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### Effect of micro nutrients and organic manures on establishment and plant growth of dragon fruit (*Hylocereus polyrhizus*) under Prayagraj agro climatic condition, CV Red jaina

**Sumit Kumar, SS Saravanan and Saket Mishra**

#### Abstract

The present investigation entitled “Effect of Micro nutrients and Organic manures on establishment and plant growth of Dragon fruit (*Hylocereus polyrhizus*) under Prayagraj agro climatic condition, c.v. Red jaina” was carried out at the Central research field, department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of agriculture, Technology and Sciences, Prayagraj (U.P.) in the year 2018-19. The experiment was conducted in Randomized Block Design having 11 treatments in three replications. The allocation of the different treatments of the individual Dragon fruit plants using random number in each replication. On the basis of results obtained, the treatment T<sub>2</sub> (Vermicompost 75% +F.Y.M. 25%) was found to be the best in terms of maximum plant height (46.73 cm), maximum number of branches (6.0), minimum days taken to first sprouting (20.03), maximum new shoot height (39.16 cm), maximum plant canopy north to south (21.36cm), maximum plant canopy east to west (20.60cm), maximum no. of sprouting per plant (4.66) and the minimum the parameter was recorded in T<sub>0</sub> control. Hence, It is recommended that the application of micronutrients and organic manures is a promising approach to increase the vegetative growth and survival percentage of dragon fruit plant. Application of micronutrient and organic manure indicated to have better impact on physical process of dragon fruit plant.

**Keywords:** Dragon fruit plant, micro nutrients and organic manures

#### Introduction

Dragon fruit belong to the family Cactaceae and It is also known as Pitaya that are found in the tropical and subtropical America, particularly in semi-desert areas of the hot regions of America. Britton & Rose is the most widely cultivated species and is grown for its fruit, which is red with white pulp. It is a long day plant with beautiful night blooming flower that is nicknamed as “Noble Women” or “Queen of the Night” (Martin *et al.*, 2011). Pitaya fruit has traditionally been consumed in Colombia, Mexico, Nicaragua, and Vietnam; however, its nice in the exotic fruit market has grown in recent years. The ripened polyrhizus fruit had an attractive purple-red peel and the flesh is soft and succulent with small black seeds. Since, this fruit are being promoted as a healthy food (Tri *et al.*, 2000) [13]. Many countries like Nicaragua, Colombia, Vietnam, Australia, United States, Thailand, Taiwan as well as Malaysia has started to commercialize *H. polyrhizus*. Pitaya peel constitutes 22% of the whole pitaya and it contained considerable amount. The cactus families are highly adaptable to a new environment (Zegbe *et al.*, 2015). The plants are able to tolerate drought, heat, poor soil, and cold. The modification of the stem for water storage, the reduction or absence of leaves, the waxy surfaces, and night-time opening of the tissues for carbon dioxide uptake (by the CAM process), enable the plants to tolerate harsh conditions. Terms used to describe plants with such adaptations include xerophytes and succulent. The dragon fruit plant gets the flowering in May to June month and fruits from Aug to Dec month. After 16 to 18 month of planting Dragon fruit plant start bearing the fruits. After one month of flowering stage, dragon fruits are ready for harvest. Its fruit is the most beautiful in the family Cactaceae with an immense shape, bright red skin studded with green scales, no surface spines and red flesh with tiny readily swallowed black seeds. Average fruit weight is 360 g. The fruit is non climacteric with best flavor when harvested at full red color. The juicy flesh of the fruit is delicious in taste which contains 70-80% of the ripe fruit.

The red fleshed varieties of Dragon fruit are rich in antioxidants. It is rich with beta carotene, Lycopene, Vitamin E, Vitamin C, phosphorus and calcium helps to develop strong bones, teeth and skin and contain essential fatty acids, *i.e.*, 48% linoleic acid and 1.5% linolenic acid.

**Table 1:** Average composition of Dragon fruit (*Hylocereus polyrhizus*)

Composition	Amount per 100 gm of Pulp
Water(g)	82.5-83
Protein (g)	0.159-0.229
Fat (g)	0.21-0.61
Crude fiber (g)	0.7-0.9
Ash (g)	0.28
Calcium (mg)	6.3-8.8
Phosphorus (mg)	30.2-36.1
Iron (mg)	0.55-0.65
Carotene (mg)	0.005-0.012
Thiamine (mg)	0.028-0.043
Riboflavin (mg)	0.043-0.045
Niacin (mg)	1.2-1.3
Ascorbic acid	8-9

## Materials and Methods

The present investigation entitled "Effect of Micro nutrients and Organic manures on establishment and plant growth of Dragon fruit (*Hylocereus polyrhizus*) under Prayagraj agro climatic condition, c.v. Red jaina" was carried out at the Central research field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj (U.P.), during 2018-2019. The experiment was conducted in Randomized Block Design having 11 treatments in 3 replications.

## Ecological Requirments

### Climate

Unlike other cacti, which are from desert origin, Dragon fruit has its origin from areas with sufficient rainfall ranging from 1,730- 2,540 mm /year. An average yearly rainfall of 500-1500 mm is required for healthy plant growth. Excessive rain may cause the flowers to drop and sometimes the fruit rots. Suitable growth conditions for Dragon fruit is shown in Table – 2.

