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Effect of FYM, Vermicompost, Panchgavya, Amritpani and Jeevamrit on the flowering and fruiting of Dragon fruit

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ABSTRACT

The dragon fruit (Hylocereus costaricensis (Web.) Britton and Rose) is a perennial climbing cactus belonging to the family Cactaceae (2n=22). The scientific name of dragon fruit is derived from the Greek word 'hyle' (meaning woody) and Latin word 'cereus' (meaning waxen). This fruit has emerged as a significant economic commodity on a global scale, due to its exceptional nutritional value (Rifat et al., 2019).

Dragon fruit is originated in tropical sub- tropical region of Mexico, Central America and Northern South America (Kakade et al., 2020). Globally, dragon fruit is produced in Vietnam, China, Indonesia Thailand, Malaysia, Israel, Sri Lanka, Mexico, Central America, Europe, South East Asia, United States and Australia over an area of 1,12,264 ha with the production of 21,00,777 MT (Kakade et al., 2020). Three major countries viz., Vietnam, China and Indonesia contribute more than 93% of dragon fruit production of world. The share of Vietnam alone is more than half (51.1%) of the world production over an area of 55, 419 ha with average productivity of 22–35 MT/ha. China is the biggest consumer and importer while Vietnam is the biggest exporter of the fresh dragon fruit (mostly white flesh).

Dragon fruit was introduced to India during the late 1990s (Chen & Paull, 2019). Thereafter, area under its cultivation was gradually increased from 4 to 400 ha in different states during 2005–2017. Initially cultivation of dragon fruit was started in Karnataka, Maharashtra, Gujarat, Kerala, Tamil Nadu, Orissa, West Bengal, Andhra Pradesh, Telangana and Andaman & Nicobar Islands. Nowadays, its cultivation has extended to Rajasthan, Punjab, Haryana, Madhya Pradesh, Uttar Pradesh and North Eastern States. India's dragon fruit production increased drastically to more than 12,000 MT over an area of 3,000–4,000 ha in 2020. Productivity of dragon fruit India is reported to be 8.0-10.5 (MT/ha) (Wakchaure & Reddy, 2023). Gujarat, Karnataka and Maharashtra are the leading producers contributing about 70% of India's dragon fruit production.

India is nowhere in the list of global exporters of dragon fruit. However, considering present expansion of dragon fruit cultivation, India has great scope in a near future for large scale export to meet global market demand particularly market at North America, Europe, Asia–Pacific, South America, and the Middle East and Africa etc. Hence, India has to promote dragon fruit farming in the form of large clusters in barren/dry land areas. One of the obstacles to increasing the profitable commercial cultivation of Dragon fruit is the lack of information about its nutritional management (Sharma et al., 2021).

The fresh dragon fruit contains the water (80-88g), ascorbic acid (4-25mg), ash (0.4-0.7g), calcium (6-10mg), calories (35-50), carbohydrates (9-14g), carotene (vitamin 'a') traces, fat (0.1-0.6g), fiber (0.3-0.9g), iron (0.3-0.7mg), niacin (0.2-0.45mg), phosphorus (16-36mg), protein (0.15-0.23g), thiamine (vitamin b1) traces, riboflavin (Vitamin B2) traces these all nutrients are found fruit per 100g-1 of fruit (Hussain et al., 2021).

Organic farming is considered eco-friendly and it is also Imbalanced use of chemicals and second-generation problems of green revolution in agriculture has weakened the ecological base in addition to degradation of soil, water resources food quality, crop productivity and farm profitability especially in cereal based intensive cropping systems in the country in general and especially North India. Organic manures and biofertilizers as source of nutrients, many organic formulations like Panchgavya and biodynamic preparation are being advocated and practiced for increasing the yield and quality of food. Panchagavya is a fermented product made from five ingredients obtained from cow, such as milk, urine, dung, curd and clarified butter (Amalraj et al., 2013).

Jeevamrutham is an organic fertilizer and a great replacement of chemical fertilizers. It is a very good source of biomass, natural carbon, nitrogen, phosphorous, calcium and other nutrients which are essential for plant growth and development. The microorganisms which are present in the soil are responsible for increasing the fertility of the soil and the productivity of the crops. In order to increase the microorganisms in the soil Jeevamrutham is used. Jeevamrit enhances microbial activity in soil and helps in improvement of soil fertility. Organic farming of dragon fruit will remain sustainable if efforts are made to increase the Total Economic Value (TEV) contained therein, so that land conversion is not carried out for other development purposes. Therefore, further research is needed to increase the social benefits of organic dragon fruit farming. (Ningsih et al. 2020).

