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Effect of growth regulators, pinching and artificial pollination on growth, yield and economics of Bottle gourd [*Lageneria siceraria* (Mol.) Standl.] cv. Anand Bottle Gourd-1

P.R. Nanaware[1], N.B. Patel[2], S. V. Savale[3] and S.N. Saravaiya[4]

Department of Vegetable Science, ASPEE College of Horticulture, Navsari Agric. University, Navsari 396 450 (Gujarat)

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ABSTRACT

A field trial was conducted during summer 2011-12 at Regional Horticultural Research Station, Navsari Agricultural University, Navsari, Gujarat, India to study the effect of growth regulators, pinching and artificial pollination on growth, yield and economics of bottle gourd cv. Anand Bottle Gourd-1. Results due to different treatment were found to be significant. Looking to the research results, it was noticed that NAA 150 ppm recorded the maximum length of vine (3.70 m). CCC 150 ppm recorded maximum number of branches (19.67/vine). The maximum fruit yield (7.67 kg/vine) recorded under Ethrel 150 ppm. From the results of the investigation, it could be inferred that Ethrel 150 ppm proved to be the best treatment in fruit yield with monetary benefit Rs. 3.27 per unit cost incurred in bottle gourd cv. "Anand Bottle Gourd-1" under south Gujarat conditions.

Key words : Bottle gourd, Pinching, Artificial pollination, Plant growth regulators.

Introduction

Bottle gourd belong to the family cucurbitaceae. In its green and tender stages bottle gourd fruits are used for cooking as vegetables and making sweets. The pulp of immature fruit, stem and leaves have many medicinal values. The plant growth regulators are considered as a effective agrochemicals after fertilizers, pesticides and herbicides are known to enhance the source sink relationship and stimulate the translocation of photo-assimilates thereby helping better fruit set. Similarly, even in bottle gourd, it is possible to increase the yield level by increasing the fruit set per cent with the use of some growth regulators. It might be a useful alternative to increase crop production and has been global realization of the important role of PGRs in increasing crop yield (Rafeekher *et al.*, 2002). Since very little information is available on artificial pollination and pinching on growth and yield in bottle gourd, the present investigation was aimed to find out suitable growth regulators pinching and artificial pollination for increasing the yield potential and also sex behavior in bottle gourd cv. Anand Bottle Gourd-1 under sub humid tropics of south Gujarat.

Materials and Methods

A field experiment was conducted at the Regional Horticultural Research Station, Navsari Agricultural

[1,3] Ph.D Scholar, [2] Assoc. Professor [4] Professor & Head
***Corresponding author's email:** npkumar36@gmail.com

University, Navsari, Gujarat, during the summer season of 2012. The experiment was laid out in a randomized block design with three replications and consisted of ten treatments; namely pinching at 60 DAS, non pinching, artificial pollination at 5 to 6 p. m. and two concentrations each of ethrel (100 and 150 ppm), NAA (100 and 150) CCC (100 and 150 ppm) and control (water spray). The seeds were dibbled on each hill at a distance of 2.0 m x 1.0 m between rows and plants. All the recommended agronomic practices and crop husbandry were followed to raise a good crop. Two foliar sprays of plant growth regulators were done at 2 and 4 true leaf stages. Five vines were selected randomly from each plot to record the observations on flowering, sex expression, yield and economics attributes.

Table 1. Effect of growth regulators, pinching and artificial pollination on growth attributes of bottle gourd cv. Anand Bottle Gourd-1.

Treatments	Length of vine (m)	Number of branches per vine
T1: Pinching of primary bud	1.87	17.60
T2: Non-pinching	2.76	13.13
T3: Artificial pollination	2.78	13.07
T4: NAA 100 ppm	3.56	14.20
T5: NAA 150 ppm	3.70	13.40
T6: CCC 100 ppm	3.34	16.00
T7: CCC 150 ppm	2.94	19.67
T8: Ethrel 100 ppm	2.70	15.80
T9: Ethrel 150 ppm	2.51	16.80
T10: Water spray (Control)	2.83	13.00
S.Em +	0.24	1.03
C.D. at 5%	0.73	3.07
C.V.%	14.62	11.73

Results and Discussion

Significant response of different treatments to various growth attributes (Table 1) *viz.*, length of vine and average number of branches per plant among the treatments. Among the treatments, NAA 150 ppm induced the maximum length of main axis (3.70 m). The vine elongating action is attributed to the effect of NAA in softening the cell wall and increasing the uptake of nutrients (Dubey, 1983). These results are in accordance with those reported by Chovatia *et al.* (2010) in bitter gourd and Dubey (1983) in sponge gourd. Maximum average number of branches per plant (19.67) produced by CCC 150 ppm. This may be attributed to the fact that CCC acts as an anti-mitotic, suppressing the apical growth of main axis and thereby increasing the number of branches per vine. The present findings are in agreement with the results of Kooner *et al.* (2000) in bottle gourd and Chovatia *et al.* (2010) in bitter gourd.

