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Effect of Trico capsule and different organic manure on growth, yield and quality of strawberry (*Fragaria ananassa* L.)

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Abstract

The research work on “Effect of Trico Capsule and Different Organic Manure on Growth, Yield and Quality of Strawberry (*Fragaria ananassa* L.)” was carried out in 2023-24 at the Horticulture field, Department of Horticulture, (fruit science), Naini Agricultural Institute (NAI) SHUATS, Prayagraj, U.P. India. The experiment was laid out in randomized block design with 10 treatments which were replicated thrice. The treatments were T₀ (Control), T₁ (100% RDN), T₂ (75% RDN + 25% N through FYM), T₃ (75% RDN + 25% N through V.C), T₄ (75% RDN + 25% N through FYM + Trico capsule), T₅ (75% RDN + 25% N through V.C. + Trico capsule), T₆ (50% RDN + 50% N through FYM), T₇ (50% RDN + 50% N through V.C), T₈ (50% RDN + 50% N through FYM + Trico capsule), T₉ (50% RDN + 50% N through V.C. + Trico capsule). On the basis of our experimental finding it is concluded that the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) was found to be best in the terms of plant vegetative growth, earliness in flowering and fruiting, fruiting parameters, yield parameters, quality and economic with B:C ratio (3.65).

Keywords: Trico capsule, FYM, vermicompost, strawberry, yield

Introduction

The most popular cultivated strawberry is the dessert strawberry, *Fragaria ×ananassa*. Annual world production of this species has steadily grown through the ages, with quantities doubling in the last 20 years to over

2.5 million tones (FAO Production Statistics). Most of the production is located in the northern hemisphere (98%), but there are no genetic or climatic barriers preventing greater expansion into the southern hemisphere. There are two primary types of strawberries now grown commercially, day-neutral and short day plants. Long day (“everbearing”) plants are also available, but they are only commercially important in southern California. There are two major production systems utilized in the world – matted rows and hills. The matted row system employs runners as the primary yield component. Both mother and daughter plants are allowed to runner freely, with periodic training into narrow rows. The hill or “plasticulture system” relies on crowns as the primary yield component, and any runners that form are removed. The hill system is used primarily in areas having warm winters and either hot or moderate summers such as California, Florida, Italy and Spain. Matted rows are used to grow short day cultivars in climates with short summers and cold winters such as continental Europe and northern North America (Hancock 1999) [1].

The trico capsule, also known as the achenes or seeds, plays a crucial role in the reproduction and dispersal of strawberries (*Fragaria* spp.). While often overlooked as mere seeds, these structures are integral to the strawberry's lifecycle and have unique functions that contribute to the plant's success.

The trico capsule contains the genetic material necessary for the propagation of the species. Each tiny seed within the capsule holds the potential to develop into a new strawberry plant under suitable conditions. This genetic diversity ensures the adaptability of the species to various environmental challenges and evolutionary pressures.

Materials and Methods

The research work on “Effect of Trico Capsule and Different Organic Manure on Growth,

Yield and Quality of Strawberry (*Fragaria ananassa* L.)” was carried out in 2023-24 at the Horticulture field, Department of Horticulture, (fruit science), Naini Agricultural Institute (NAI) SHUATS, Prayagraj, U.P. India. The experiment was laid out in randomized block design with 10 treatments, which were replicated thrice. The treatments were T₀ (Control), T₁ (100% RDN), T₂ (75% RDN + 25% N through FYM), T₃ (75% RDN + 25% N through V.C), T₄ (75% RDN + 25% N through FYM + Trico capsule), T₅ (75% RDN + 25% N through V.C. + Trico capsule), T₆ (50% RDN + 50% N through FYM), T₇ (50% RDN + 50% N through V.C), T₈ (50% RDN + 50% N through FYM + Trico capsule), T₉ (50% RDN + 50% N through V.C. + Trico capsule). The present research work was carried out with an objective of studying the effect of trico capsule and organic manure on growth and yield of strawberry.

Results and Discussion

The maximum plant height at 120 days after transplanting was observed in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 18.10 cm followed by T₄ (75% RDN + 25% N through FYM + Trico capsule) with 17.17 cm and the minimum plant height was observed in the treatment T₀ (Control) with 13.41 cm. Trico capsules contain beneficial microbes that enhance soil nutrient availability, promoting healthier root development in strawberry plants. Improved root systems enable better absorption of water and nutrients, leading to increased plant vigor and growth Yadav and Maurya (2020) [11]. Consequently, strawberry plants treated with trico capsules exhibit heightened height as a result of stronger root anchorage and enhanced nutrient uptake, ultimately fostering robust above-ground growth Singhanian *et al.*, (2021) [8].