Organically produced dragon fruit would be residue free, poisonous chemical free healthy crop, an ideal fruit crop for a health-conscious person. Very scant information is available until now about the fully organic cultivation of dragon fruit, keeping this view, the present experiment was undertaken to examine the effect of FYM, Vermicompost, Panchgavya, Amritpani and Jeevamrit on the flowering and fruiting of Dragon fruit.

Materials and methods

The present experiment entitled "Effect of FYM, Vermicompost, Panchgavya, Amritpani and Jeevamrit on the flowering and fruiting of Dragon fruit" was conducted at the Main Experimental Station, Department of Horticulture, and lab work in PG Lab, Department of Fruit Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj. Ayodhya (U.P.) during year 2023-24 and 2024-25. Seven treatments (T1- Control, T2- FYM + Panchgavya, T3- FYM + Amritpani, T4- FYM + Jeevaamrit, T5- Vermicompost + Panchgavya, T6- Vermicompost + Amritpani and T7- Vermicompost + Jeevaamrit) are used with three replications in randomized block design in 2023-24 and 2024-25. All the organic manure are in two split parts at different stage in soil, 1st application in last week of December and 2nd application in last week of March. The experiment yielded several key observations and measurements. During flowering parameter such as Total number of flowers per plant, Number of fruit set percent, Length of the flowers (cm), Width of the flower (cm), Days taken to first fruit set, Fruit weight (g) Yield per plant (kg). For the data recording five plants were selected randomly and their mean is taken for analysis. The data mean values were to given to a one way ANNOA.

Table- 1

Treatment	No. of flower		Flower Length (cm)		Flower width (cm)		Fruit Weight (g)		Fruit length (cm)	
	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25
T1	16.00g	15.60f	27.98a	28.39ab	4.35b	4.14a	175.19e	175.83e	8.70d	8.97a
T2	25.00e	25.67d	28.20a	28.06b	4.40b	4.53a	224.20d	225.40d	9.98a	9.89a
T3	17.99f	18.39e	28.05a	27.74b	4.33b	4.01a	262.69c	261.94c	9.08cd	9.49a
T4	25.99d	25.70d	28.12a	28.38ab	4.34b	4.17a	278.10b	279.07b	9.38bc	10.06a
T5	46.99a	46.53a	29.29a	30.09a	4.61a	4.52a	291.07a	291.36a	10.02a	9.96a
T6	40.99b	41.30b	28.08a	27.68b	4.11c	4.04a	258.80c	258.33c	9.63ab	9.66a

T7	38.00c	38.40c	28.05a	28.14ab	4.02c	4.40a	256.10c	256.44c	9.74ab	10.01a

Table- 2

Treatment	Fruit width		Fruit diameter		No. of fruit /plant		yield per plant	
	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25
T1	6.68d	7.33a	19.51c	20.04b	13g	14.19d	1.77g	1.80d
T2	8.14a	8.58a	22.75ab	23.11a	17e	16.98c	3.68e	3.71c
T3	8.10a	8.52a	23.40a	23.78a	16f	17.29c	3.37f	3.66c
T4	7.87ab	8.43a	22.15b	22.79a	27.00d	26.72b	5.43d	5.29b
T5	8.26a	9.03a	23.87a	23.70a	32a	31.12a	6.57a	6.37a
T6	7.40c	8.46a	22.15b	22.85a	31b	30.43a	6.20b	6.14a
T7	7.48bc	8.89a	22.78ab	22.61a	29c	29.00ab	5.90c	6.07a

The data presented in Table- 1&2 revealed significant differences among the treatments for all the measured parameters indicating the influence of effects on floral and fruit traits.

