Biological Forum – An International Journal 14(3): 52-57(2022)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Impact of Biostimulants on Floral Induction and Yield Attributing Traits of Pitaya (*Hylocereus undatus* L.)

B. Kavinmukil[1], J. Rajangam[2*], S. Muthuramalingam[3] and K.M. Sellamuthu[4]
[1]PG Scholar, Department of Fruit Science, Horticultural College and Research Institute, Periyakulam, TNAU (Tamil Nadu), India.
[2]Dean, Horticultural College and Research Institute, Periyakulam, TNAU (Tamil Nadu), India.
[3]Assistant Professor, Department of Fruit Science, Horticultural College and Research Institute, Periyakulam, TNAU (Tamil Nadu), India.
[4]Associate Professor, Department of Natural Resource Management, Horticultural College and Research Institute, Periyakulam, TNAU (Tamil Nadu), India.

(Corresponding author: J. Rajangam)*
(Received 03 May 2022, Accepted 24 June, 2022)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: The focus of this research was to investigate the synergistic effect of biostimulants on floral induction and yield of dragon fruit (*Hylocereus undatus* L.) and also to tackle the obstacles of insufficient nutrient availability to the plants that results in poor fruit set and decreased crop output. The experimental trial was taken up in a farmer's orchard in Seelayampatti, Theni district during the year 2021-2022. The cumulative imposition of various biostimulants consisting of Seaweed extract (0.5 per cent + Panchagavya (2 per cent) + CPPU 100 ppm foliar spray + Paclobutrazol 0.75 g active ingredient per meter of canopy diameter soil drenching (T_{13}) significantly influenced flowering (number of days required for floral bud initiation, number of floral buds per pole, number of flowers per pole) and fruit yield contributing features among 14 treatments. As a result, the treatment *viz*., Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm foliar spray + Paclobutrazol 0.75 g soil drenching (T_{13}) combination is indeed the best option for improving pitaya's early floral commencement and yield traits.

Keywords: Dragon fruit, biostimulants, floral induction, yield, synergistic effect.

INTRODUCTION

Dragon fruit, a tropical climbing epiphytic cactus species that has evolved in Latin America, is expanding as a tremendous commodity even in outlying areas mainly attributed to its medicinal and health virtues globally. *Hylocereus* bears a striking resemblance to the cactaceae family and is a dicotyledonous floral shrub (Spichiger *et al.,* 2000 and Gunasena *et al.,* 2007). Because of its spectacular nocturnal flowers, dragon fruit is recognized as the "Queen of the Night" and "Noble Woman". Strawberry Pear, Night Blooming Cereus, Pithaya, and Belle of the Night are just a few of the fruit's nicknames. Vietnam, Indonesia, and China produce over 93% of the world's dragon fruit. According to recent statistics in India, dragon fruit is cultivated on an area of 3000 hectares with an estimated average output of 13.5 metric tonnes ha^{-1}. The huge rise in production and cropped land is mostly ascribed to states such as Gujarat, Karnataka, and Maharashtra, which together contribute 70% of total output. Pitaya is diversified on an area around 100.40 hectares in Tamil Nadu, with an average output of 12.10 metric tonnes per hectare (Wakchaure *et al.*, 2020).

Pitaya fruit has an intense complexion and a delightful, juicy pulp with black palatable seeds lodged in it with excellent nutritional values. Dragon fruit is notable for its high calcium and phosphorus content, as well as its antioxidant composition. The red pulped pitaya is enriched with betalains, which meets the expanding market need for antioxidants and natural food colorants with antiradical qualities (Perween *et al.,* 2018). Dragon fruit offers antioxidants, anti-microbial, anti-diabetics, anti-carcinogenic, and cardiovascular protective properties.

