



## SHORT COMMUNICATION

# EFFECT OF PRE-SOWN ELECTRICAL STIMULUS OF SEED ON GROWTH AND YIELD OF RIDGE GOURD (*LUFFA ACUTANGULA* ROXB.) AND SNAKE GOURD (*TRICHOSANTHES ANGUINA* L.)

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**Pre-sowing electric current treatment of seed has been recognized as an innovative tool for yield improvement in field crops. Different intensities of electrical stimulus (0, 50, 100, 150, 200 mA and 0, 100, 200, and 300 mA) were applied to the seeds of ridge gourd and snake gourd respectively for three minutes before sowing. It was observed that electrical stimulus influences different growth and yield parameters in these crops. 150mA intensity electrical stimulus for three minutes duration was found to be optimum for increasing yield in ridge gourd. But, improvement of yield in snake gourd was achieved when seeds were treated with 200 mA of electrical stimulus for three minutes.**

**Key words:** Electrical stimulus, pre-sown seed, ridge gourd, snake gourd, yield.

Treating pre-sown seeds with an electric current is a very attractive technology for yield improvement in various field crops. Bose (1902) first studied the plant responses to electrical stimulus. Later, it was found that sex expression in cucurbits could be modified with electric current treatment of pre-sown seeds. Wahab *et al.* (1980) studied the effect of electric current on watermelon and snake cucumber seeds and found increased formation of female flowers and subsequently higher yields. Similar yield improvement in bitter gourd was achieved by electric current treatment of pre-sown seeds (Kumar *et al.* 1990). However, it is still not clear how electric current promotes female flower formation and modifies sex expression. Generally, it is believed that electric current treatment may initiate some short term as well as long term physiological and biochemical changes, which may be reflected in growth and

development processes of plant and ultimately the yield. The present investigation was carried out on two cucurbitaceous vegetable crops viz. ridge gourd (*Luffa acutangula* Roxb) and snake gourd (*Trichosanthes anguina* L.) to study the effect of pre-sowing electric current treatment of seeds on growth and yield in these crops.

Air dried seeds of ridge gourd and snake gourd of local cultivars were soaked in distilled water for overnight. Seeds were then placed in a mixture of electrolyte solutions of 0.05% KNO<sub>3</sub> and 0.05% Ca (NO<sub>3</sub>)<sub>2</sub> (1:1) between two copper electrodes (7cm x 5cm x 0.15cm) in a glass beaker. A smooth electrical current of DC 220V having five intensities, i.e. 0, 50, 100, 150, and 200 mA for ridge gourd and four intensities, i.e. 0, 100, 200 and 300 mA for snake gourd were passed

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through seeds separately for 3 minutes. Control seeds were soaked only in electrolyte solution for 3 minutes. Control as well as treated seeds were then air-dried for 24 hours and sown in the well prepared field with plot size 2m × 4m at Mondouri Horticultural Research Station, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal. The field experiment set up was Randomized Block Design with three replications for each treatment. Weeding, manuring, irrigation and other necessary cultural practices were done as and when required. Growth and yield parameters were recorded following standard practices.

Data presented in Table 1 revealed that electric current treatment of pre-sown seeds significantly influences all growth parameters of ridge gourd. Among the treatments, 150mA current exposure for three minutes was found to be most effective in influencing major growth parameters in this crop. Number of branches per plant, total number of nodes and leaves per plant and total vine length were found to increase significantly at this intensity and duration over all other treatments. But average length of branch per plant and number of nodes on main vine and length of main vine were maximum at 50 mA electric current treatment for three minutes, which indicates that modification of growth parameters are very much specific to intensity of electric current and duration of exposure. Similar findings were reported in bottle gourd by Rahman and Yasmin (1994).

Similar to improvement of growth parameters, electric current treatment significantly influenced various yield parameters and yield of ridge gourd. Earliness in the formation of male and female flowers in conjunction with appearance of both male and female flowers from lower nodes of this plant were noticed which render beneficial effects towards yield over control (Table 2). Electric current treatment of seeds modify sex ratio in this crop as evidenced by production of large number of female flowers (17.33) over control (11.00) at 150 mA intensity. Decrease in the ratio of male: female flower by this treatment is another advantageous parameter leading to higher yield. Similar increase in number of female flowers and decrease in number of male flowers in response to electric current treatment of pre-sown seeds were also recorded in bottle gourd (Rahman *et al.* 1991). Treating ridge gourd seeds with electric current, also significantly increased the number of fruits per plant (11.00) and yield per plant (1.367kg) over control i.e., (6.00) and (0.886kg) respectively. Although, fresh weight, length of fruit were maximum at 200mA which might be attributed to production of less number of fruits per plant, yet the diameter of the fruit was not so much reflected at this intensity (Table 2).

