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Response of sweet pepper (*Capsicum annum*) to seed treatments in relation to seed germination, flowering, fruit characters and yield

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Among the non-traditional vegetable crops, sweet pepper (*Capsicum annum* var. *grossum*) is important one and is classed as a luxury vegetable. It is an excellent source of pro-vitamin A and vitamin C. Treatment of seeds before sowing is one of the major areas where the manifestation of different plant characters including flowering, fruiting and yield can be observed.. Sweet pepper is also an important crop, which can give good response to different seed treatments, regarding its seed germinability, flowering and fruiting characters. Therefore, the present investigation was carried out to find out the effect of seed treatment on seed germination, flowering and fruiting characters including yield of sweet pepper employing various chemicals *viz,*. NAA, GA_3, potassium orthophosphate, and thiourea at different concentrations.

The experiment was conducted in tropical humid region under new alluvial soil of West Bengal. The soil was sandy loam with a pH of 6.8. Nine different treatments including two growth regulators were used for seed treatment and laid out following Randomized Block Design with three replications. The treatments were as follows-

(i) Napthalene Acetic Acid (NAA):20ppm and 40ppm (split in to two treatments)
(ii) Gibberellic Acid (GA_3):50ppm and 100ppm (split in to two treatments)
(iii) Potassium Orthophosphate : 0.5% and 1.0% (split in to two treatments)
(iv) Thiourea : 0.5% and 1.0% (split in to two treatments)
(v) Control : Distilled water soaking

The seeds of sweet pepper cv. 'California Wonder' were soaked in the prepared respective treatment solutions for 24hrs and dried in shade before sowing. For control, seeds were soaked in distilled water for 24hrs. Sowing was done at the end of September and four weeks old seedlings were transplanted in the plots of 2.0m × 1.5m with a closer spacing of 50cm × 50cm. Crop was raised following recommended package of practices for sweet pepper. Mature green fruits were harvested and two years pooled data were taken for the analysis.

It was observed that seed germination of sweet pepper was markedly affected by the seed treatments with various chemicals (Fig.1). A significant increase in seed germination was found with thiourea at 0.5%, which resulted highest seed germination (96.25%), followed by potassium orthophosphate at 0.5%. On the other hand, seed germination was sharply dropped to 58.87% by NAA at 40ppm indicating its detrimental effect on the seed germination, though its lower concentration recorded sufficient germination (85.38%). Desai *et al.* (1987) reported highest seed germination in field (84.67%) in capsicum cv. Bharat when seeds were treated with chlormequat at 600ppm followed by NAA at 10ppm (83.0%). Detrimental effect of higher concentration (80ppm) of growth regulators (IAA and GA_3) in seed germination of chilli cv. NP-46A was also reported by Patil and Ballal (1979). But, Hariharan and Unnikrishnan (1983) reported that seed germination was hastened by soaking the seeds of *C. annum* in 30, 50, or 70ppm of NAA for 4 to 5 days, whereas Solanki and Joshi (1985) suggested best germination (78.6%) in capsicum when seeds were soaked in 3% KH_2PO_4 solution for 12 hrs.

It was observed that earlier flowering (40.42 days) were recorded with the treatments thiourea (1.0%), followed by NAA at 40ppm (Table-1). Flowering was delayed by GA_3 at its both levels. Hariharan and Unnikrishnan (1983) reported that the plants of *C. annum,* resulted from soaking the seeds in 30, 50, or 70ppm of NAA for 4 to 5 days, showed early flowering (by 5 to 7 days) than untreated control. Seed treatments significantly influenced the plants to produce flowers. Maximum flowers per plant (29.32) were noticed with treatment thiourea at 0.5% and lowest number (24.74) with GA_3 at 100ppm. A significant variation in fruit-set was found among different treatments (Fig.2). Highest percentage of fruit-set (41.73%) was observed when seeds were treated with NAA (20ppm). Whereas, thiourea (0.5%), GA_3 (50ppm) and potassium orthophosphate (0.5%) had decreasing effect on fruit-set over control. Number of fruits per plant was also influenced significantly with different seed treatments (Table 1). Both levels of NAA showed increase in fruits set per plant with maximum value (7.10) at 20ppm. All other treatments reduced fruit number over control with minimum value (5.89) by GA_3 at 100ppm. Fruit weight was significantly varied among treatments. It was found that most of the treatments