Inadequate nutrition availability leads to reduced fruit set and crop output. As an outcome, appropriate dietary supply is essential for efficient dragon fruit production. Plant biostimulants are a novel class of chemicals, mostly exploited in sustainable fruit production, that attempt to accelerate plant development even after a stressful crisis has elapsed and have physiological effects akin to phytohormones (Patrick Du Jardin 2015). Fruit trees benefit from the utilization of triazole plant hormones, particularly Paclobutrazol, which restricts vegetative growth and promotes blooming. According to Krishna *et al.* (2017), paclobutrazol has been shown to boost flowering and fruit set in mango cv. "Banganapalli". By stimulating extensive and early flowering, CPPU (For chlorfenuron) enhances fruit size and efficacy. Following the application of CPPU, Parson (2019) noted that the floral buds in dragon fruit developed into tiny flowers and started to open up between 4 to 7 days. The impact of for chlorfenuron

(CPPU) pre harvest treatment on the red fleshed cv. "Fu Kwai Hong" pitaya fruit under storage at 5°C was investigated by Jiang *et al.* (2020). The bracts were doused with 100 mg L^{-1} CPPU at blooming time, with water serving as the control. Fruit that had undergone CPPU treatment had considerably thicker bracts, a lower fruit index and a lower cracking ratio in both winter and summer seasons. Several scholars had explored the utilization of biostimulants in order to improve flowering and yield attributes in mango (Gopu *et al*., 2017); dragon fruit by Chang (2021); pomegranate (Hussein *et al.,* 2021). Nonetheless, there appears to be very little evidence concerning the usage of biostimulants on blooming and yield contributing features of dragon fruit, hence the current study was undertaken to seek a substitute for solely inorganic fertilization.

MATERIALS AND METHODS

The experimental field study was conducted at the six years old dragon fruit field during the academic year 2021 – 22 which is situated at 9° 52′N latitude and 77° 23′E longitude with an elevation of 296 m Mean Sea Level of Seelayampatti village, Theni district under the dominion of Department of Fruit Science, Horticultural College and Research Institute, Periyakulam. The trial was set up in a Randomized Block Design (RBD) featuring 14 treatments as well as 3 replications with 15 plants for each treatment.

Table 1: Details of the treatment.

Sr. No.	Treatments
T_1	Seaweed extract @ 0.5 % foliar spray
T_2	Seaweed extract @ 1.0 % foliar spray
T_3	Panchagavya @ 2 % foliar spray
T_4	Panchagavya @ 3 % foliar spray
T_5	CPPU 100 ppm foliar spray
T_6	CPPU 200 ppm foliar spray
T_7	Humic acid 7.5 % soil drenching
T_8	Humic acid 10 % soil drenching
T_9	Paclobutrazol 0.75 g active ingredient per metre of canopy diameter soil drenching
T_{10}	Paclobutrazol 1.5 g active ingredient per metre of canopy diameter soil drenching
T_{11}	Seaweed extract 0.5 % + Panchagavya 2 % + CPPU 100 ppm foliar spray
T_{12}	Seaweed extract 0.5 % + Panchagavya 2 % + CPPU 100 ppm foliar spray + Humic acid 7.5 % soil drenching
T_{13}	Seaweed extract 0.5 % + Panchagavya 2 % + CPPU 100 ppm foliar spray + Paclobutrazol 0.75 g soil drenching
T_{14}	Control

A. Time of treatment implementation

The initial dose of seaweed extract, panchagavya, and CPPU formulations were delivered as a foliar spray shortly before blooming, followed by the fruit setting stage. Paclobutrazol 23% suspension concentrate was administered in varying doses as a soil amendment during the last week of January 2022, as specified by Burondkar and Gunjate (1993). The ring system was adopted to distribute the first dose of humic acid soil drenching during January 2022, followed by another application in February 2022. Each pole of four plants acquired the recommended fertilizer dose of 450:350:300 g NPK per pole each year via urea, single super phosphate, and muriate of potash in three equitable doses at frequent time gaps during the new flush phase, just prior to flowering as well as fruit development stage. During the fruit set phase, the requisite amount of micronutrients such as zinc and manganese were supplied as a foliar spray.

B. Observations recorded

(i) Floral parameters. Fifteen randomly chosen segments were labeled in all poles after the emergence of new cladodes and assessments on days taken for floral bud initiation, number of floral buds per pole and number of flowers per pole was documented from the labeled segments.