The maximum Number of Leaves at 120 days after transplanting was observed in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 26.50 followed by T₄ (75% RDN + 25% N through FYM + Trico capsule) with 25.50 and the minimum Number of Leaves was observed in the treatment T₀ (Control) with 10.00. Trico capsules harbor symbiotic microorganisms that establish beneficial relationships with strawberry plants, stimulating their growth (Singh *et al.*, 2018) [6]. These microbes enhance nutrient availability in the soil, facilitating optimal conditions for leaf development. With improved nutrient uptake and overall plant health, strawberries treated with trico capsules produce more leaves. This increase in leaf number is a direct result of enhanced nutrient assimilation and metabolic activity, promoting foliage proliferation and plant vitality Li *et al.*, (2020) [4].

The maximum Plant spread at 120 days after transplanting was observed in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 38.76 cm followed by T₄ (75% RDN + 25% N through FYM + Trico capsule) with 36.43 cm and the minimum Plant spread was observed in the treatment T₀ (Control) with 23.44 cm. Trico capsules introduce beneficial microbes into the soil surrounding strawberry plants, fostering a more robust root system and improving soil structure (Kumar *et al.*, 2019) [3]. As a result, plants treated with trico capsules develop stronger and more extensive root networks, enabling better anchorage and nutrient absorption. Enhanced root growth supports healthier and more vigorous above-ground growth, leading

to increased plant spread as strawberries utilize available resources more efficiently for lateral expansion Singh *et al.*, (2020) [7].

The maximum number of runners was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 9.56 followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 8.32 which was statistically superior over control T₀ (Control) with 2.95 number of runners. Trico-capsule, an organic fertilizer, when compared to various organic manures, demonstrated a significant impact on the number of strawberry runners. The application of Trico-capsule resulted in a notable increase in the number of runners, surpassing the effects of other organic manures. This suggests its potential for enhancing strawberry propagation and yield. The precise mechanisms behind this phenomenon warrant further investigation for optimizing strawberry cultivation practices and maximizing yield potential (Singh *et al.*, (2021) [8].

The maximum number of flower per plant was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 32.17 followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 31.18 which was statistically superior over control T₀ (Control) with 26.70. Research comparing the effects of Trico-capsule and vermicompost on strawberry cultivation revealed interesting insights into flower initiation. Trico-capsule application led to a notable reduction in the days to flower initiation compared to vermicompost or control groups. This suggests Trico-capsule's potential in accelerating the reproductive phase of strawberry growth (Yadav and Maurya 2020) [11].

The maximum number of fruit per plant was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 21.45 followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 20.67 which was statistically superior over control T₀ (Control) with 11.43. Trico- capsule and vermicompost augmented flowering and fruiting, Trico-capsule exhibited a more pronounced impact Waida *et al.*, (2019) [10]. The bio-fertilizer Trico- capsule, rich in beneficial microorganisms, notably enhanced flower induction, pollination efficiency, and fruit set, leading to increased yields.

The maximum Fruit set % was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 66.68 followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 66.29 which was statistically superior over control T₀ (Control) with 42.81 Fruit set %. Trico- capsule and vermicompost augmented flowering and fruiting, Trico-capsule exhibited a more pronounced impact Waida *et al.*, (2019) [10]. The bio-fertilizer Trico- capsule, rich in beneficial microorganisms, notably enhanced flower induction, pollination efficiency, and fruit set, leading to increased yields.

The maximum Weight of fruit was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 23.14 g followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 22.25 g which was statistically superior over control T₀ (Control) with 12.84 g. Organic manures also exerted positive effects, Trico-capsule emerged as a particularly potent enhancer of Weight of fruit. Kowalska *et al.*, (2021) [2]. Incorporating Trico-capsule into agricultural practices could thus be pivotal for optimizing strawberry yield and productivity.

The maximum Yield/plant was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with

603.25 g followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 572.90 g which was statistically superior over control T₀ (Control) with 247.86 g Yield/plot.

The maximum Yield/plot was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 3.62 kg followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 3.44 kg which was statistically superior over control T₀ (Control) with 1.49kg Yield/plot.

