

Original Research Article

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Effect of Different Dose of NPK on Flower Phenology of Dragon Fruit

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ABSTRACT

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An investigation was carried out with different doses of NPK nutrients (viz. T₁ - N₂₅₀ P₂O₅₁₅₀ K₂O₁₀₀ g/pole; T₂ - N₃₀₀ P₂O₅₂₀₀ K₂O₁₅₀ g/pole; T₃ - N₃₅₀ P₂O₅₂₅₀ K₂O₂₀₀ g/pole; T₄ - N₄₀₀ P₂O₅₃₀₀ K₂O₂₅₀ g/pole; T₅ - N₄₅₀ P₂O₅₃₅₀ K₂O₃₀₀ g/pole; T₆ - N₅₀₀ P₂O₅₄₀₀ K₂O₃₅₀ g/pole; T₇ - N₅₅₀ P₂O₅₄₅₀ K₂O₄₀₀ g/pole and T₈ - Control) in premises adjacent to the Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India during the years 2015 and 2016 to evaluate the effects of NPK nutrients on flower morphology of dragon fruit (*Hylocereus costaricensis*) cv. Royal Moroccan Red. The experiment was laid out in a randomised block design with 8 (eight) treatments and 3 (three) replications. Each treatment comprised of one pole having 4 (four) plants. The observations were recorded on days to first flower, flower length, androecium characters, gynoecium characters and different parts of perianth was observed. The days required to first flower was 431.25 days with application of N₃₅₀ P₂O₅₂₅₀ K₂O₂₀₀ g/pole and flowering became earlier by nearly 15 days over control. Among the different flower parameters, the length of upper, inner, outer and lower free perianth, style, stamen and the ovary were only significantly influenced due to the different treatments.

Introduction

Hylocereus costaricensis commonly called as Dragon fruit or Pithaya which is a native of Mexico and Central and South America (Britton and Rose, 1963; Mizrahi *et al.*, 1997; Morton, 1987).

It is a long day plant with beautiful night blooming flower that is nicknamed as “Noble Woman” or “Queen of the Night”. The fruit is also known as Strawberry Pear, Dragon fruit, Pithaya, Night blooming Cereus, Belle of the night, Conderella plant and Jesus in the Cradle. It is a long day plant usually flowering

starts from April to November sometimes extending till December and occurs in four to six flushes and sometimes to seven (Perween *et al.*, 2018). Pithaya belongs to the genus *Hylocereus* (2n = 22). Young stems and fresh flower buds are eaten as vegetables, while dried ones are used for homemade medicine (Ortiz-Hernández, 1999).

In Taiwan, dry flowers are consumed as vegetables (Mizrahi and Nerd, 1999). Literature on morphology of dragon fruit lacking in general and on flower morphology in particular. There is no scientific information available in the India subcontinent on the

effect of nutrient on flower morphology of dragon fruit. Hence the present investigation was undertaken to evaluate the response of NPK on flower morphology of dragon fruit.

Materials and Methods

The present study was conducted with eight fertilizer treatments viz., $T_1 = N_{250}P_{150}K_{100}$, $T_2 = N_{300}P_{200}K_{150}$, $T_3 = N_{350}P_{250}K_{200}$, $T_4 = N_{400}P_{300}K_{250}$, $T_5 = N_{450}P_{350}K_{300}$, $T_6 = N_{500}P_{400}K_{350}$, $T_7 = N_{550}P_{450}K_{400}$, $T_8 =$ Control and Organic manure @ 20 kg/ pillar containing four plants was laid out in Randomized Block Design with 4 replications of NPK fertilizers combination at was conducted at premises of Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India during the period of 2015-2016.

The experimental field was situated at 23.5° N latitude and 89° E longitude on elevation 9.75 above mean sea level (MSL). Characters observed were days to first flower, flower length, androecium characters, gynoecium characters and different parts of perianths. Days to first flower was taken by days count from planting to first flower bloom of the plant.

All measurements were taken by slide caliper except length of flower taken by scale along with the perianth (upper, middle and lower) length. The data on different parameters were analyzed using analysis of variance (ANOVA) based on randomized block design (RBD).

Results and Discussion

The minimum days required to first flower was 431.25 in the treatment T_3 ($N_{350}P_{250}K_{200}$) which significantly differed with T_2 (439.75 days) and maximum days (445.75) were required to first flowering in control (T_8). Highest stamen length of 11.25 cm was observed in T_6 receiving $N_{500}P_{400}K_{350}$ followed by T_8 (11.03 cm) and lowest stamen

length was recorded in treatment T_2 (9.99 cm) which was at par with T_7 (10.11 cm). Ovary and style length varied significantly among the different treatments. The highest style length was observed in T_2 (22.72 cm) receiving $N_{300}P_{200}K_{150}$ g / pillar followed by in T_7 (21.99 cm) and lowest in T_4 (20.21 cm) supplied with of $N_{400}P_{300}K_{250}$. Among the treatments highest ovary length was recorded in treatment supplied with $N_{450}P_{350}K_{300}$ (32.26 cm) and lowest in control (31.35cm). Perianth observed in pithaya flowers was hypothetically classified into four types:

a. Upper inner free perianth, b. Upper outer free perianth, c. Middle free perianth and d. Lower free perianth. Upper inner free perianth was free from the flower however, their lower part is indistinctly joined to the other flower parts. Length of upper free perianth varied significantly among the treatments with highest value of 13.42 cm in T_2 ($N_{300}P_{200}K_{150}$) and lowest upper inner free perianth length of 13.17 cm in T_8 (control). Upper outer free perianth was similar to upper inner perianth but having green colour with reddish margin (Fig. 1 and 2).