(ii) Yield attributes. With the use of a vernier caliper, the length of ten randomly selected fruits at fully ripened stage was measured in centimeters from the stem end to the scaly bract end; the breadth of the fruit was measured in centimeter from the center portion of the fruits. At the time of harvest, the weight of the fruits was estimated in grams using an electronic weighing scale. After discarding the peel and straining the seeds from the fruit, the pulp and seed weights were calculated with an electric weighing machine and reported in grams. Number of fruits per pole, fruit yield (kg per pole) were observed at random from labeled plants and the mean was computed. Fruit density was calculated based on water displacement method. The mean values were statistically analyzed by following Panse and Sukhathme’s (1967) analysis of variance approach.

RESULT AND DISCUSSION

A. Flowering parameters

The administration of Paclobutrazol and various biostimulants profoundly influenced all the flowering characteristics viz., number of days taken for floral bud initiation, number of floral buds per pole and number of flowers per pole (Table 2). The treatment combination comprising of Seaweed extract 0.5 % + Panchagavya 2 % + CPPU 100 ppm foliar spray + Paclobutrazol 0.75 g a.i. m^{-1} of canopy spread soil drenching (T_{13}) accelerated floral bud initiation in 96.03 days to 126.88 days in treatment T_{14} (control). This could be owing to favorable impact of sea weed extract on flowering because of its optimal carbohydrate and nitrogen content including the wide range of plant hormones, vitamins it possess. Paclobutrazol induced early and vigorous flowering, resulted in precocious shoot maturation, carbohydrate build up, enhanced photosynthetic rate and a reduction in floral suppressing hormone (Upreti *et al.,* 2013). The current findings were consistent with those of Burondkar and Gunjate (1993); Sarker *et al.* (2016) in mango.

Biostimulants had a significant impact on the number of floral buds per pole and the number of flowers per pole. The treatment T_{13} (Seaweed extract 0.5 % + Panchagavya 2 % + CPPU 100 ppm foliar spray + Paclobutrazol 0.75 g a.i. soil drenching) recorded the highest number of floral buds per pole (49.72 floral buds) while the treatment T_{14} (Control) had the lowest (33.96 floral buds). The minimum number of flowers per pole was documented in T_{14} (Control) with 28.96 flowers whereas the treatment T_{13} offered the maximum value (46.83 flowers per pole). The improved performance of the treatments are due to the fact that the active cytokinins are the primary stimulators of floral bud initiation in dragon fruit (Khaimov-Armoza *et al.,* 2012) and PBZ suppresses vegetative promoter levels and indeed enhance the florigenic/vegetative promoter ratio, which stimulates blooming in tropical fruits. The similar pattern was also observed by Khaimov *et al.* (2006) in dragon fruit, Shinde *et al.* (2000) in mango.

Table 2: Effect of biostimulants on flowering characteristics of pitaya.

Sr. No.	Details of the treatment	No. of days taken for floral bud initiation	Number of floral buds per pole	Number of flowers per pole
T_1	Seaweed extract @ 0.5 %	124.33	34.86	30.31
T_2	Seaweed extract @ 1.0 %	122.50	35.32	30.56
T_3	Panchagavya @ 2 %	123.33	36.95	31.75
T_4	Panchagavya @ 3 %	123.00	38.58	33.55
T_5	CPPU 100 ppm	115.83	40.21	35.82
T_6	CPPU 200 ppm	121.50	41.07	38.09
T_7	Humic acid @ 7.5 %	125.67	36.80	33.70
T_8	Humic acid @ 10 %	121.17	37.15	35.86
T_9	Paclobutrazol 0.75 g a.i.	112.83	42.41	38.09
T_{10}	Paclobutrazol 1.5 g a.i.	110.12	44.19	38.89
T_{11}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm	123.75	46.02	40.69
T_{12}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm + Humic acid (7.5 %)	118.66	46.33	42.13
T_{13}	**Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm + Paclobutrazol 0.75 g a.i.**	**96.03**	**49.72**	**46.83**
T_{14}	Control	126.88	33.96	28.96
SE (d)		**3.22**	**0.82**	**0.89**
CD value at 5 per cent level		**6.62**	**1.69**	**1.84**

