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Effect of cobalt nitrate, penshibao and Fantac on flowering and yield of musk melon (*Cucumis melo* L.)

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Abstract : **The investigation carried out on musk melon revealed that pre treatment of seeds with Cobalt Nitrate at 1 ppm showed significant influence on vegetative, flowering and yield characters. Seed treatment with 100 ppm Penshibao had significant influence in delaying the emergence of male flower at higher nodes Whereas foliar application of Penshibao at the same concentration had significant influence only on yield characters. The foliar application of Fantac (500 ppm) showed significant influence on leaf area, fruit set per cent and fruit weight. Plants raised from seeds treated in Cobalt Nitrate 1.0 ppm and received three applications of Fantac (500 ppm) gave the highest yield per vine (3.47 kg). This increase in yield was attributed to more leaf area, advancement of female flowering, increased pistillate flower production, narrow sex ratio, increased fruit set per cent, bigger sized fruits and fruit weight.**

Key words: Musk melon, Cobalt nitrate, pre treatment of seeds, Fantac, Penshibao, 2 - Chloro Ethyl Phosphonic Acid (CEPA).

ntroduction

Musk melon is a popular delicacy and in important Cucurbitaceous fruit crop. Cucurbitaceous crops, being monoecious, the yield argely depends on the number of female flowers roduced. The sex ratio normally ranged between 5:1 and 15:1(Seshadri,1986). Exogenous appli-ation of 2 - CEPA has been reported to induce emale flowers. Sidhu *et al.* (1982) stated that 00 - 240 ppm of 2 - CEPA was sufficient o alter the sex ratio in desired direction in nusk melon. Recently, pre-treatment of seeds vith Cobalt Nitrate (Atta Ally, 1998) and bio-timulators has been reported to increase the roduction of various cucurbitaceous vegetables. Iowever, there is very less research work done n these aspects in musk melon.

Hence, this research work was carried out o study the effect of pre-treatment of seeds with Cobalt Nitrate and bio stimulators like 'Penshibao' nd 'Fantac' and to compare the effect of pre-reatment of seeds and foliar application with 2 - CEPA.

Materials and Methods

The experiment was carried out in the vegetable research complex of Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar during 2000. The seeds of musk melon variety "Kajri" were subjected to ten treatment combinations *viz.* T_1 (Control - water soaking of seeds), T_2 (Water soaking of seeds + Ethrel (250 ppm) foliar spray), T_3 (Seed treatment with 0.5 ppm Cobalt Nitrate), T_4 (Seed treatment with 1.0 ppm Cobalt Nitrate), T_5 (Seed treatment with 1.5 ppm Cobalt Nitrate), T_6 (Seed treatment with 'Penshibao' (100 ppm) + Ethrel (250 ppm) foliar spray), T_7 (Seed treatment with 'Penshibao' (100 ppm) + Ethrel (250 ppm) and 'Penshibao' (100 ppm) foliar spray, T_8 (Water soaking of seeds + Ethrel (250 ppm) and 'Penshibao' (100 ppm) foliar spary), T_9 (Seed treatment with 1.0 ppm Cobalt Nitrate + Fantac (500 ppm) foliar spray) and Tio (Water soaking of seeds + Ethrel (250 ppm) and 'Fantac' (500 ppm) foliar spray).

For seed treatments, seeds were soaked for 48 hours prior to sowing in respective chemicals. 2 - CEPA application was done four times. First spray of 2 - CEPA was given at two true leaf stage and next three sprays were given at weekly intervals. 'Penshibao' (100 ppm) was applied as foliar spray. The first spray was given at 60 days after sowing and the second on fifteen days after first spray. Fantac (500 ppm) was applied as foliar spray at the time of flowering and then two sprays were given at fifteen days interval. The treatment with water spray served as control. Observation on vine length, leaf area, days to first male flowering, days to first female flowering, sex ratio, fruit set per cent, number of marketable fruits per vine, fruit weight and yield per vine were recorded to study the effect of various treatments.

Table 1. Effect of pre-treatment of seeds with cobalt nitrate and Penshibao, foliar application of Ethrel Penshibao and Fantac on morphological, flowering and yield characters

Treatments	Vine length (cm)	Leaf area (cm^2)	Days to first male flowering	Days to first female flowering	Sex ratio	Fruit set per cent (%)	Number of marketable fruits per vine	Fruit weight (kg)	Fruit yield per vine (kg)
T_1	224.5	172.4	23.54	46.16	15: 1	34.50	3.10	0.316	0.87
T_2	242.5	220.5	44.19	29.22	5:1	57.86	3.59	0.569	1.95
T_3	229.6	181,9	32.06	44.17	13:1	37.35	3.22	0.379	1.15
T_4	241.0	210.5	43.11	30.14	6:1	60.85	3.46	0.563	1 93
T_5	234.6	191.5	36.01	48.76	11:1	43.47	3.39	0.441	1.47
T_6	239.7	201.9	48.14	27.09	4:1	51.68	3.89	0.502	1 91
T_7	260.3	231.4	52.01	25-01	3:1	49.59	3.79	0.689	2.54
T_8	255.2	229.5	39.69	33.99	6:1	64.14	3.79	0.657	2.42
T_9	247.8	282.3	40.57	33.14	7:1	76.31	4.00	0.889	3.47
T_{10}	250.1	267.9	42.16	30.95	6:1	70.36	3.83	0.834	3.21
SEd	14.2	16.1	1.55	2.75	0.69	2.53	0.24	0.028	0.23
C.D. (P = 0.05)	30.0	33.7	3.28	5.80	1 : 47	5.34	0.53	0.076	0.33

