



MODIFICATION OF MORPHO-PHYSIOLOGICAL TRAITS IN POINTED GOURD (*Trichosanthes dioica* Roxb.) THROUGH PLANT GROWTH REGULATORS

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ABSTRACT

Pointed gourd (*Trichosanthes dioica* Roxb.) is most popular vegetable crop of Eastern India and is grown in light loamy soil with humid climate. It's high index of digestibility and medicinal value, make this vegetable, the most adopted among people of Eastern U.P. Low production of parwal fruit is due to limitation of sink development due to excessive vine growth during autumn period. Foliar spray of growth regulators particularly growth retardants Cycocel and Alar was found to reduce the vegetative sink in favour of reproductive sink. Moderate level of Alar and Cycocel spray improved the yield due to reduction in vine and internodal length, improvement in growth parameters like NAR, increased in chlorophyll concentration of leaves. Spray of Alar (1000 ppm) was most effective and increased the yield (111.2%), followed by Cycocel (1000 ppm) which had potential to increase parwal yield (78%), low and high concentration of growth retardants had not produced more impact as moderate level of growth retardants, growth promoters increased the yield (16-48 %) than control.



KEYWORDS: Chlorophyll content, Internode length NAR, Plant growth, Pointed gourd, regulators, Vine length, and Yield.

INTRODUCTION

Pointed gourd (*Trichosanthes dioica* Roxb.) is locally known as Parwal, Palwal, Pater, Patola, Parora, belongs to the family Cucurbitaceae. It is large genus, principally of Indo-Malayan origin and has approximately 44 species, of which only 22 species are found in India (Chakravarty, 1982). It is one of the most important vegetable crops particularly grown in Assam, West Bengal, Bihar, Uttar Pradesh, Madhya Pradesh and Gujrat (Nath and Subramanyam, 1972). In the eastern U.P. it is widely grown in district Jaunpur, Gonda, Basti, Ballia, Faizabad, Gorakhpur, Deoria and Varanasi district in diara and upland soil. According to rough estimate Jaunpur district alone exports about 22,000 q of Parwal annually to the distant cities in India (Mishra, 1957).

Pointed gourd is one of the important cucurbit species growing principally in light loamy soil during summer and winter season. The hot and humid climate is best for this crop, during winter it become dormant and sprouts again in summer. Among the members of Cucurbitaceae, most research efforts in growth regulators have been devoted to improve cucumber (*Cucumis sativus*) productivity followed by melon (*Cucumis melo*) and watermelon (*Citrullus lanatus*). Vegetative growth of parwal in autumn season is tremendous and this reduces the reproductive sink particularly female flowers, vines

and enhanced the number of male flowers. The reduction of growth in this season has positive effect to produce female flowers. The reduction of growth in this season has positive effect to produce female flowers. Very scarce literature is available on this approach, in which research activities has incorporated the use of growth regulators/retardants to accomplish the reduction in growth parameters in pointed gourd.

MATERIALS AND METHODS

A field experiment was conducted in factorial randomised block design with two varieties of pointed gourd (FP-260 & FP 307) at Instructional farm of Narendra Deva University of agriculture & Technology, Kumarganj, Faizabad during 2000-2001. Vine cuttings of 1.5 to 2.0 meter were planted in the pits having 30 cm depth and 30 cm diameter. Each pit was filled with a mixture of 3 Kg soil, 2 Kg sand and 4 Kg FYM. After planting the cuttings were covered with rice straw and showered with water to maintain suitable condition for sprouting.

In this experiment four different growth regulators were used in three different concentrations these are, Cycocel & Alar each @ 500, 1000, 2000 ppm, Kinetin 10, 20, 30 ppm and Anand Vishal 0.5, 1.0, 2.0 ppm. Among growth regulators, Cycocel and Alar growth retardants and Kinetin and Anand Vishal are growth promoters. Anand Vishal is a trade product of *Beco Chemicals Pvt. Ltd. M.P.* with cytokinin as active ingredient (0.012%). The plant growth regulators solutions were prepared by dissolving cycocel in distilled water, alar in organic solvent, Kinetin in NaOH (0.1N) and Anand Vishal is already in liquid form and used as such.

Plant growth regulators were first sprayed at active vegetative stage (200 Days After Planting DAP) in the month of February, second and third spraying was done at fortnightly interval from the first one. Plants were sprayed from top to bottom thoroughly wetting every leaf of the plant. Some drop of teepol was also added with spray material for proper adherence of plant growth regulator to plant part.

Vine length (m) was taken from the base of plant to the growing tip of the plant with the help of meter scale. For measuring internode length three internodes were randomly selected from each treatment and their length was measured and mean was calculated. NAR was calculated according to the formulae given by Red ford (1967). Total chlorophyll content was measured by the method of Arnon (1949). Yield is calculated by total number of fruits produced by each treatment during the season and then mean were recorded.