B. Yield parameters

(i) Fruit length and breadth (cm). The treatments of several biostimulants markedly altered fruit length and breadth of pitaya (Fig. 1). The maximum fruit length and breadth (19.90 cm and 15.20 cm) were obtained in treatment T_{13} (Foliar spray of Seaweed extract 0.5 % + Panchagavya 2 % + CPPU 100 ppm + soil drenching of Paclobutrazol 0.75 g a.i. m^{-1} of canopy diameter) meanwhile the minimum values (13.24 cm and 8.50 cm) were reported in control. This could be as a result of the efficacy of biostimulants micro and macro nutrients on rapid cell proliferation and cell enlargement of pitaya. The outcome was congruent with the previous reporting's from El-Razek EA (2012) in peach and Reddy *et al.* (2015) in mango.

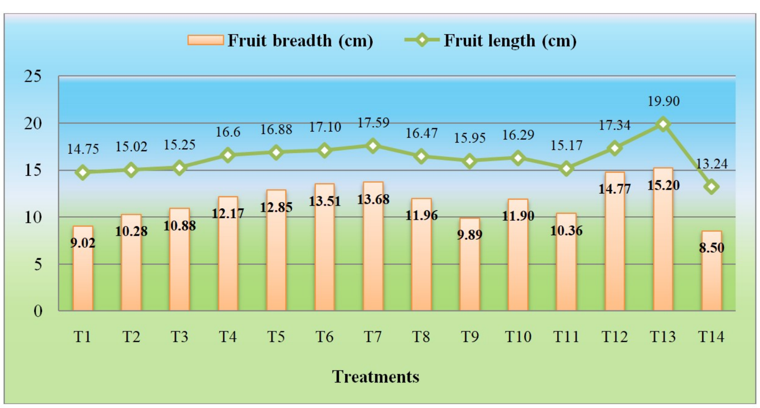

Fig. 1. Impact of biostimulants on fruit length (cm) and fruit breadth (cm) of dragon fruit.

(ii) Fruit weight (g) and fruit density (g/cm^3). The infusion of biostimulants had a significant impact on fruit weight and density in all treatments (Table 3). Highest fruit weight was observed in T_{13} (610.55 g) and fruit density (1.34 g/cm^3) while the lowest fruit weight and density was reported in control (320.00 g and 0.95 g /cm^3). Increased fruit weight and density could be the result of enhanced resource mobilization as well as Paclobutrazol treatment, which manipulates plant water interactions in favor of forming sink (fruits). The results were in agreement with Carreno *et al.* (2007) in grapes and Deepika *et al.* (2019) in jamun.

Table 3: Impact of biostimulants on fruit weight (g) and fruit density (g/cm^3) of dragon fruit.

Sr. No.	Details of the treatment	Fruit weight (g)	Fruit density (g / cm^3)
T_1	Seaweed extract @ 0.5 %	373.37	0.96
T_2	Seaweed extract @ 1.0 %	377.23	0.97
T_3	Panchagavya @ 2 %	390.97	0.97
T_4	Panchagavya @ 3 %	400.22	0.98
T_5	CPPU 100 ppm	418.89	0.96
T_6	CPPU 200 ppm	420.74	0.98
T_7	Humic acid @ 7.5 %	397.88	0.96
T_8	Humic acid @ 10 %	434.25	0.97
T_9	Paclobutrazol 0.75 g a.i.	416.17	0.99
T_{10}	Paclobutrazol 1.5 g a.i.	420.00	1.13
T_{11}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm	517.32	1.02
T_{12}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm + Humic acid (7.5 %)	528.68	1.20
T_{13}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm + Paclobutrazol 0.75 g a.i. m^{-1} of canopy spread	**610.55**	**1.34**
T_{14}	Control	320.00	0.95
SE (d)		**7.22**	**0.02**
CD value at 5 per cent level		**14.84**	**0.05**

(iii) Pulp weight and seed weight (g). The pulp and seed weight were found to be higher in treatment T_{13} (448.31 g and 10.80 g) while, the control had the lowest mean vale (224.70 g and 5.80 g) (Table 4). All these findings shows that both inorganic and micro elements present in the treatment combinations boosted the competitive strength of fruits against other assimilate, resulting in a significant increase in pulp and seed weight. The outcome of these parameters were in accordance with Chouliaras *et al.* (1997) in kiwi and Krisanapook *et al.* (1997) in persimmon.