As in ridge gourd, growth parameters of snake gourd were significantly influenced by electric current. Among the different growth parameters, number of branches per plant, total number of nodes and leaves per plant and total

**Table 1.** Effect of pre-sown electrical stimulus on growth parameters of ridge gourd

Treatments	No. of branches/ plant	Average length of branch / plant (m)	No. of nodes on main vine	Total number of nodes and leaves / plant	Length of main vine (m)	Total vine length (m)
C <sub>50</sub>	3.33	1.20	30.35	85.67	3.20	7.20
C <sub>100</sub>	6.67	0.84	23.67	103.00	2.20	7.80
C <sub>150</sub>	9.00	0.90	25.67	138.33	2.50	10.60
C <sub>200</sub>	5.33	1.00	30.33	112.33	3.10	8.43
Control	6.00	0.97	28.33	117.33	2.80	8.62
S.Em (±)	0.422	0.063	0.258	0.734	0.129	0.142
CD at 5%	1.379	0.206	0.843	2.398	0.421	0.464

C = Intensity of electrical stimulus (mA)

**Table 2.** Effect of pre-sown electrical stimulus on yield parameters of ridge gourd

Treatments	No. of days to 1st male flower initiation	No. of days to 1st female flower initiation	No. of node at which 1st male flower appear	No. of node at which 1st female flower appear	Total no. of male flowers/plant	Total no. of female flowers/plant	Male: female flower ratio	No. of fruits/plant	Fr.wt. of fruit (g)	Length of fruit (cm)	Diameter of fruit (cm)	Yield /plant (kg)
C <sub>50</sub>	31.33	34.00	3.67	6.33	58.67	10.00	5.88	6.67	140.35	18.10	4.20	0.936
C <sub>100</sub>	30.67	32.67	3.33	5.67	73.33	13.67	5.36	8.00	130.46	17.50	4.30	1.044
C <sub>150</sub>	30.00	31.67	2.67	4.67	76.33	17.33	4.40	11.00	124.23	16.00	4.10	1.367
C <sub>200</sub>	33.33	35.00	4.00	6.67	71.67	11.67	6.14	5.67	150.66	19.00	4.40	0.854
Control	32.67	35.00	3.66	7.00	77.33	11.00	7.03	6.00	147.72	18.30	4.50	0.886
S.Em (±)	0.906	0.775	0.197	0.422	0.258	0.380	0.115	0.428	0.937	0.141	0.099	0.013
CD at 5%	NS	NS	0.644	1.379	0.843	1.241	0.376	1.398	3.061	0.461	NS	0.042

C = Intensity of electrical stimulus (mA), NS = Non significant

**Table 3.** Effect of pre-sown electrical stimulus on growth parameters of snake gourd

Treatments	No. of branches/plant	Average length of branch / plant (m)	No. of nodes on main vine	Total number of nodes and leaves / plant	Length of main vine (m)	Total vine length (m)
C <sub>100</sub>	8.33	1.76	29.00	222.33	3.20	17.86
C <sub>200</sub>	11.00	1.52	30.67	256.67	3.53	20.25
C <sub>300</sub>	7.67	2.14	27.33	239.33	3.48	19.89
Control	8.67	1.90	33.67	247.00	3.55	20.02
S.Em (±)	0.462	0.037	0.553	0.616	0.019	0.134
CD at 5%	1.601	0.128	1.916	2.134	0.066	0.464

C = Intensity of electrical stimulus (mA)

vine length were maximum at 200mA. However, average length of branch per plant was maximum at 300mA and number of nodes on main vine was maximum at control (Table 3)

A perusal of data in Table 4 revealed that electric current treatment significantly influence all the yield parameters. Electric current at 200mA for three minutes duration promotes earliness in flowering behaviour and appearance of male as well as female flowers from lower

nodes in comparison to control. This investigation is identical with the findings of Omran and Wahab (1974), Wahab *et al.* (1980) and Alamgir *et al.* (1991) in different cucurbits. Data in Table 4 revealed that electric current at 200mA for three minutes duration of exposure significantly increased the number of fruits (10.67) and yield per plant (1.818kg) over control i.e. (7.00) and (1.411kg) respectively and thus increased yield by 28.84% over control.

**Table 4.** Effect of pre-sown electrical stimulus on yield parameters of snake gourd

Treatments	No. of days to 1st male flower initiation	No. of days to 1st female flower initiation	No. of node at which 1st male flower appear	No. of node at which 1st female flower appear	Total no. of male flowers/plant	Total no. of female flowers/plant	Male: female flower ratio	No. of fruits/plant	Fr.wt. of fruit (g)	Length of fruit (cm)	Diameter of fruit (cm)	Yield /plant (kg)
C <sub>100</sub>	50.33	53.33	8.67	15.33	145.33	12.67	11.47	9.33	180.67	39.43	3.26	1.686
C <sub>200</sub>	49.00	51.67	7.67	13.67	158.00	15.67	10.08	10.67	170.35	38.00	3.23	1.818
C <sub>300</sub>	51.67	54.67	8.33	17.00	152.67	12.00	12.72	8.33	185.23	40.32	3.00	1.543
Control	52.33	56.33	9.67	18.67	158.33	11.67	13.56	7.00	201.57	41.48	3.50	1.411
S.Em (±)	0.215	0.255	0.289	0.518	0.518	0.289	0.032	0.430	0.382	0.209	0.047	0.012
CD at 5%	0.745	0.884	1.001	1.795	1.795	1.001	0.111	1.490	1.324	0.724	0.163	0.042

C = Intensity of electrical stimulus (mA)

This study concludes that electric current treatment of pre-sown seeds could be recognized as a potential tool for improving yield with particular reference to cucurbits where, number of male flowers is higher than female flowers and determination of intensity of electric current and duration of exposure are mandatory prior to undergoing such an investigation. Among different intensities of electric current used, 150mA and 200mA for three minutes duration were found to be optimum doses for ridge gourd and snake gourd, respectively to improve yield in these crops.

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