RESULTS AND DISCUSSION

Spraying of retardants reduce the vine & internode length. There was a progressive and significant reduction in the vine and internode length with the increasing concentration of retardants. However, promoters increased the vine length & internode length over control, significantly with the increasing concentration. Among retardants, the range of retardation in vine length ranges from 13.7 to 19.6 % over control. In promoters, the increased vine length ranges from 12.1 to 29.5 % over control. Among retardants, the internode length ranges from 4.7 to 19.5 % over control. Among promoters, maximum and minimum internode length was recorded in kinetin 30 ppm (22.8%) and Anand Vishal 0.5 ppm (3.4 %) over control. Enhancement of vine and internode length by promoters was attributed due to well-known kinetin effect of cell division (Arteca 1997, Kumar & Purohit, 1996). Retardants restrict the vine and internode length by reducing the level of GA in the tissue (Li *et al.* 1999, Dahanayake & Galway, 1999, Gianfagna, 1995).

Data on net assimilation rate (NAR) has been calculated on 240-270 DAP and 300-330 DAP. A significant varietal difference was found in NAR in both varieties with higher NAR was recorded in FP 260. Comparatively higher NAR was recorded by foliar spraying of retardants than promoters. At 240-270 DAP; maximum NAR was recorded in cycocel 1000 ppm (118.6%) followed by alar 1000 ppm (93.0%) over control. Whereas at 300-330 DAP, maximum NAR values was recorded in alar 1000 ppm (104 %) followed by cycocel 1000 ppm (82.6%). Foliar spraying of promoters, kinetin 20 ppm and anand vishal 2.0 ppm given maximum and minimum NAR values respectively at 240-270DAP & 300-330 DAP. Increasing NAR values by retardants might be due to higher production of dry matter and

increased photosynthetic surface and photosynthates & their availability at growing parts (Greer & Anderson, 1965). NAR decreased in later season of the crop due to advanced plant age, low photosynthetic efficiency and senescence of leaves (Kumar & Purohit, 1996).

Data regarding total chlorophyll content clearly shows that there is significant varietal difference in both varieties. Foliar spray of retardants, particularly alar 1000 ppm, showed maximum chlorophyll content (129.5%) followed by alar 500 ppm (118.4%), minimum chlorophyll content by retardants was observed in Cycocel 2000 ppm (11.8%). Foliar spraying of promoters, particularly 30 ppm (112.6%) produces maximum chlorophyll content followed by Kinetin 20 ppm (74.2%). The increase in total chlorophyll content might be attributed due to increased chloroplast development, retardation of chlorophyll breakdown and increased leaf area (Arteca, 1997).

Fruit weight per plant (Kg) was found highest by alar 1000 ppm (111.2%) followed by Cycocel 1000 ppm (77.7%), alar 500 ppm (67.4%), minimum yield per plant was recorded in Anand Vishal 2.0 ppm. The increase in yield by retardants might be due to diversion of photosynthates from vegetative growth to reproductive growth that's why plants treated with growth retardants produced cluster of flower buds in place of further vegetative growth (Cathey, 1964).

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Table 1. Effect of foliar spraying of plant growth regulators on vine & length of two varieties of pointed gourd.

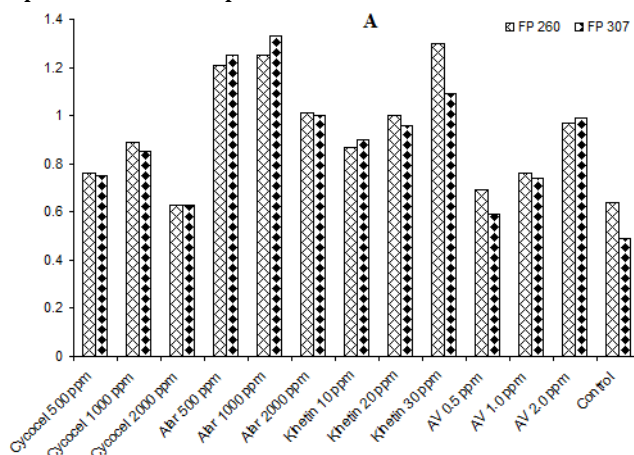
Treatments	Vine length (m)			Internode length (cm)		
	FP 260	FP 307	Mean	FP 260	FP 307	Mean
Cycocel 500 ppm	3.45	3.66	3.56 (-14.7)	7.90	6.30	7.10 (-4.7)
Cycocel1000 ppm	3.41	3.58	3.50 (-16.2)	7.50	6.00	6.75 (-9.4)
Cycocel2000 ppm	3.25	3.46	3.35 (-19.6)	6.60	5.40	6.00 (-19.5)
Alar 500 ppm	3.52	3.67	3.60 (-13.7)	7.57	6.40	6.98 (-6.26)
Alar 1000 ppm	3.51	3.59	3.55 (-14.9)	7.10	5.80	6.45 (-13.4)
Alar 2000 ppm	3.39	3.51	3.45 (-17.3)	7.00	5.60	6.30 (-15.4)
Kinetin 10 ppm	5.43	5.09	5.26 (26.1)	9.00	7.50	8.25 (10.7)
Kinetin 20 ppm	5.57	5.16	5.36 (28.5)	9.50	7.90	8.70 (16.7)
Kinetin 30 ppm	5.58	5.22	5.40 (29.5)	9.90	8.40	9.15 (22.8)
AV 0.5 ppm	4.81	4.54	4.68 (12.1)	8.40	7.00	7.70 (3.4)
AV 1.0 ppm	4.96	4.68	4.82 (15.5)	8.60	7.30	7.95 (6.7)
AV 2.0 ppm	5.10	4.88	4.99 (19.6)	9.00	7.50	8.25 (10.7)
Control	4.25	4.10	4.17	8.20	6.70	7.45
Mean	4.33	4.24		8.17	6.75	
CD at 5% P	V= 0.012 T= 0.03 VxT= 0.043			V= 0. 102 T= 0.261 VxT= 0.369		