Table 4: Efficacy of biostimulants on wt. of the pulp (g) and seed weight (g) of dragon fruit.

Sr. No.	Details of the treatment	Wt. of the pulp (g)	Seed wt. (g)
T_1	Seaweed extract @ 0.5 %	252.26	5.29
T_2	Seaweed extract @ 1.0 %	257.95	5.31
T_3	Panchagavya @ 2 %	268.41	6.23
T_4	Panchagavya @ 3 %	274.60	6.35
T_5	CPPU 100 ppm	359.49	7.25
T_6	CPPU 200 ppm	372.77	7.28
T_7	Humic acid @ 7.5 %	244.81	5.66
T_8	Humic acid @ 10 %	265.57	6.26
T_9	Paclobutrazol 0.75 g a.i.	288.43	6.13
T_{10}	Paclobutrazol 1.5 g a.i.	290.69	6.15
T_{11}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm	380.35	8.30
T_{12}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm + Humic acid (7.5 %)	387.54	8.33
T_{13}	Seaweed extract (0.5 %) + Panchagavya (2 %) + CPPU 100 ppm + Paclobutrazol 0.75 g a.i. m^{-1} of canopy diameter	**448.31**	**10.80**
T_{14}	Control	224.70	5.18
SE (d)		**6.43**	**0.16**
CD value at 5 per cent level		**13.22**	**0.32**

(iv) Number of fruits per pole, fruit yield (kg/pole) and yield (tonnes/hectare). The effectiveness of biostimulants on pitaya yield has been proven to be significant (Fig. 2). The treatment T_{13} had the maximum number of fruits per pole (35.54 fruits), yield per pole (12.89 kg / pole) and yield per hectare (17.18 tons/ha), moreover the control had the minimum number of fruits per pole (23.34 fruits), yield (7.72 kg / pole) and yield per ha (10.29 tons/ ha). In dragon fruit the maximum yield is determined by the combination of fruit length and breadth and also the mean weight of the fruits. The positive impact of humic acid, Paclobutrazol, seaweed extract on pitaya yield may be related to higher mineral nutrient uptake and cationic exchange in the soil. These findings back up previous research of Momin *et al.* (2016) in mango and Da Cunha *et al.* (2005) in pineapple.

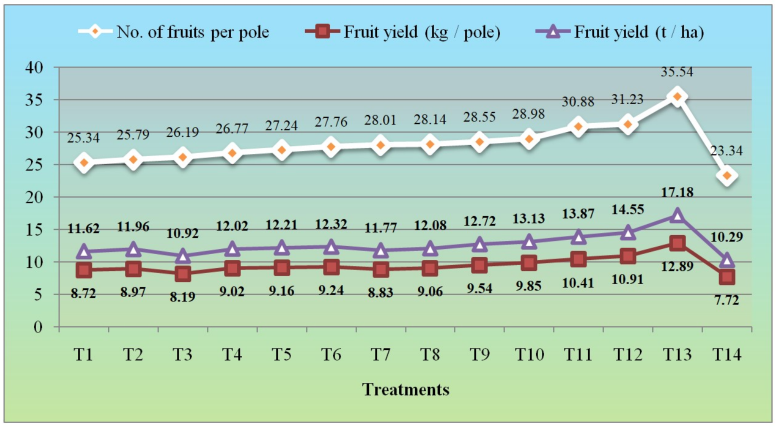

Fig. 2. Influence of biostimulants on number of fruits per pole, fruit yield (kg / pole) and fruit yield (tonnes / ha) of dragon fruit.

CONCLUSION

From the progress of the contemporary research, it can be asserted that the treatment T_{13} comprising of Seaweed extract 0.5 % + CPPU 100 ppm + Panchagavya 2% foliar application + Paclobutrazol 0.75 g active ingredient per meter of canopy range soil drenching resulted with an outcome of maximum blooming and yield related attributes which was followed by treatment T_{12} (Seaweed extract 0.5 % + CPPU 100 ppm + Panchagavya 2% foliar application + Humic acid 7.5 per cent soil drenching). Early stimulation of flowering with qualitative fruit production was assisted by the synergic effect of biostimulants which hastened pitaya fruits harvest and put out for economic market utilization, offering significant returns to the farming sector.