**Table 2:** Suitable growing conditions for Dragon fruit

Climatic Factor	Optimum condition
Altitude (m)	Up to 1,700
Temperature (°C)	20-30
Rainfall (mm/Year)	500-2,000 (with alternative dry and wet period)
Soil	Well drained red yellow podzolic, lateritic soil and reddish brown earth
pH	5.5 – 6.5

## Varietal Description of Red jaina

This is one of the finest variety of dragon fruit originated in Central America having red colour fruit with dark red flesh. This variety is medium to high in yield with an average of 200 to 300 gram of fruit weight. It is easily adapted to various growing conditions and soil types. This variety is highly suitable for juice extraction. 6 month old Dragon fruit plants planted at 2x1 m apart were taken in the present investigation.

Micro nutrients, organic manures and other management practices were followed as per recommendation for Dragon fruit.

**Table 3:** Effect of Micro nutrients and Organic manures on establishment and plant growth of Dragon fruit (*Hylocereus polyrhizus*) under prayagraj agro climatic condition, cv. Red jaina

Sr. No.	Symbols	Combinations
1.	T <sub>0</sub>	Control
2.	T <sub>1</sub>	Poultry manure (50%) + F.Y.M. (50%)
3.	T <sub>2</sub>	Vermicompost (75%) + F.Y.M. (25%)
4.	T <sub>3</sub>	Vermicompost (25%) + F.Y.M. (75%)
5.	T <sub>4</sub>	Poultry manure (50%) + Zinc (0.4%)
6.	T <sub>5</sub>	Vermicompost (50%) + F.Y.M. (50%)
7.	T <sub>6</sub>	F.Y.M. (50%) + Boron (0.4%)
8.	T <sub>7</sub>	Vermicompost (50%) + Zinc (0.1%)
9.	T <sub>8</sub>	Vermicompost (100%)
10	T <sub>9</sub>	F.Y.M. (100%)
11	T <sub>10</sub>	Poultry manure (100%)

## Summary

The maximum plant height was recorded in T<sub>2</sub> [V.C.(75%)+F.Y.M.(25%)] with (46.73 cm), followed by T<sub>5</sub> [V.C.(50%)+F.Y.M.(50%)] with (45.30 cm) and the minimum was recorded in T<sub>0</sub> (control) with (35.36 cm). These results are support with Tirkey *et al.*, (2003) [15].

The maximum number of branches were recorded in T<sub>2</sub>--V.C.(75%)+F.Y.M.(25%) with (6.00), followed by T<sub>5</sub>V.C.(50%)+F.Y.M.(50%) with (5.66) and the minimum was recorded in T<sub>0</sub> (control) with (2.33). Similar finding were reported with Silva *et al.*, (2016) [8].

The minimum days taken to first sprouting was recorded in T<sub>2</sub>V.C.(75%)+F.Y.M.(25%) with (20.03), followed by T<sub>5</sub>V.C.(50%)+F.Y.M.(50%) with (22.30) and the maximum was recorded in T<sub>0</sub> (control) with (59.33).

The maximum New shoots height was recorded in T<sub>2</sub>V.C.(75%)+F.Y.M.(25%) with (39.16 cm), followed by T<sub>5</sub> V.C.(50%)+F.Y.M.(50%) with (38.06 cm) and the minimum was recorded in T<sub>0</sub> (control) with (10.43 cm).

The maximum plant canopy north to south was recorded in T<sub>2</sub> = [Vermicompost(75%)+F.Y.M.(25%)] with (21.36cm) followed by T<sub>5</sub> = [Vermicompost(50%)+F.Y.M.(50%)] with (19.13cm) and the minimum was recorded in T<sub>0</sub> (control) with (8.56 cm). Similar finding were reported by Ganapathi *et al.* (2018) [4].

