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Effect of Naphthalene Acetic acid (NAA) on the pre-harvest drop of Mandarin Orange fruits

by

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Synopsis: The effect of Planofix (NAA) in the prevention of pre-harvest fruit drop in mandarin orange was studied at the Agricultural Research Station, Ambalavayal during two seasons. Three concentrations of active growth regulators i. e. 2·5 ppm, 5 ppm and 10 ppm were used in the trial with a control receiving only water spray. 5 ppm active growth regulator was found to reduce the fruit drop by 22·57 per cent in the off-season crop and by 4·28 per cent in the main season crop over the untreated plants. There was no appreciable difference in the weight of the fruits obtained from the treated and untreated plants.

Introduction: The effects of plant growth regulators on various aspects of plant behaviour are well recognised. Prevention of pre-harvest drop of fruits is one of the several uses to which the growth regulators are successfully employed. Aerial sprayings with alphanaphthaleneacetic acid (NAA) have been resorted to in the United States of America to control pre-harvest drop in certain varieties of apples according to Venkataratnam (1957).

Gardener *et al.* (1940) showed that certain growth regulating chemicals when used as sprays would inhibit abscission and thus effectively retard the pre-harvest drop of apples. NAA or its sodium salt was the active ingredient in most of the commercial hormone preparations for preventing fruit drop in apples and pears. According to Tukey (1954) the trials on citrus with NAA conducted in America have not been successful in preventing the pre-harvest drop of citrus fruits. But the trials conducted elsewhere have shown that NAA is also effective in controlling fruit drop in citrus. Zanini as quoted by Hayes (1960) reported that 10 ppm of NAA applied to mandarin orange in November and December effectively prevented fruit drop. Miege also quoted by Hayes (1960) reported success with potassium naphthyl acetate on Clementine orange. Among some of the earliest attempts in the prevention of fruit drop with growth regulators in India was the one carried out at Kallar Fruit Research Station, Madras with mandarin oranges and mangosteen in 1942. Certain proprietory products were used but there were no appreciable differences between treated and untreated trees. Later in 1949, spraying of Planofix (NAA) was found to reduce pre-harvest drop in citrus fruits and in mango. The fruits were held for a few more days. In a trial with Nagpur orange, Ojha (1960) got a reduction in fruit drop by as much as 41 per cent by the spray of water solution of Planofix containing 0·8 ppm active hormone (NAA).

Among other growth regulators used on citrus 2, 4-D spray any time from three months before drop beigns to two weeks after heavy drop started reduced the pre-harvest drop of citrus fruits according to Stewart (1947) and Stewart *et al.*

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(1952). Stewart and Klotz (1950) showed that sprays of 2, 4, 5- trichlorophenoxy acetic acid were more effective in controlling mature fruit drop of lemon trees than 2, 4-D.

With a view to find out the effect of NAA in preventing pre-harvest drop of mandarin orange in Wynad, a trial was conducted at the Agricultural Research Station, Ambalavayal in the off-season (second crop - December to June) of 1961–'62 and in the main season (first crop - July to December) of 1962–'63.

Materials and Methods: Planofix, a proprietory product containing NAA was used in the trial. Three concentrations of the active growth regulator i. e. 2·5 ppm., 5 ppm. and 10 ppm. were used in the trial with a control receiving only water spray. Seven mandarin orange plants, about 12 years old, were used under each treatment. The same set of plants was used during both seasons. The spraying of growth regulator of different concentrations was done two months after fruit set. The total number of fruits in each tree was counted before the spray. The number of fruits dropped every day was counted after spraying till the harvest was over. The total number of fruits harvested was also recorded.

Results and Discussion: The total number of fruits before the application of the growth regulator, the number dropped and the percentage of drop during the two seasons are furnished below.

Treatments	Total no. of fruits before the application	No. of fruits dropped	Percentage of fruit drop
Fruit drop during the off-season in 1961—'62 :			
Control	121	50	41·32
2·5 ppm	163	42	25·76
5 ppm	144	27	18·75
10 ppm	178	46	25·84
Fruit drop during the main season in 1962—'63 :			
Control	1891	324	17·13
2·5 ppm	1561	320	20·50
5 ppm	1276	164	12·85
10 ppm	1054	155	14·71

The results show that there is an appreciable decrease in fruit drop in the treated plants. While in the off-season crop of 1961—'62, the percentage of fruit drop in the untreated trees was 41·32 it was only 18·75 in trees sprayed with 5 ppm active growth regulator showing thereby a reduction in fruit drop by 22·57 per cent. During the main crop season of 1962—'63, the fruit drop in control plants was 17·13 per cent while the same in plants sprayed with 5 ppm active growth regulator was only 12·85 per cent.

It is interesting to note that during both the seasons fruit drop in plants sprayed with 5 ppm NAA was the lowest while the results obtained in plants sprayed with 2·5 ppm hormone were inconsistant. Though the fruit drop in plants sprayed with 10 ppm growth regulator was less than that of control, the drop was more than those treated with 5 ppm growth regulator. Therefore, it is evident that 5 ppm growth regulator spray is effective in preventing fruit drop in mandarin orange in Waynad. The effect of NAA in the prevention of fruit drop in citrus has been shown by Miege (1948), Zanni (1958) and Ojha (1960).

No appreciable difference in the weight of treated and untreated fruits was noticed as reported in the case of Valencia oranges by Stewart *et al.* (1952) and in grapefruit by Stewart and Parker (1954) with 2, 4-D. While the average weight per fruit obtained from untreated plants was 112 gm., it was 110 gm. in 2.5 ppm, 115 gm. in 5 ppm and 116 gms in 10 ppm sprayed plants.

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