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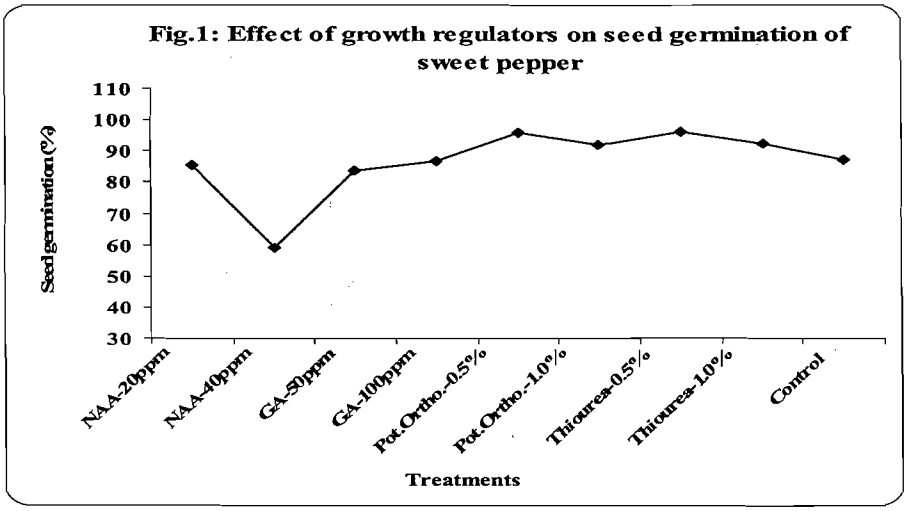
recorded increase in fruit weight over control and GA_3 at 100ppm resulted maximum fruit weight (73.98g), whereas NAA at both concentrations and potassium orthophosphate at 0.5% decreased fruit weight as compared to control. The increased fruit weight in GA_3 (100ppm) was mainly due to the increased fruit size, particularly increased length of the fruit. It is also clear that production of more number of fruits reduces the weight of the fruits due to lesser accumulation of photosynthates in the fruits.

Table1: Effect of seed treatments on flowering and fruiting of sweet pepper

Treatments	Days to first flower	Flowers plant-1	Fruits plant-1	Fruit wt. (g)	Seeds fruit-1	Yield (g plant-1)	Yield (t ha-1)
NAA-20ppm	40.68	27.17	7.10	68.17	298.15	432.47	17.29
NAA-40ppm	40.52	27.92	6.82	68.06	291.85	446.19	17.85
GA-50ppm	43.15	26.89	6.09	73.10	263.76	457.28	18.29
GA-100ppm	43.86	24.74	5.89	73.98	267.83	436.29	17.45
Pot. Orthophos. -0.5%	42.30	27.56	6.15	67.86	280.37	417.35	16.69
Pot. Orthophos. -1.0%	41.76	25.86	6.12	71.25	281.43	424.47	16.97
Thiourea-0.5%	40.93	29.32	6.07	70.85	276.13	429.34	17.17
Thiourea-1.0%	40.42	26.25	6.03	72.24	279.58	434.46	17.38
Control	42.75	26.73	6.28	69.32	272.07	423.06	16.92
SEm(±)	**0.78**	**0.49**	**0.16**	**1.41**	**2.14**	**3.78**	**0.28**
LSD(0.05)	**2.33**	**1.47**	**0.48**	**4.22**	**6.39**	**11.31**	**0.83**