Number of Flowers:

The number of flowers per plant was significantly influenced by the treatments. The highest flower count was recorded in T5 (Vermicompost + Panchgavya) with 46.99 in 2022–23 and 46.53 in 2023–24, followed by T6 and T7, which also involved vermicompost-based combinations. In contrast, the lowest flower number was recorded in T1 (Control), with 16.00 and 15.60 flowers in the respective years. The increase in flower number in T5 and T6 (40.99) may be attributed to the improved nutrient availability and microbial activity due to the combined effect of vermicompost and organic biostimulants like Panchgavya and Amritpani. The control treatment (T1) recorded the lowest number of flowers. The improved flowering in vermicompost + Panchgavya treatment could be attributed to enhanced microbial activity, improved nutrient mineralization, and the presence of plant growth regulators in Panchgavya such as auxins, gibberellins, and cytokinins (Chauhan *et al.* 2024 & Ayesha, 2019) which are known to promote floral differentiation and reproductive vigor

Flower Length and Width:

All treatments showed statistically similar flower lengths except for T5, which recorded the longest flowers (29.29 cm and 30.09 cm) in both years. Likewise, T5 exhibited the maximum flower width (4.61 cm and 4.52 cm), which was significantly superior to the control and other treatments. The enhanced floral dimensions under T5 may be attributed to improved water-holding capacity and soil aeration provided by vermicompost, along with the hormonal stimulation from Panchgavya that supports better cell expansion and flower morphology Verma *et al.* (2019).

Fruit Weight:

Marked differences were observed in fruit weight among treatments. T5 produced the heaviest fruits (291.07 g in 2022–23 and 291.36 g in 2023–24), followed by T4 and T3. The lowest fruit weight was noted in T1 (175.19 g and 175.83 g). The combination of vermicompost and Panchgavya likely improved nutrient uptake, particularly nitrogen and potassium, which are critical for fruit development (Shukla *et al.* 2025). Additionally, the microbial consortia in Panchgavya may have contributed to better sink strength and carbohydrate partitioning, ultimately resulting in larger fruit biomass.

Fruit Length:

Fruit length followed a similar trend to fruit weight. T5 recorded the maximum fruit length (10.02 cm and 9.96 cm) in both years repectively, which was significantly higher than other treatments. The minimum fruit length was observed in T1 (8.70 cm and 8.97 cm). Effect of vermicompost and Panchgavya likely enhanced the availability of essential micronutrients which are vital fruit elongation. Moreover, the presence of microbial metabolites in Panchgavya may have further contributed to the enhancement of fruit quality traits (Chauhan *et al.* 2024).

Fruit width

For the trait fruit width (cm) T5 recorded maximum value (8.26 cm in 2022–23 and 9.03 cm in 2023–24), followed by T4 and T3. The lowest fruit width was noted in T1 (6.68 cm and 7.73 cm), indicating the effectiveness of treatments having combinations of vermicompost and Panchgavya/ Amritpani in enhancing fruit girth (Rawat *et al*. 2022). The minimum fruit width (6.68 cm) was observed in T1 (control), highlighting the limitation of nutrient-deficient conditions.

Fruit diameter

The highest fruit diameter in 2022-23 was observed in T3 (23.40 cm) and T5 (23.87 cm), which were statistically similar and significantly greater than T1 (19.51 cm). In 2023-24, T3 and T2 recorded the largest diameters of 23.78 cm and 23.11 cm respectively, with T5 also showing comparable values (23.70 cm). These results suggest that organic inputs significantly improved fruit development. In contrast, T1 recorded the lowest diameter (19.51 cm), reflecting poor fruit growth under non-fertilized conditions (Hussian *et al.* 2024).

Number of fruits per plant

The lowest fruit number was recorded in T1 with 13 fruits in 2022-23 and 14.19 in 2023-24. Treatment T5 yielded the highest fruit number, with 32 fruits per plant in 2022-23 and 31.12 in 2023-24, closely followed by T6 and T7. Treatment T4 also showed a notable increase with 27 and 26.72 fruits in respective years. This indicates that combinations involving vermicompost and bio-stimulants like Panchgavya, Amritpani, and Jeevaamrit considerably promoted flowering and fruit set (Hussian *et al.* 2024, Chauhan *et al.* 2024).

Yield per plant

Yield per plant reflected the trends seen in fruit number and size. The lowest yield was consistently observed in T1 (1.77 kg in 2022-23 and 1.80 kg in 2023-24), which was significantly lower than all other treatments. Treatment T5 achieved the highest yield per plant with 6.57 kg in 2022-23 and 6.37 kg in 2023-24, closely followed by T6 and T7. The results show that treatments involving T5, T6, and T7 substantially improved yield, which can be attributed to their effects on both the number of fruits and fruit size. The lowest yield in T1 can be attributed to reduced vegetative vigor and reproductive efficiency in the absence of nutrient supplementation.

Overall, treatment T5 (Vermicompost + Panchgavya) emerged as the most effective nutrient management strategy, leading to superior performance across all yield parameters. The results reaffirm the potential of integrated organic inputs in enhancing dragon fruit productivity under sustainable farming systems.