values in parenthesis are per cent increase or decrease over control)

Table 2. Effect of foliar spraying of plant growth regulators on Net Assimilation Rate of two varieties of pointed gourd.

Treatments	NAR 240-270 DAP (mg dm ⁻² day ⁻¹)			NAR 300-330 DAP (mg dm ⁻² day ⁻¹)		
	FP 260	FP 307	Mean	FP 260	FP 307	Mean
Cycocel 500 ppm	0.031	0.029	0.030 (39.5)	0.018	0.018	0.018 (56.5)
Cycocel1000 ppm	0.047	0.047	0.047 (118.6)	0.022	0.020	0.021 (82.6)
Cycocel2000 ppm	0.034	0.018	0.026 (20.9)	0.020	0.015	0.018 (52.2)
Alar 500 ppm	0.042	0.021	0.032 (46.5)	0.021	0.012	0.017 (43.5)
Alar 1000 ppm	0.055	0.028	0.042 (93.0)	0.031	0.016	0.024 (104.3)
Alar 2000 ppm	0.028	0.025	0.027 (23.3)	0.021	0.015	0.018 (56.5)
Kinetin 10 ppm	0.029	0.020	0.025 (13.9)	0.011	0.012	0.012
Kinetin 20 ppm	0.034	0.029	0.032 (46.5)	0.017	0.016	0.017 (43.5)
Kinetin 30 ppm	0.027	0.022	0.025 (13.9)	0.010	0.015	0.013 (8.6)
Anand Vishal 0.5 ppm	0.027	0.020	0.024 (9.3)	0.008	0.011	0.010 (-17.4)
Anand Vishal 1.0 ppm	0.028	0.025	0.027 (23.3)	0.010	0.013	0.012
Anand Vishal 2.0 ppm	0.037	0.023	0.030 (39.5)	0.013	0.013	0.013 (13.1)
Control	0.023	0.020	0.022	0.016	0.012	0.012
Mean	0.034	0.025			0.014	
CD at 5% P	V= 0.001 T= 0.002 VxT= 0.003			V= 0. 001 T= 0.002 VxT= 0.003		

(Values in parenthesis are per cent increase or decrease over control)



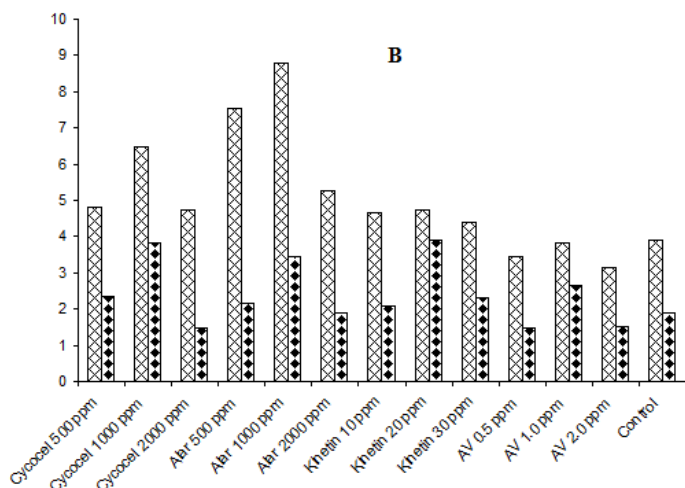


Fig.1. Effect of foliar spraying of plant growth regulators on total chlorophyll content (A) and yield (B) of two varieties of pointed gourd