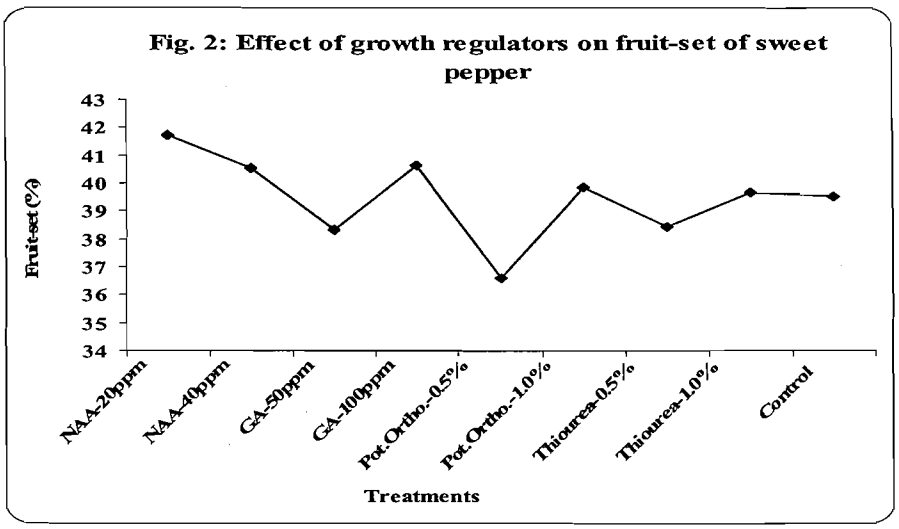
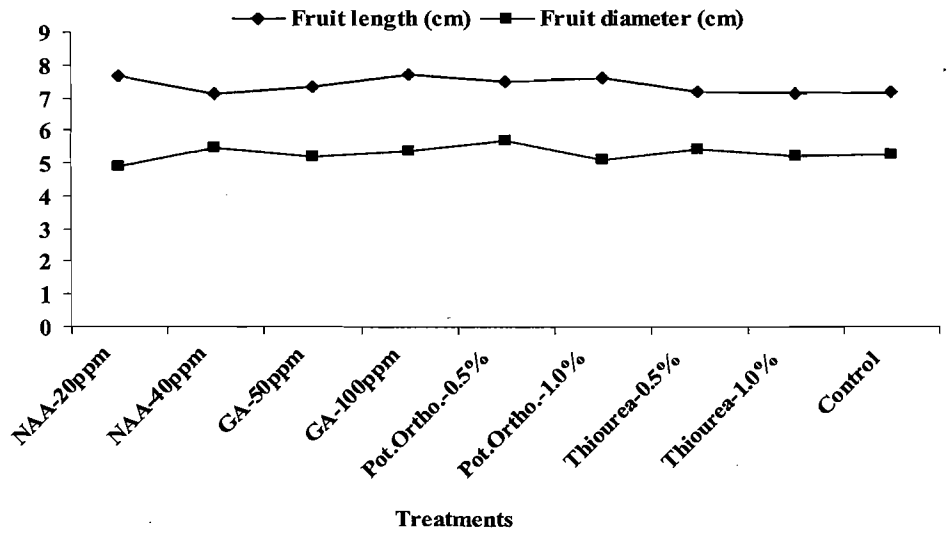


Fig. 3: Effect of growth regulators on fruit size of sweet pepper



The length and diameter of the fruits were influenced markedly by the seed treatments (Fig.3). Maximum fruit length (7.71cm) and fruit diameter (5.72cm) were recorded for the treatments, GA_3 (100ppm) and potassium orthophosphate (0.5%), respectively, whereas least values of these characters were found in NAA at 40ppm and 20ppm, respectively. Hariharan and Unnikrishnan (1983) obtained larger fruits of *C. annum,* resulted from soaking the seeds in 30, 50, or 70ppm of NAA for 4 to 5 days than untreated control. Again, different seed treatment chemicals produced significant results in number of seeds per fruit (Table 1). The highest (298.15) and lowest (263.76) number of seeds fruit^{-1} was obtained with NAA (20 ppm) and GA_3 (50ppm), respectively. All the treatments except GA_3 (50 and 100ppm) increased seed number per fruit over control and this might be due to higher germination and fertilization of pollen in the plants treated with these chemicals. Seed number in *C. annum* was markedly increased by seed treatment in 30 and 50ppm of NAA compared to control (Hariharan and Unnikrishnan, 1983). Fruit yield plant^{-1} was also significantly varied in the plants grown from seeds treated with different chemicals. All the treatments increased fruit yield except potassium orthophosphate at 0.5%. However, highest yield (457.28 g plant^{-1}, *i.e.,* 18.29 t ha^{-1}) was obtained with GA_3 at 50ppm, followed by NAA at 40ppm.

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