Conclusion

The present study demonstrated that use of organic inputs significantly enhanced the yield and yield-attributing traits of dragon fruit. Among the treatments, T5 (Vermicompost + Panchgavya) was found to be the most effective in flowering and fruiting traits of dragon fruit. Treatments involving vermicompost in combination with biostimulants like Amritpani and Jeevaamrit (T6 and T7) also showed promising results. In contrast, the control treatment (T1) consistently recorded the lowest values across all recorded parameters, highlighting the importance of nutrient supplementation. These findings suggest that the application of vermicompost along with Panchgavya can be a sustainable and efficient strategy for improving dragon fruit productivity under organic and low-input farming systems especially in eastern plains.

References-

Ayesha, S. (2022). Studies on the influence of organic manures and bio-fertilizers on plant growth, yield, quality and storage of dragon fruit [*Hylocereus undatus* (Haworth) Britton & Rose and *Hylocereus polyrhizus* (FAC Weber) Britton & Rose] (Doctoral dissertation, University of Agricultural Sciences, Bangalore).

Chauhan, P., Kumar, A., Tripathi, S. K., Katiyar, H., Kumar, A., Verma, A. K., & Singh, S. (2024). Effect of Organic Manures and Bio-fertilizers on Growth, Yield and Quality of Dragon Fruit (Hylocereus undatus L.) under Western Uttar Pradesh Conditions. *Journal of Scientific Research and Reports*, *30*(11), 1106-1117.

Chen, N. J., & Paull, R. E. (2019). Overall dragon fruit production and global marketing overall dragon fruit production and global marketing. *FFTC Agric Policy Platform*, *9*(2), 229-239.

Hossain, F. M., Numan, S. M. N., & Akhtar, S. (2021). Cultivation, nutritional value, and health benefits of Dragon Fruit (Hylocereus spp.): A Review. *International Journal of Horticultural Science and Technology*, *8*(3), 259-269.

Hussian, F., Joseph, A. V., & Ajam, S. (2024). Effect of organic manures and bio-fertilizer on growth parameters and field establishment of dragon fruit (*hylocerus polyrhizus*). *Plant Archives*, *24*(2), 2518-2524.

Kakade, V., Jinger, D., Dayal, V., Chavan, S., Nangare, D. D., Wakchaure, G. C., & Dinesh, D. (2020). Dragon Fruit: Wholesome and remunerative fruit crop for India. *Food and Scientific Reports*, *1*(12), 44-48.

Leo Daniel Amalraj, E., Praveen Kumar, G., Mir Hassan Ahmed, S. K., Abdul, R., & Kishore, N. (2013). Microbiological analysis of panchagavya, vermicompost, and FYM and their effect on plant growth promotion of pigeon pea (*Cajanus cajan* L.) in India. *Organic Agriculture*, *3*, 23-29.

Ningsih, K., Sakdiyah, H., Felani, H., Dwiastuti, R., & Asmara, R. (2020). Economic valuation for organic farming of dragon fruit: Cost benefit analysis approach. In *IOP Conference Series: Earth and Environmental Science* (Vol. 469, No. 1, p. 012082). IOP Publishing.

Rawat, A. K., Maji, S., Mayaram, R., Maurya, A. K., & Meena, R. C. (2022). Effect of fertilizers, vermicompost and farmyard manure on growth of red dragon fruit (*Hylocereus costaricensis* (Web.) Britton and Rose).

Rifat, T., Khan, K., & Islam, M. S. (2019). Genetic diversity in dragon fruit (*Hylocereus sp*) germplasms revealed by RAPD marker. *JAPS: Journal of Animal & Plant Sciences*, *29*(3).

Sharma, S., Mittal, R., Sharma, A., & Verma, V. (2021). Dragon fruit: A promising crop with a growing food market that can provide profitable returns to farmers. *Int. J. Agric. Sci. Res*, *11*, 1-14.

Shukla, J. K., Tripathi, V. K., & Trivedi, A. K. (2025). Impact of Organic Manure and Bio-fertilizers in Various Combinations on Growth and Flowering of Dragon Fruit. *Journal of Advances in Biology & Biotechnology*, *28*(3), 51-65.

Wakchaure, G. C., & Reddy, K. S. (2023). Present Status, Scope, Marketing, Constraints and Policy Issues of Dragon Fruit Farming in India. *Climate Change & Abiotic Stresses Management Solutions for Enhancing Water*

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