The maximum Yield/ha was obtained in the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) with 32.58 tonn followed by treatment T₄ (75% RDN + 25% N through FYM + Trico capsule) with 30.96 tonn which was statistically superior over control T₀ (Control) with 13.41

tonn Yield/ha. A comprehensive study explored the impact of Trico-capsule and various organic manures on the Yield/plant of strawberries. Results demonstrated that Trico-capsule application significantly elevated the Yield/plant compared to treatments with different organic manures. This outcome suggests that Trico-capsule, with its blend of beneficial microorganisms, contributed to improved flower formation, pollination efficiency, and fruit set, ultimately enhancing the Yield/plant of strawberries. Although organic manures also exerted positive effects, Trico-capsule emerged as a particularly potent enhancer of Yield/plant. Incorporating Trico-capsule into agricultural practices could thus be pivotal for optimizing strawberry yield and productivity Ruggieri *et al.* (2021)^[5].

Table 1: Effect of Trico-capsule and Different Organic Manures on plant height, number of leaves, plant spread and number of runners, of strawberry

Symbol	Plant Height (cm)				No. of leaves				Plant Spread				No. of runners
	30 DAT	60 DAT	90 DAT	120 DAT	30 DAT	60 DAT	90 DAT	120 DAT	30 DAT	60 DAT	90 DAT	120 DAT	
T ₀	4.33	6.05	9.72	13.41	2.83	4.41	6.67	10.00	9.05	12.80	17.69	23.44	2.95
T ₁	5.12	7.93	11.90	14.09	5.92	9.5	10.75	18.00	13.92	18.16	23.68	30.83	4.94
T ₂	5.50	8.05	12.25	13.85	6.67	9.5	11.50	19.08	16.08	20.97	27.33	35.48	5.24
T ₃	6.52	8.48	12.17	15.00	6.33	10.4	14.83	23.33	16.17	22.25	29.00	37.77	4.42
T ₄	7.83	10.40	12.82	17.17	7.50	14.9	18.67	25.50	17.68	23.36	29.22	36.43	8.32
T ₅	8.52	11.38	13.75	18.10	8.92	5.6	19.58	26.50	20.26	25.45	32.42	38.76	9.56
T ₆	5.67	7.46	11.27	14.63	6.67	11	13.67	20.00	12.83	16.83	22.04	28.84	5.87
T ₇	5.03	7.33	11.93	13.60	6.08	10	11.00	19.50	16.30	19.98	26.54	35.05	5.92
T ₈	7.43	10.15	12.48	16.63	7.25	13.5	16.92	24.50	15.40	21.88	28.40	31.43	5.79
T ₉	7.32	8.79	12.27	15.47	6.83	10.4	13.75	20.33	13.51	17.51	22.72	29.52	6.07
F Test	S	S	S	S	S	S	S	S	S	S	S	S	S
SEd	0.39	0.64	0.62	0.50	0.21	0.22	0.55	0.49	0.48	0.38	0.18	0.19	0.410
CD @5%	1.16	1.89	1.83	1.48	0.62	0.64	1.65	1.44	1.43	1.13	0.52	0.55	0.820
CV	10.44	10.09	7.77	4.17	5.68	4.34	7.96	5.54	4.59	3.65	1.41	1.49	1.764

Table 2: Effect of Trico-capsule and Different Organic Manures on number of flower/plant, number of fruit/plant, fruit set %, weight of fruit, yield/plot, yield/ha of strawberry

Symbol	No. of flower/plant	No. of fruit/plant	Fruit set %	Weight of fruit (g)	Yield/plant (g)	Yield/plot (g)	Yield/ha (tonn)
T ₀	26.70	11.43	42.81	12.84	247.86	1.49	13.41
T ₁	27.29	16.38	61.23	14.17	271.68	1.63	14.67
T ₂	27.78	16.67	62.46	15.64	305.39	1.83	16.47
T ₃	28.64	17.19	63.29	16.17	335.64	2.01	18.09
T ₄	31.18	20.67	66.29	22.25	572.90	3.44	30.96
T ₅	32.17	21.45	66.68	23.14	603.25	3.62	32.58
T ₆	28.11	16.87	64.28	17.47	511.44	3.07	27.63
T ₇	29.68	17.81	62.48	18.27	474.10	2.84	25.56
T ₈	29.10	17.89	61.48	19.74	478.81	2.87	25.83
T ₉	28.81	18.45	64.04	18.88	497.72	2.99	26.91
F Test	S	S	S	S	S	S	S
SEd	0.96	0.892	1.896	0.27	1.437	0.231	1.056
CD @5%	1.923	1.732	3.654	0.80	2.786	0.463	2.124
CV	3.627	3.254	7.243	8.82	5.638	0.894	4.372

Conclusion

On the basis of our experimental finding it is concluded that the treatment T₅ (75% RDN + 25% N through V.C. + Trico capsule) was found to be best in the terms of plant vegetative growth, earliness in flowering and fruiting, fruiting parameters, yield parameters.

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