
T ₀	Control
T ₁	100% RDF
T ₂	100% FYM (6 t/ha)
T ₃	100% Vermicompost (2 t/ha)
T ₄	100% RDF + 25% FYM (1.5 t/ha) + 75% Vermicompost (1.5 t/ha)
T ₅	100% RDF + 50% FYM (3 t/ha) + 50% Vermicompost (1 t/ha)
T ₆	100% RDF + 75% FYM (4.5 t/ha) + 25% Vermicompost (0.5 t/ha)
T ₇	100% RDF + 100% FYM (6 t/ha) + 100% Vermicompost (2 t/ha)

Vegetative characters

Plant height

Plant height of the five representative plants was recorded with a meter scale at 15, 30, 45, 60, and 75, DAP. The average was calculated and subjected to statistical analysis and expressed in cm.

Plant spread

Spread of the plants was measured in East-West and North-South directions and the mean value of plant spread was calculated at 15, 30, 45, 60, and 75 DAP and expressed in cm.

Number of leaves

The number of fully opened leaves was counted from the five representative plants at each successive stage of growth *i.e.*, 15, 30, 45, 60, and 75 DAP. The average was evaluated and subjected to statistical analysis.

Number of Branches per plant

The number of branches per plant was counted from the five representative plants at each successive stage of growth *i.e.*, 15, 30, 45, 60, and 75 DAP. The average was evaluated and

subjected to statistical analysis.

Fruit weight

To know the fruit weight, the above selected ten fruits were weighed and the average weight of fruit was calculated and expressed in grams (g).

Fruit Length

Fruit length was measured by Vernier calipers method with the help of measuring scale and expressed in centimetre (cm).

Fruit /Diameter

Fruit diameter was measured by with the help of Vernier calipers and expressed in centimeter (cm).

Number of fruits/plant

To determine the number of fruits/plant, total number of fruit was recorded at 10 days interval and average number of fruits set was calculated.

Fruit Yield/plant (g)

The total amount of fruits produced per treatment was

weighed and recorded at the time of each harvesting and expressed as yield of fruits/plant in grams (g).

Fruit Yield (q/ha)

The total amount of fruits produced from the area of the crop raising was weighed and recorded at the time of each harvesting, it was multiplied by the area of per ha in kilograms (kg).

Results and Discussion

The data (Table 1) revealed that there was a steady rise in plant height, spread of plants, number of leaves per and number of branch. The maximum Plant height at 75 days was Observed in T7 (16.19 cm) with application of 100% RDF+100% FYM (6 tha-1)+100% Vermicompost (2 tha-1) which was significantly superior over T3 (15.90 cm) and T1 (15.51 cm) statistically at par with T2 (14.94cm) and T6 (14.40 cm). Least plant height 12.18 cm was oerved under T0 (Control) during the investigation.Similar trend was found at rest of the Growth stages. It was possibly due to the modification in the soil environment viz., moderating soil temperature during early Growth of the crop which coincides with hot dry month that preserves soil moisture also contributed to increase the production of the more vegetative Growth. The similar findings were also reported by Nowsheen *et al.* (2006). The maximum Plant spread at 75 days was Observed in T7 (35.06 cm) with application of 100% RDF+ 100% FYM (6 tha-1) + 100% Vermicompost (2