FUTURE SCOPE

In order to increase flowering and yield targets for larger trials, future studies have to be done further by employing the treatment (T_{13}) Seaweed extract 0.5 percent + CPPU 100 ppm + Panchagavya 2 percent foliar application + Paclobutrazol 0.75 g a.i.

Acknowledgement. I wish to convey my sincere gratefulness towards my chairman Dr. J. Rajangam as well as my advisory committee members Dr. S. Muthuramalingam and Dr. K.M. Sellamuthu for their incredibly valuable guidance and support.
Conflict of Interest. None.

REFERENCES

Burondkar, M. M. and Gunjate, R. T. (1993). Control of Vegetative Growth and Inductive of Regular and Early Cropping in 'Alphonso'mango with Paclobutrazol. *Acta Horticulturae*, *341*: 206-215.

Carreno, J., Oncina, R., Carreno, I. and Tornel, M. (2007). Effect of paclobutrazol on vegetative growth, grape quality and yield of Napoleon table grape variety. *Acta Horticulturae, 754*: 179-182.

Chang, Pai-Tsang (2021). Effect of Preharvest Application of CPPU and Perforated Packaging on the Postharvest Quality of Red-Fleshed Pitaya (*Hylocereus polyrhizus* sp.) Fruit. *Horticulturae*, *7*(8): 253.

Chouliaras, V., Gerascapoulos, D. and Lionakis, S. (1997). Effects of seaweed extract on fruit growth, weight and maturation of 'Hayward' kiwifruit. III International Symposium on Kiwifruit 444.

Da Cunha, G. A. P., Reinhardt, D. H. R. C. and Costa, J. T. A. (2005). Relationships among growth regulators and flowering, yield, leaf mass, slip production and harvesting of'Perola'pineapple. *Acta Horticulturae, 666*: 149-160.

Deepika, V., Rajangam, J., Swaminathan, V., Venkatesan, K. and D Janaki (2019). Effect of paclobutrazol on floral bud initiation, flowering and fruit set of jamun (*Syzygium cuminii* Skeels.). *Journal of Pharmacognosy Phytochemistry*, *8*(5): 1547-1549.

Du Jardin, Patrick (2015). Plant biostimulants: Definition, concept, main categories and regulation. *Scientia horticulturae*, *196*: 3-14.

El-Razek, E. A., Abd-Allah, A. S. E. and Saleh, M. M. S. (2012). Yield and fruit quality of Florida Prince peach trees as affected by foliar and soil applications of humic acid. *Journal of Applied Sciences Research*, 5724-5729.

Gopu, B., Balamohan. T. N., Swaminathan, V., Jeyacumar, P. and Soman, P. (2017). Effect of Growth Retardants on Yield and Yield Contributing Characters in Mango (*Mangifera indica* L.) cv. Alphonso under Ultra High Density Plantation. *Int. J. Curr. Microbiol. Appl. Sci., 6*: 3865-3873.

Gunasena, H. P. M., Pushpakumara, D. K. N. G (Gamini) and Kariyawasam, M. (2007). "Dragon fruit (*Hylocerus undatus* (Haw.) Britton and Rose)". *Underutilized Fruit Trees in Sri Lanka,* 110-142.

Hussein, S. A., Noori, A. M., Lateef, M. A. and Ch Ra Ismael (2021). Effect of Foliar Spray of Seaweed (Alga300) and Licorice Extracts on Growth, Yield and Fruit Quality of Pomegranate Trees *Punica Granatum* L. Cv. Salimi. IOP Conference Series: Earth and Environmental Science.

Jiang, Yi-Lu., Lyn-Ya Chen., Tan-Cha Lee. and Pai-Tsang Chang (2020). "mproving postharvest storage of fresh red-fleshed pitaya (*Hylocereus polyrhizus* sp.) fruit by pre-harvest application of CPPU. *Scientia Horticulturae*, *273*: 1096-46.

