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# EFFECT OF RINGING AND GIBBERELLIC ACID ON CROPPING POTENTIAL OF LOW BEARING SWEET ORANGE CV. PINEAPPLE

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Pineapple orange trees were sprayed with gibberellic acid (GA) at 2.5, 5.0, 7.5 and 10.0 ppm and/or ringed on 29th January 8th February and 18th February before blooming. Earlier ringed branches markedly increased fruit numbers per branch. This was associated with greater number of flowers, fruit set and reduced fruit drop. All treatments of GA up to 7.5 ppm increased fruit number but higher concentration at 10 ppm reduced the fruit number per branch. GA spray at 7.5 ppm combined with ringing on 29th January was the most effective treatment to improve yield.

## INTRODUCTION

Sweet orange (Citrus sinensis L. Osbeck) are commercially the most important and widely cultivated species of citrus throughout the world although some good cultivars are shy bearing. Low yield of sweet oranges may be attributed to internal imbalance of growth regulators and/or other physiological factors. Application of gibberellic acid (GA) coupled with ringing operations improved cropping potential of some grape fruit cultivars (Furr and Armstrong, 1956) and many other fruits (Dennis and Edgerton, 1966). It was,therefor, considered important to test several variables of GA doses and ringing in different combinations on pineapple cv. of sweet oranges.

Goren and Monselise (1971) reported that ringing before flower opening in low bearing orange trees increased yield.

It was observed to decrease drop of flowers and fruitlets. Agusti et al. (1982) studied that a single GA spray (5-20 mg $l^{-1}$) at petal fall enhanced initial fruit set in the sweet orange cv. Navelate, 0.5 mg $l^{-1}$ being the best treatment for yield improvement. However, higher doses were reported to have negative effects. Arthur et al. (1985) observed that prebloom girdling increased fruit set significantly in "Shamouti" orange. Goldschmidt et al.,(1985) found that girdling in October increased flower numbers compared with ungirdled "Murcott" mandarin trees. GA treatments, however, depressed the reproductive inflorescence in both girdled and ungirdled branches.

## MATERIALS AND METHODS

These studies were conducted during 1987. Fifteen healthy and uniform pineapple orange trees on rough lemon rootstock grown in the Experimental Orchard of the University of Agriculture, Faisalabad were selected. The age of the trees was 15 years. Gibberellic acid at the rates of 2.5, 5.0, 7.5 and 10.0 ppm and three dates of ringing i.e. 29th January, 8th February and 18th February in all possible combinations before bloom were tested. For ringing a bark patch of 2-3 mm wide was removed with a sharp knife from all around the selected branches. Data were recorded on flowering intensity, fruit setting, fruit drops and number of fruits per branch. The data were analysed according to 2 factors factorial RCBD. DMR test was also applied for computing significance among the individual means.

## RESULTS AND DISCUSSION

The information concerning the efficacy of ringing on cropping potential of Pineapple orange revealed that ringing was effective in increasing flowering, fruit setting, yield and reducing fruit drops (Table 1a). Ringing of 29th January induced maximum as well as statistically more flowering (2700), fruit setting (28.0%), and yield (116 fruits per branch) as compared to other treatments including control that produced 1903 flowers, 17.0% fruit set and 29.5

Table 1a. *Effect of ringing on flowering intensity, fruit setting, fruit drop and number of fruits per branch*

| Rigning dates | Means | | | | |
|---|---|---|---|---|---|
| | Flowering intensity | Fruit setting (%) | Initial fruit drop (%) | June drop (%) | No.of fruits per branch |
| Control | 1903 c | 17.0 d | 73.5 a | 19.1 a | 29.5 d |
| 29th January | 2700 a | 28.0 a | 66.1 b | 18.4 b | 116.0 a |
| 8th February | 2185 b | 26.2 b | 64.4 c | 17.5 c | 99.0 b |
| 18th February | 1967 c | 23.5 c | 62.2 d | 6.5 d | 86.3 c |

Table 1b. *Effect of gibberellic acid on flowering intensity, fruit setting, fruit drop and number of fruits per branch*

| GA doses | | | | | |
|---|---|---|---|---|---|
| Control | 2090 b | 19.9 d | 70.3 a | 18.5 a | 61.1 d |
| 2.5 ppm | 2278 a | 21.1 e | 69.6 a | 18.3 ab | 77.5 c |
| 5.0 ppm | 2316 a | 23.0 b | 67.4 b | 17.9 bc | 99.5 b |
| 7.5 ppm | 2213 ab | 26.8 a | 65.0 c | 17.5 cd | 122.1 a |
| 10.0 ppm | 2047 b | 27.7 a | 60.4 d | 17.1 d | 60.00d |

Significant at 5% level.

