Effect of Paclobutrazol and GA_{4+7} on flowering- fruiting of dragon fruit [Hylocereus costaricensis (Web.) Britton and Rose]

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Abstract: The present experiment identified the synergistic effect of Paclobutrazol and GA_{4+7} with different concentrations on the flowering- fruiting of dragon fruits. This study was conducted in completely randomized block design. Dragon fruit plants were treated with different concentration of Paclobutrazol and GA_{4+7} during the field condition. The results indicated that the Paclobutrazol treated with 400mg significantly influenced on the early flower bud initiation; increase the number of flowers and to increase the number of flushes. However, GA_{4+7} @200mg had better result on to reduce the number of flower drop. The results showed that Paclobutrazol treated with 400mg is the most effective treatment than GA_{4+7} for improving the number of flowers, number of flushes and early flowering.

Keywords: Dragon fruit, Paclobutrazol, GA4+7, Number of flowers

Introduction

The dragon fruit (*Hylocereus sp*.) is a perennial and long day plant (Jiang *et al.,* 2012) which belongs to cactaceae family. Numerous more names for dragon fruit exist, including Pitaya, Night Blooming Cereus, Strawberry Pear, Belle of the Night, and Cindrella plant (Perween *et al.,* 2018). Dragon fruit is originated in tropical & sub- tropical region of Mexico, Central America and Northern South America (Kakade *et al.,* 2020). According to Hamidah *et al.,* 2017, primarily three species of dragon fruits—*Hylocereus undatus*, *Hylocereus costaricensis*, and *Hylocereus megalanthus*—are grown in various geographic regions of the world. Vietnam, where dragon fruit was first introduced a century ago, is the world's top grower, producing more than half (51.1%) of the fruit worldwide on an area of 55,419 hectares according to Harithpriya K. & Jeychandran R., (2019). The second-largest producer of dragon fruit is China. With more than 70% of the total dragon fruit produced, Gujarat, Karnataka, and Maharashtra are the top three states in India. Joshi *et al.,* (1998) reported that Paclobutrazol was effective in early and regular flowering in mango. Singh and Singh, (2006) reported that Paclobutrazol effective on promoting flowering and fruit set in mango. Carreno *et al.,* (2007) studied that Paclobutrazol enhanced the flowering and fruit set in grapes. Kurlus *et al.,* (2017) found that significant effect of GA4+7 on fruit set % on sour cherry cv. English Morello. Hence, the present experiment is conducted on "Effect of Paclobutrazol and GA_{4+7} on flowering-fruiting of dragon fruit [*Hylocereus costaricensis* (Web.) Britton and Rose]".

Materials and methods

The present experiment entitled that "Effect of Paclobutrazol and GA_{4+7} on flowering- fruiting of dragon fruit [*Hylocereus costaricensis* (Web.) Britton and Rose]" was carried out during the period 2022-23 to 2023-24 at Main Experimental Station of Fruit Science orchard, College of Horticulture and Forestry, A.N.D.U.A. & T., Kumarganj, Ayodhya 224229 (UP) and 5-5 flowers of each treatment (7 treatment) and each replication (three replications) was taken for the observation of each parameters. Different concentration of Paclobutrazol and GA_{4+7} were applied in the field where Paclobutrazol (Culatr @ 23% a.i.) was applied as soil drench and GA_{4+7} (GA4+7 @ 98% a.i.) as foliar spray (after sun set) through Randomized Block Design. First flower bud initiation was recorded as date from each treatment and expressed as DD/MM/YY. Days taken from flower bud initiation to bloom was recorded from the date of first flower bud initiation, Days taken in fruit set from the day of full bloom, days taken in harvesting from the day of fruit set and expressed in days, respectively. Flower length and flower width was measured with the help of digital vernier calliper and flower diameter noted with the help of measuring tape and expressed in centimetre, respectively. Number of flowers and number of flower drop was noted from the date of first flower bud initiation and expressed in numbers. Number of flushes was also noted from the date of first flower bud initiation to last moth of flower bud initiation.

Statistical analysis

The data recorded from the experiment were analysed by using SAS 9.1 statistical software for each treatment.