Results and Discussion

Effect of seed treatment with cobalt nitrate

Pre-treatment of seeds with Cobalt Nitrate at all levels showed their superiority over control in vegetative, flowering and yield characters. The increased vine length (241 cm) at 1.0 ppm Cobalt Nitrate (T_4) may be attributed to stimulatory action of auxins, which softens the cell wall by increasing its plasticity (Tagawa and Bonner, 1957). The same treatment (T_4) also resulted in narrow sex ratio (6:1). This could be attributed to the action of Cobalt Nitrate in increasing the level of ethylene in early stages. The beneficial effect of pre-treatment of seeds with Cobalt Nitrate at 1 ppm on fruit weight (0.563 kg) and yield per vine (1.93 kg) could be attributed to its action on photosynthetic source and its efficient translocation to growing sinks.

Comparison of Cobalt Nitrate seed treatment and Ethrel foliar spray

Comparative effect of Cobalt Nitrate (1.0 ppm) and 2 - CEPA (250 ppm) on various characters as shown in Table1 revealed that 1.0 ppm Cobalt Nitrate seed treatment (T_4) could be considered as equal to that of Ethrel foliar spray at 250 ppm (T_2) concentration. It is interesting to note that both 1.0 ppm Cobalt Nitrate treatment and Ethrel foliar spray narrowed down the sex ratio and resulted in medium sized fruits of about half kilograms. The present results go in conformity with findings of Atta Ally (1998) in summer squash. On the other hand, the concentration of Cobalt Nitrate at 0.5 ppm as well as 1.5 ppm did not show any significant response regarding various vegetative and reproductive characters. This could be explained by the fact that the induction of endogenous production of ethylene depends on the concentration and the balance of other growth hormones (Atta Ally, 1998).

Effect of Penshibao seed treatment

Eventhough there was no direct treatment to study the effect of seed treatment with Penshibao at 100 ppm concentration, the effect could be assessed by comparing T_6 (seed treatment with Penshibao (100 ppm) + ethrel (250 ppm) foliar spray) and T_2 (water soaking of seeds + Ethrel (250 ppm) foliar spray. The increase or decrease shown in T_6 could be considered as the per se effect of Penshibao seed treatment. Penshibao seed treatment had delayed the days to appearance of male flowers (48.14). Ho and Saito (1956)

observed that the accumulation of carbohydrate was correlated with the accumulation of flower forming substances. Thus, application of micronutrient (boron) might have increased the carbohydrate content and there by increased the no. of female flowers. Narrow sex ratio observed in this can be attributed to the promotive effect of boron in pistillate flower initiation.

Effect of Penshibao foliar spray

Comparative data on T_6 (seed treatment with Penshibao (100 ppm) + Ethrel (250 ppm) foliar spray and T_7 (seed treatment with Penshibao 100 ppm) + Ethrel (250 ppm) and Penshibao 100 ppm) foliar spray depicted in table revealed that the difference between them could be considered as the per se effect of Penshibao foliar spray. Careful appraisal of results indicated the significant influence of Penshibao on yield characters.

The role of Penshibao foliar spray in improving fruit weight and yield has been reported by several workers (Randhawa and Singh, 1969). It is interesting to note higher influence of foliar spray on yield characters as compared to seed treatment. This could be explained by the fact that foliar spray was given at half fruiting stages of the crop. It is also possible that requirements of micronutrients increase during the later stages of crop growth. Similarly, the requirement by seedling could have been met by the available micronutrients in soil during the initial stages. Thus, Penshibao seed treatment did not show significant influence on vegetative characters such as vine length, and leaf area as compared to foliar application. It can be assumed that the combination would excel their per se effect. Perusal of data on fruiting characters outline the effect of Penshibao in increasing fruit weight (0.689 kg) and yield per vine (2.54 kg).

Comparison of Penshibao and Fantac foliar spray

Of the two biostimulators tried, T_8 (water soaking of seeds + Ethrel and Penshibao foliar spray) and T_{10} (water soaking of seeds + Ethrel and Fantac foliar spray), Fantac showed significant influence over Penshibao on leaf area (267.9 cm^2) fruit set per cent (70.36%) and fruit weight (0.834 kg). The increased yield might be attributed to stimulating action of biostimulator (Fantac) which contains L -cysteine and folic acid as its active ingredients. It goes in line with the findings of Sisay Asrat *et al.* (1992).

Evaluation of treatments

Among the various treatments T_9 (seed treatment 1.0 ppm Cobalt Nitrate + Fantac 500 ppm foliar spray), ranked high in fruit yield per vine (3.47 kg).

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