Table 2. *Effect of ringing and gibberellic acid on initial fruit drop and number of fruits per branch*

| Treatments | Means | |
|---|---|---|
| | Initial fruit drop (%) | No. of fruits per branch |
| Control | 75.4 a | 24.0 j |
| No ringing + 2.5 ppm GA | 75.1 a | 33.0 i |
| " " + 5.0 " " | 73.7 ab | 36.0 i |
| " " + 7.5 " " | 7".0 b | 36.0 i |
| " " +10.0 " " | 70.5 c | 18.7 j |
| Ringing(29.1.87) + 0.0 ppm GA | 70.1 cd | 89.7 e |
| " " + 2.5 " " | 69.3 cde | 113.3 d |
| " " + 5.0 " " | 67.0 fg | 132.0 c |
| " " + 7.5 " " | 64.5 hij | 163.7 a |
| " " +10.0 " " | 59.5 k | 80.0 f |
| " (8.2.87) + 0.0 " " | 68.4 def | 68.3 gh |
| " " + 2.5 " " | 67.6 ef | 96.3 e |
| " " + 5.0 " " | 65.4 ghi | 107.3 d |
| " + 7.5 " " | 63.0 j | 150.3 b |
| " +10.0 " " | 57.4 l | 72.7 fg |
| " (18.2.87) + 0.0 " " | 67.2 efg | 62.3 h |
| " " + 2.5 " " | 66.4 fgh | 67.3 gh |
| " " + 5.0 " " | 63.4 ij | 94.7 e |
| " " + 7.5 " " | 59.6 k | 138.3 c |
| " " +10.0 " " | 54.6 m | 68.7 gh |

* Significant at 5% level.

+ Any two means not sharing a letter differ significantly.

fruits per branch respectively. Fruit drop which directly affected cropping potential of Pineapple orange was found to be reduced by ringing. Ringing on 18th February like that of 29th January reduced the initial as well as June drop to the extents of 62.2% and 6.5% respectively. The earlier findings regarding effect of ringing were similarly reported by Goren and Monselise (1971), Arthur et al. (1985) and Goldschmidt et al. (1985). The results of their studies are quite similar to our findings. Data regarding the effects of GA sprays also indicated significant results. Mean values of the data given in Table 1 b, revealed that GA progressively promoted flowering up to a concentration of 7.5 ppm and beyond this a negative effect on flowering was observed. Maximum flowers were induced with the application of GA at 5.0 ppm which numbered to 2316 branch. The highest fruit setting i.e. 27.7% was observed with the application of GA at 10.0 ppm. It was significantly higher than GA at 2.5 ppm, 5.0 ppm and control. In control treatment the percentage of fruit setting was merely 19.9. Initial as well as June drop was also reduced to 60.4% and 17.1% as a result of GA a 10 ppm which was statistically less than all the treatments including control. In untreated control the percentage of both of these drops was observed to the tune of 70.3 and 18.5% respectively. Gibberellic acid treatment at concentration of 7.5 ppm produced the maximum number of fruits (yield) i.e. 122 per branch followed by 2.5 ppm, control and GA 10 ppm. These conclusions are in consonance with the findings of Agusti et al. (1982) and Goldschmidt et al. (1985).

Interaction between GA and ringing treatments was found significant only for initial fruit drop and yield (Table 2). The combined effect of both GA spray at 10 ppm and ringing on 18th February, reduced initial drop to 54.69% which was 75.4% in control treatments. Combination of treatments of GA at 7.5 ppm and ringing on 29th January increased fruit numbers up to 163.7 per branch which was the highest and significantly superior than with any other treatment tested in the present study. Similarly, positive effect of ringing and GA on yield have also been reported by Goldschmidt et al. (1985).

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