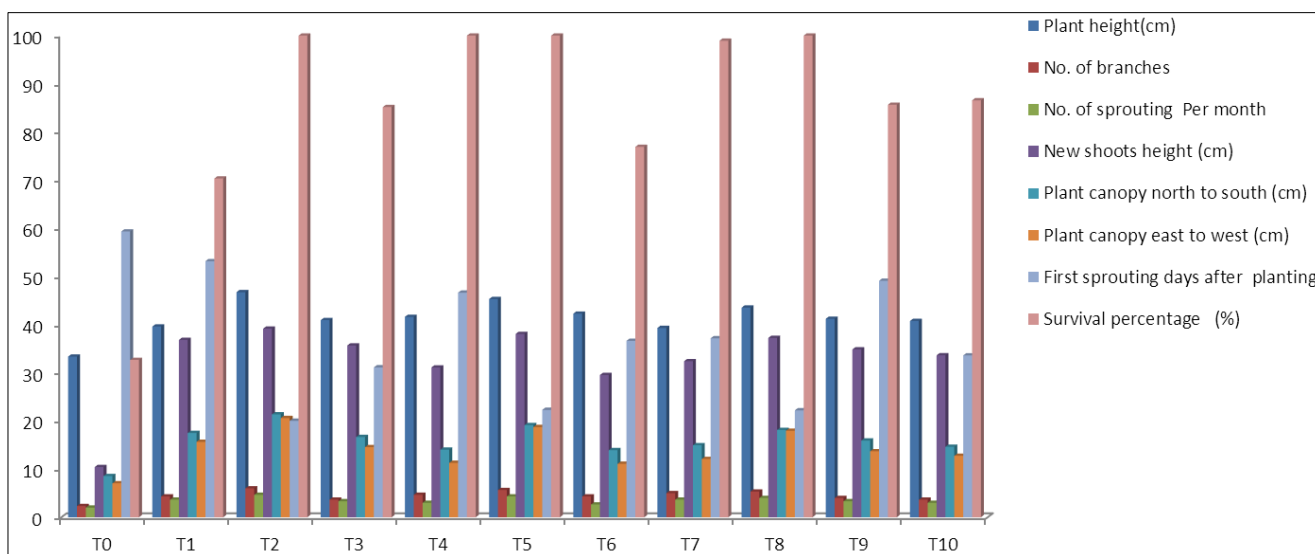
The maximum plant canopy east to west was recorded in T<sub>2</sub>= [Vermicompost (75%)+F.Y.M.(25%)] with (20.60cm), followed by T<sub>5</sub>= [Vermicompost (50%)+F.Y.M.(50%)] with (18.73 cm) and the minimum was recorded in T<sub>0</sub> (control) with (7.06 cm). These findings are in accordance with Kiran *et al.*, (2017).

The maximum number of sprouting per plant was recorded in T<sub>2</sub> =[Vermicompost (75%)+F.Y.M.(25%)] with (4.66), followed by T<sub>5</sub> = [V.C.(50%)+F.Y.M.(50%)] with (4.33) and the minimum was recorded in T<sub>0</sub> (control) with (2.00). Similar findings were reported by Chakma *et al.*, (2014) [2].

The maximum Survival % was recorded in T<sub>2</sub>V.C.(75%)+F.Y.M.(25%) with (100%), followed by T<sub>5</sub>V.C.(50%)+F.Y.M.(50%) with (100%) and the minimum was recorded in T<sub>0</sub> (control) with (32.66%). Reported by Silva *et al.* (2009) [9].

**Table 4:** Effect of Micro nutrients and Organic manures on establishment and plant growth of Dragon fruit c.v. Red jaina

Number	Treatments	Plant height(cm)	No. of branches	No. of sprouting Per month	New shoots height (cm)	Plant canopy north to south (cm)	Plant canopy east to west (cm)	First sprouting days after planting	Survival percentage (%)
T <sub>0</sub>	Control	33.36	2.33	2.00	10.43	8.56	7.06	59.33	32.66
T <sub>1</sub>	Poultry manure (50%) + F.Y.M. (50%)	39.60	4.33	3.66	36.83	17.50	15.66	53.16	70.33
T <sub>2</sub>	Vermicompost (75%) + F.Y.M. (25%)	46.73	6.00	4.66	39.16	21.36	20.60	20.03	100.00
T <sub>3</sub>	Vermicompost (25%) + F.Y.M. (75%)	40.93	3.66	3.33	35.66	16.66	14.56	31.13	85.16
T <sub>4</sub>	Poultry manure (50%) + Zinc (0.4%)	41.60	4.66	3.00	31.10	14.03	11.30	46.63	100.00
T <sub>5</sub>	Vermicompost (50%) + F.Y.M. (50%)	45.30	5.66	4.33	38.06	19.13	18.73	22.30	100.00
T <sub>6</sub>	F.Y.M. (50%) + Boron (0.4%)	42.26	4.33	2.66	29.53	13.93	11.10	36.63	76.90
T <sub>7</sub>	Vermicompost (50%) + Zinc (0.1%)	39.30	5.00	3.66	32.40	14.96	12.10	37.16	98.93
T <sub>8</sub>	Vermicompost (100%)	43.53	5.33	4.00	37.23	18.13	17.96	22.20	100.00
T <sub>9</sub>	F.Y.M. (100%)	41.20	4.00	3.33	34.86	15.93	13.70	49.10	85.63
T <sub>10</sub>	Poultry manure (100%)	40.76	3.66	3.00	33.63	14.63	12.76	33.60	86.56
	F- test	S	S	S	S	S	S	S	S
	S. Ed. (±)	1.815	0.414	0.524	0.793	0.582	0.493	3.362	6.074
	C. D. (P = 0.05)	3.814	0.870	1.101	1.666	1.222	1.036	7.062	12.758
	CV (%)	5.380	11.393	18.748	2.976	4.481	4.271	11.012	8.741

**Fig 1:** Effect of Micro nutrients and Organic manures on establishment and plant growth of Dragon fruit c.v. Red jaina

## Conclusion

On the basis of results obtained, It is concluded that the treatment T<sub>2</sub> [V.C.(75%)+F.Y.M.(25%)] was found best in terms establishment, growth and survivability of Dragon fruit (*Hylocereus polyrhizus*) under Prayagraj agro climatic conditions, c.v. Red jaina.

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