Khaimov, A. and Mizrahi, Y. (2006). Effects of day-length, radiation, flower thinning and growth regulators on flowering of the vine cacti *Hylocereus undatus and Selenicereus megalanthus*. *The Journal of Horticultural Science Biotechnology, 81*(3): 465-470.

Khaimov-Armoza, A., Nova´k, O., Strnad, M., Mizrahi, Y. (2012). The role of endogenous cytokinins and environmental factors in flowering in the vine cactus *Hylocereus undatus. Israel J. Plant Sci.*, *60*(3): 371-383.

Krisanapook, K., Subhadrabandhu, S., Saleeto, S., Niraparth, S. and Sirisuk, S. (1997). Increasing fruit size in persimmon cv. Xichu by plant bioregulators and girdling. VIII International Symposium on Plant Bioregulation in Fruit Production 463.

Krishna, Golla Vijay., Bhagwan, A., Raj Kumar, M. and Siva Shankar, A. (2017). Effect of flower enhancing plant growth regulators and fruit set improving chemicals on vegetative growth, early flower initiation and fruit yield of mango (*Mangifera indica* L.) cv. Banganpalli. *Int. J. Pure App. Biosci.*, *5*(3): 667-677.

Momin, S. K., Gaikwad, S. S., Patel, R. J., Amarcholi, J. J. and Sharma, K. M. (2016). Effect of Foliar Application of Chemicals on Fruiting Parameters of Mango (*Mangifera indica* L.) cv. Kesar. *Research Journal of Agricultural Sciences*, *7*(1): 143-144.

Panse, Vinayak Govind and Pandurang Vasudeo Sukhatme (1967). Statistical methods for agricultural workers.

Parson Saradhuldhat. (2019). Dragon fruit On and Off-season production in Thailand. *FFTC Agricultural Policy Platform*.

Perween, Tamanna, Mandal, K. K. and Hasan, M. A. (2018). Dragon fruit: An exotic super future fruit of India." *Journal of Pharmacognosy Phytochemistry*, *7*(2): 1022-1026.

Reddy, P. V. K. and Singh, D. B. (2015). Influence of foliar application of biovita (bio-fertilizer) on fruit set, yield and quality of'dashehari'mango (*Mangifera indica* L.). Global Conference on Augmenting Production and Utilization of Mango: Biotic and Abiotic Stresses 1066.

Sarker, Babul, C., Mohammad A. Rahim and Douglas, D. Archbold (2016). Combined effects of fertilizer, irrigation, and paclobutrazol on yield and fruit quality of mango. *Horticulturae, 2*(4): 14.

Shinde, A. K., Waghmare, G. M., Wagh, R. G. and Burondkar, M. M. (2000). Effect of dose and time of paclobutrazol application on flowering and yield of mango. *Indian Journal of Plant Physiology*, *5*(1): 82-84.

Spichiger, R. E., Savolainen and Figeat, M. (2000). Botanique systématique des plantes à fleurs - une approche phylogénétique nouvelle des angiospermes des régions tempérées et tropicales. *Presses Polytech, Univ Romand, Lausanne, Suisse*, 372p.

Upreti, K. K., Reddy, Y. T. N., Prasad, S. S., Bindu, G. V., Jayaram, H. L. and Rajan, S. (2013). Hormonal changes in response to paclobutrazol induced early flowering in mango cv. Totapuri. *Scientia* Horticulturae, *150*: 414-418.

Wakchaure, G. C., Satish Kumar, Meena, K. K., Rane, J. and Pathak, H. (2020). Dragon fruit cultivation in India: scope, marketing, constraints and policy issues. *Director, ICAR-National Institute of Abiotic Stress Management, Baramati, Pune, Maharashtra, India*.

How to cite this article: B. Kavinmukil, J. Rajangam, S. Muthuramalingam and K.M. Sellamuthu (2022). Impact of Biostimulants on Floral Induction and Yield Attributing Traits of Pitaya (*Hylocereus undatus* L.). *Biological Forum – An International Journal*, *14*(3): 52-57.