tha-1) which was significantly superior over T3 (34.36 cm) and T1 (34.32 cm) statistically at par with T2 (32.84 cm) and T6 (33.34 cm). Least plant spread 29.92 cm was observed under T0 (Control) during the investigation. Similar trend was found at rest of the Growth stages. The application of organic manures like FYM to soil not only improve soil physical properties, pH, water holding capacity but also add important nutrients to the soil, thus increase the nutrient avail-ability and its ultimate absorption by plant. Biofertilizers like *Azotobacter* fix atmospheric nitrogen and enhances the production of various field crops. similar findings were also observed by Umar *et al.*, (2008) The maximum number of branches per plant at 75 days was observed in T7 (19.96) with application of 100% RDF + 100% FYM (6 tha-1) + 100% Vermicompost (2 tha-1) which was significantly superior over T5 (16.73) T3 (16.47) and T2 (16.34) statistically at par with T1 (15.05) and T4 (14.79). Least number of branches per plant 11.15 was observed under T0 (Control) during the investigation. Similar trend was found at rest of the Growth stages. Similar findings were also reported by Sandeep *et al.*, (2012). The maximum number of leaves per plant at 75 days was observed in T7 (17.77) with application of 100% RDF + 100% FYM (6 tha-1) + 100% Vermicompost (2 tha-1) which was significantly superior over T6 (16.70) and T5 (14.04) statistically at par with T4 (13.29) and T1 (13.01). Least number of leaves per plant 10.63 was observed under T0 (Control) during the investigation. Similar trend was found at rest of the Growth stages. Bilal *et al.* (2009)

Table 1: Effect of FYM and Vermicompost on plant height, plant spread, number of leaves per plant and number of leaves per plant in Strawberry cv. Camarosa

Treatments	Plant Height (cm)					Plant Spread					No. of leaves per plant					No. of leaves per plant				
	15 DAP	30 DAP	45 DAP	60 DAP	75 DAP	15 DAP	30 DAP	45 DAP	60 DAP	75 DAP	15 DAP	30 DAP	45 DAP	60 DAP	75 DAP	15DAP	30 DAP	45 DAP	60 DAP	75 DAP
T0	8.72	9.21	10.40	11.27	12.18	14.96	19.45	25.43	27.23	29.92	6.94	6.96	8.75	8.74	10.63	7.61	7.89	10.53	10.92	11.15
T1	10.06	12.22	12.68	13.08	15.51	15.16	23.69	30.06	31.24	34.32	10.21	10.75	12.46	13.29	13.01	10.29	12.06	13.62	14.08	15.05
T2	9.96	12.69	11.95	13.58	14.94	16.42	21.35	27.92	29.89	32.84	7.50	8.95	9.28	10.99	10.92	8.61	10.48	11.32	12.98	16.34
T3	10.12	14.21	15.01	15.21	15.90	17.24	21.28	31.70	31.01	34.36	9.44	10.61	10.31	14.06	12.13	10.88	11.39	15.06	13.00	16.47
T4	8.83	10.59	11.79	12.26	12.23	16.58	17.65	27.72	28.48	31.01	8.18	8.76	8.87	10.30	13.29	10.54	10.69	14.59	14.72	14.79
T5	8.78	10.38	11.19	13.38	13.89	17.39	17.40	26.55	28.69	29.28	9.08	9.72	10.61	11.44	14.04	10.17	11.10	14.07	15.36	16.73
T6	8.97	11.61	12.04	12.43	14.40	16.30	21.19	27.71	30.36	33.34	11.02	11.80	13.20	12.08	16.70	11.03	12.48	14.65	16.04	17.13
T7	10.22	4.65	15.93	15.97	16.19	18.53	21.87	31.80	31.91	35.06	10.84	12.60	13.47	15.65	17.77	11.83	13.78	16.38	19.02	19.96
SEm±	0.31	0.35	0.40	0.53	0.53	0.49	0.48	0.98	1.19	1.33	0.50	0.49	0.33	0.54	0.66	0.44	0.35	0.61	0.49	0.88
CD at 5%	0.93	1.07	1.22	1.60	1.60	1.50	1.46	2.97	3.60	3.42	1.51	1.47	1.00	1.65	2.00	1.33	1.07	1.85	1.49	2.66