The influence of various treatments on yield and its associated traits of bottle gourd are presented in (Table 2). The response of different treatments to average fruit length (cm) and average fruit girth (cm) were significant among all the treatments. The maximum fruit length (33.51 cm), fruit girth (22.00

Table 2. Effect of pinching, artificial pollination and plant growth regulators on yield attributes in bottle gourd cv. Anand Bottle Gourd-1.

Treatments	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	Number of fruits/ vine	Fruit yield (kg vine $^{-1}$)	Total fruit yield (t ha^{-1})
T1: Pinching of primary bud	29.50	20.27	546.00	9.13	4.99	24.97
T2: Non-pinching	28.14	19.29	510.33	8.00	4.07	20.35
T3: Artificial pollination	28.50	19.46	512.00	11.93	6.14	30.68
T4: NAA 100 ppm	31.28	20.84	586.67	12.20	7.17	35.83
T5: NAA 150 ppm	30.54	20.66	564.00	9.93	5.60	28.02
T6: CCC 100 ppm	30.45	20.37	573.67	9.20	5.27	26.37
T7: CCC 150 ppm	29.90	20.58	581.00	10.00	5.80	29.00
T8: Ethrel 100 ppm	31.76	20.97	577.33	10.53	6.07	30.37
T9: Ethrel 150 ppm	33.51	22.00	612.00	12.53	7.67	38.40
T10: Water spray (Control)	29.00	19.89	508.00	8.24	4.16	20.82
S.Em +	0.78	0.42	14.32	0.63	0.43	2.13
C.D. at 5%	2.33	1.24	42.54	1.86	1.26	6.32
C.V.%	4.49	3.55	4.45	10.65	12.95	12.95

Table 3. Economics of different treatments.

Treatments	Marketable fruit yield (tones ha^{-1})	Gross realization (Rs. ha^{-1})	Cost of production (Rs. ha^{-1})			Net realization	B : C ratio
			Fixed	Variable	Total		
T1: Pinching of primary bud	23.63	94600	30870	2278	33148	61452	1.85:1
T2: Non-pinching	19.68	78800	30870	1231	32101	46699	1.45:1
T3: Artificial pollination	30.02	120000	30870	7500	38370	81630	2.13:1
T4: NAA 100 ppm	34.85	139400	30870	2728	33598	105802	3.15:1
T5: NAA 150 ppm	27.33	109400	30870	2384	33254	76146	2.29:1
T6: CCC 100 ppm	25.70	102800	30870	2190	33060	69740	2.11:1
T7: CCC 150 ppm	28.05	112200	30870	2475	33345	78855	2.36:1
T8: Ethrel 100 ppm	29.68	118800	30870	3137	34007	84793	2.49:1
T9: Ethrel 150 ppm	37.30	149200	30870	4098	34968	114232	3.27:1
T10: Water spray (Control)	20.48	82000	30870	1581	32451	49549	1.53:1

cm) and fruit weight (612 g) were recorded under the treatment of Ethrel 150 ppm. The probable reason for increase in length, girth and weight of fruits after the application of Ethrel may be attributed to higher respiration and photosynthesis in treated plants as compared to control. This might be due to greater accumulation of carbohydrates, owing to photosynthesis, which resulted into increased weight and size of fruits. Similar findings were reported by Kacha (2004) and Chovatia *et al.* (2010) in bitter gourd. The maximum fruit yield per vine (7.67 kg/vine) and fruit yield per hectare (38.40 t ha^{-1}) were gained under Ethrel 150 ppm. An increase in fruit yield under treated plants may further be attributed to plants remain physiologically more active to buildup sufficient food restore for the developing flowers and fruits, ultimately leading the higher yield. The similar results were reported by Kooner *et al.* (2000) in bottle gourd, Chovatia *et al.* (2010) in bitter gourd and Thappa *et al.* (2011) in cucumber.

Consequent to higher yields, T_9 (Ethrel 150 ppm) fetched higher net returns (Rs. 114232 ha^{-1}) with a benefit of Rs. 3.27 per rupee invested (Table 3). The similar results were reported by Thappa *et al.* (2011) in cucumber.

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