Length of upper outer free perianth varied significantly among the treatments while number and diameter varied insignificantly. Highest upper outer free perianth length of 13.43 cm observed in T_7 ($N_{550}P_{450}K_{400}$) and lowest in T_5 (12.75cm). Middle free perianth was similar to upper outer perianth but smaller in size. Length of lower free perianth varied significantly among the treatments with highest value in the treatment T_7 (33.72cm) and lowest in T_1 (33.27cm). The unusually large, tubular style is 20 cm in length and 0.5 cm in diameter (Perween *et al.*, 2018); the stigmas having 21 slender lobes, creamy green in colour (Daubresse Balayer *et al.*, 1999; Luders, 1999; Perween *et al.*, 2018) (Table 1 and 2).

Table.1 Effect of nutrients on perianth of dragon fruit

Treatment	Upper inner free perianth			Upper outer free perianth			Middle free perianth			Lower free perianth		
	Number	Length (cm)	Diameter (mm)	Number	Length (cm)	Diameter (mm)	Number	Length (cm)	Diameter (mm)	Number	Length (cm)	Diameter (mm)
T ₁	10.50	13.20	13.35	11.50	13.24	13.16	9.00	8.52	13.06	31.25	33.27	13.06
T ₂	11.00	13.42	13.26	11.00	13.24	13.20	9.50	8.57	13.02	32.25	33.29	13.11
T ₃	11.25	13.25	13.22	11.50	13.22	13.21	9.75	8.51	13.04	31.50	33.33	13.05
T ₄	11.50	13.30	13.33	10.50	12.83	13.22	9.00	8.62	13.05	31.25	33.59	13.08
T ₅	11.50	13.20	13.29	10.75	12.75	13.21	10.00	8.63	13.04	31.50	33.53	13.03
T ₆	11.50	13.30	13.27	11.25	13.10	13.23	9.50	8.61	13.09	31.25	33.28	13.15
T ₇	11.00	13.37	13.26	11.25	13.43	13.19	9.00	8.56	13.09	31.50	33.72	13.06
T ₈	11.00	13.18	13.28	12.50	13.20	13.19	9.00	8.51	13.06	31.25	33.28	13.03
CD _{0.05}	NS	0.14	NS	NS	0.23	NS	NS	NS	NS	NS	0.15	NS

Table.2 Effect of nutrients on gynoecium characters of dragon fruit

Treatment	Days to first flower	Flower length (cm)	Petal length (cm)	Petal number	Stamen length (cm)	Anther length (mm)	Anther diameter (mm)	Style length (cm)	Style diameter (mm)	Number of stigma lobes	Stigma lobe length (mm)	Stigma lobe diameter (mm)	Ovary length (mm)
T ₁	440.50	30.11	11.44	22.25	10.37	8.71	0.958	21.37	5.58	24.00	21.77	1.442	31.42
T ₂	439.75	30.46	11.18	22.25	9.99	8.71	0.950	22.72	5.60	24.75	22.12	1.425	31.40
T ₃	431.25	30.49	11.25	22.25	10.86	8.73	0.955	20.50	5.48	24.25	21.79	1.450	31.54
T ₄	440.75	30.62	11.17	21.75	10.45	8.72	0.958	20.21	5.63	23.75	21.51	1.435	31.52
T ₅	441.25	30.77	11.39	22.00	10.64	8.70	0.948	20.41	5.48	24.50	22.21	1.433	32.26
T ₆	441.25	31.07	11.27	21.50	11.25	8.71	0.955	20.28	5.63	24.50	21.62	1.430	31.39
T ₇	442.75	31.00	11.33	22.25	10.11	8.75	0.968	21.99	5.55	24.00	22.25	1.433	31.49
T ₈	445.75	30.05	11.28	22.00	11.03	8.73	0.950	21.55	5.55	24.25	21.73	1.423	31.35
CD _{0.05}	6.7437	NS	NS	NS	0.5281	NS	NS	0.66	NS	NS	NS	NS	0.18

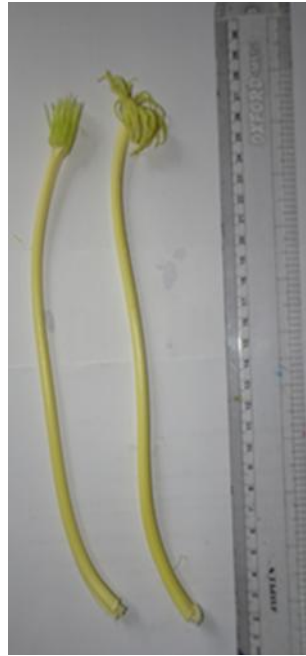
NS- Non-significant

NOTE: T₁ - N₂₅₀ P₂O₅₁₅₀ K₂O₁₀₀; T₂ - N₃₀₀ P₂O₅₂₀₀ K₂O₁₅₀; T₃ - N₃₅₀ P₂O₅₂₅₀ K₂O₂₀₀; T₄ - N₄₀₀ P₂O₅₃₀₀ K₂O₂₅₀; T₅ - N₄₅₀ P₂O₅₃₅₀ K₂O₃₀₀; T₆ - N₅₀₀ P₂O₅₄₀₀ K₂O₃₅₀; T₇ - N₅₅₀ P₂O₅₄₅₀ K₂O₄₀₀; T₈ - Control.

Fig.1 Different floral parts of dragon fruit flower



Cross section of flower (Dorsal view)



Style and Stigma lobes



Cross section of flower (Ventral view)



Upper inner perianth



Upper outer perianth



Middle perianth



Lower perianth



Ovary (cross section)



Stamens and stigma

Fig.2 1- Flower bud initiation, 2, 3 and 4 - Flower buds, 5- Mature flower bud ready to bloom, 6 and 7 – Blooming of flowers



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