Table no.2 is showing Fruit weight, fruit length fruit diameter, number of fruit per plant, yield per plant (g) and yield quintal per ha also. The data pertaining to fruit weight presented in the revealed that the maximum fruit weight was observed in T7 (11.47 g) with application of 100% RDF + 100% FYM (6 tha-1) +100% Vermicompost (2tha-1) which was significantly superior over T3 (10.30 g) and T5 (9.82 g) statistically at par with T6 (9.72 g) and T2 (9.47 g). Least fruit weight (8.18 g) was observed under T0 (Control) during the investigation.The maximum fruit length was observed in T7 (4.73 cm) with application of 100% RDF + 100% FYM (6kg/ha⁻¹) + 100% Vermicompost (2kgha⁻¹) which was significantly superior over T5 (4.70 cm), T3 (4.69 cm) and T4 (4.52 cm) statistically at par with T6 (4.42 cm) and T2 (4.18 cm). Rana and Chandel *et al.*, (2003). The maximum fruit diameter was observed in T7 (2.93 cm) with application of 100% RDF + 100% FYM (6 kgha⁻¹)+100% Vermicompost (2kgha⁻¹) which was significantly superior over T3 (2.85 cm), T5 (2.80 cm) and T6 (2.78 cm) statistically at par with T4 (2.67 cm) and minimum fruit diameter was observed in T0 (2.45cm). Athani *al.*,

(2007). The highest number of fruits per plant was observed during the research in T7 (18.14) with application of 100% RDF + 100% FYM (6 kgha⁻¹) + 100% Vermicompost (2 kgha⁻¹) which was significantly superior over T2 (17.96) and T3 (17.81) statistically at par with T1 (16.30) and T4 (16.20 cm) while minimum fruit per plant was recorded in T0 (12.18) fruit per plant. Vijay *et al.*, (2010). The maximum fruit Yield per plant (g) was observed in T7 (208.07 g) with application of 100% RDF + 100% FYM (6kgha⁻¹) + 100% Vermicompost (2 kgha⁻¹) which was significantly superior over T3 (183.44 g) and T2 (170.08 g) statistically at par with T5 (141.41 g) and T6 (151.63 g) while minimum yield was obtained (99.63 gm). Ahmet *et al.*, (2010) [5]. The maximum fruit Yield (q/ha) was observed in T7 (58.94 q/h) with application of 100% RDF + 100% FYM (6 kgha⁻¹) + 100% Vermicompost (2 kgha⁻¹) which was significantly superior over T3 (58.76 q/ha) and T4 (56.24 q/ha) statistically at par with T5 (54.28 q/ha) and T6 (53.18 q/ha). While minimum yield per hacter was recorded (47.74 q/ha) Wang and Lin *et al.*, (2002) Yusuf *et al.*, (2003).

Table 2: Effect of FYM and Vermicompost on Fruit weight(g), Fruit length(cm), number of fruit per plant, Yield/ plant(g) and Yield (q/ha) in Strawberry cv. Camarosa

Treatments	Fruit weight(g)	Fruit length (cm)	Fruit diameter (cm)	No. of fruits per plant	Yield/ plant (g)	Yield (q/ha)
T0	8.18	3.55	2.45	12.18	99.63	47.47
T1	8.43	3.65	2.01	16.30	137.41	51.75
T2	9.47	4.18	2.50	17.96	170.08	52.07
T3	10.30	4.69	2.85	17.81	183.44	58.76
T4	8.16	4.52	2.67	16.20	132.19	56.24
T5	9.82	4.70	2.80	14.40	141.41	54.28
T6	9.72	4.42	2.78	15.60	151.63	53.18
T7	11.47	4.73	2.93	18.14	208.07	58.94
SEm±	0.22	0.06	0.09	0.38	5.19	1.13
CD at 5%	0.67	0.19	0.26	1.15	15.76	3.44

Conclusion

On the basis of results presented and discussed from the present investigation shows that the soil application of 100% RDF + 100% FYM (6 tha-1) + 100% Vermicompost (2 tha-1) top dressing P and K was found most effective in vegetative attributes as well as yield per hectare of Strawberry fruit. Because vermicompost and FYM (Farm Yard Manure) as a growth enhancer and also help the increasing the fruit productivity of strawberry. Hence it may be recommended for enhancing productivity of Strawberry fruits. Thus, the application of 100% RDF + 100% FYM (6 tha-1) + 100% Vermicompost (2 t/ha) and top dressing of P and K can be recommended for higher production of Strawberry under central part of Uttar Pradesh (Lucknow).

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