Result and discussion

The pooled data showed that number of flowers, number of flower drop and number of flushes was significantly influenced by the different concentration of Paclobutrazol and GA_{4+7}. However, the pooled data showed on Days taken from flower bud initiation to bloom, Days taken from bloom to fruit set, Days taken from fruit set to harvesting, Flower length, Flower width and Flower diameter was not significantly influenced by the different concentration of Paclobutrazol and GA_{4+7}. Early flower bud initiation was observed in the treatment T3 (Paclobutrazol @400mg) on 11/06/2022 and 27/04/2023 while, late flower bud initiation was observed under the control on 17/07/2022 and 13/06/2023 during both the years. Sarkar and Rahim, (2018) in mango reported that paclobutrazol significantly increased the advanced flowering. The minimum days (15.77) taken from flower bud initiation to bloom was recorded in the treatment T3 (Paclobutrazol @400mg) which was followed by the T5 (GA_{4+7} @200mg) while maximum days (16.47) recorded under the control. The minimum days (2.19) taken from flower bloom to fruit set was recorded in the treatment T3 (Paclobutrazol @400mg) which was followed by treatment T5 ($GA_{4+}7$ @200mg) while maximum days (2.27) recorded under the control. The minimum days (31.46) taken from fruit set to harvesting was recorded in the treatment T3 (Paclobutrazol @400mg) which was followed by the T5 ($GA_{4+}7$ @200mg) 31.52 days. However, maximum days (32.46) recorded under the control. The maximum flower length (28.14cm) observed in the treatment T7 (GA_{4+7} @600mg) which was followed by the T6 (GA_{4+7} @400mg) 28.07cm. However, minimum flower length (27.84cm) observed in the treatment T1 (control). The maximum flower width (4.21cm) observed in the treatment T7 (GA_{4+7} @600mg) which was followed by the T6 (GA_{4+7} @400mg) 4.18cm. However, minimum flower width (3.99cm) observed in the treatment T1 (control). The maximum flower diameter (14.68cm) observed in the treatment T7 (GA_{4+7} @600mg) which was followed by the T6 (GA_{4+7} @400mg) 14.57cm. However, minimum flower diameter (13.99cm) observed in the treatment T1 (control).

The maximum number of flowers (16.02) was recorded in the treatment T3 (Paclobutrazol @400mg) followed by the T5 (GA_{4+7} @200mg) 14.79. However, minimum number of flowers (11.32) recorded under the treatment T1 (control). Similar findings are reported by the Tongumpai *et al.,* (1988) in mango, Burondkar and Gunjate, (1992) also in mango, Pant and Kumar, (2004) in apple. The minimum number of flower drop (1.91) was recorded in the treatment T5 (GA_{4+7} @200mg) followed by the T3 (Paclobutrazol

Table No. 1: Effect of Paclobutrazol and GA_{4+7} on flowering of dragon fruit.

ment	Date of early flower bud initiation		Days taken from flower bud initiation to bloom	Days taken from bloom to fruit set	Days taken from fruit set to harvesting	Flower length	Flower width	Flower diameter	Number of flower	Number of flower drop	N of fl
	2022-23	2023-24									
rol)	17/07/2022	13/06/2023	16.47a	2.27a	32.46a	27.84a	3.99b	13.99a	11.32e	3.14a	
BZ mg)	05/07/2022	07/05/2023	16.23abc	2.25ab	31.67a	28.01a	4.15a	14.41a	13.34c	2.42c	
BZ mg)	11/06/2022	27/04/2023	15.77d	2.19c	31.46a	27.99a	4.12a	14.32a	16.02a	2.14e	
BZ mg)	30/06/2022	08/05/2023	16.27ab	2.23abc	31.67a	27.96a	4.10ab	14.22a	12.79d	2.63b	

DOI: 10.48141/sci-arch-36.3.24.23 ISSN:1005-1538

A_{4+7} mg)	27/06/2022	03/05/2023	15.85cd	2.20bc	31.52a	28.04a	4.16a	14.46a	14.79b	1.91f	
A_{4+7} mg)	13/07/2022	10/05/2023	16.01bcd	2.22abc	31.60a	28.07a	4.18a	14.57a	14.48b	2.20d	
A_{4+7} mg)	09/07/2022	22/05/2023	16.35ab	2.23abc	32.28a	28.14a	4.21a	14.68a	12.50d	2.69b	
			16.13	**2.22**	**31.80**	**28.01**	**4.13**	**14.38**	**13.60**	**2.44**	
Mean			**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**0.39**	**0.05**	
LSD (0.05%)											

@400mg) 2.14. However, maximum number of flower drop (3.14) was observed in the treatment T1 (control). The maximum number of flushes (5.19) was observed in the treatment T3 (Paclobutrazol @400mg) followed by the T5 (GA4+7 @200mg) 5.06. However, minimum number of flushes (3.19) was observed in the treatment T1 (control).

Conclusion

It is concluded that dragon fruit plants were treated with the Paclobutrazol @400mg significantly effect on the early flower bud initiation; increase the number of flowers and to increase the number of flushes. The results showed that Paclobutrazol treated with 400mg is the most effective treatment than GA4+7 for improving the number of flowers, number of flushes and early flowering.

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