

Gibberellic Acid on Mandarin

possibility of increasing fruit set of Clementine mandarin without adversely affecting fruit or trees now under study

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Poor fruit set is a problem in the Clementine—Algerian—mandarin wherever it is grown.

The self-incompatibility of the variety Clementine causes a low set of seedy fruits when no pollen other than its own is available. However, Clementine pollen functions well on other citrus varieties.

Fruit set can be greatly improved by interplanting with other varieties of mandarin—tangerine—to serve as pollen sources. Although effective, interplanting has the disadvantage of increasing seediness. Girdling of the tree trunks during the flowering period is also an effective means of improving fruitset—and does not increase seediness—but may be detrimental if continued for several years.

Growth regulators such as 2,4-D or NAA have not been effective in promoting fruit set in Clementine so experiments were initiated to investigate the effects of gibberellic acid.

In May 1957, gibberellic acid, at the rate of 1,000 ppm—parts per million—in 95% ethanol was applied to flowers in full bloom on one 27-year-old Clementine tree and on two 8-year-old trees. All previously opened flowers, young fruits, and buds on the same twigs were removed. Treated flowers were not emasculated. The twigs were covered with paper bags to exclude pollinating insects. Twigs with control flowers were treated in the same manner except that gibberellic acid was not applied.

Gibberellic Acid on Clementine Mandarin
Data at harvest, January 24, 1958. Treated May 2, 1957

Treatment ¹	No. of flowers pollinated	No. of fruits set	Ave. seed/fruit	Ave. wt./fruit (gm.)	Ave. width/length ratio
Self-pollinated					
Gibberellic acid	244	35	0	64.6	0.9881
Control	247	2	0	68.5	1.0778
Open-pollinated	10	5.9	84.2	1.0743
Cross-pollinated	675	39	15.7	98.7	1.1015

¹ Fruits from open-pollination and controlled cross-pollination used for comparison of fruit characters.

From 244 flowers treated with gibberellic acid 35 fruits were set, but only two fruits were set from 247 untreated flowers. When the fruits were harvested it was apparent that the fruits set with gibberellic acid were more necked and elongate than other fruits on the same trees. The development of necks was more pronounced on the young trees.

Effects

Because only two fruits were set from the control flowers, fruits available from controlled cross-pollination and open-pollination were used in comparisons of fruit characters. Measurements demonstrate that the fruits treated with gibberellic acid have a significantly smaller average width-to-length ratio than the untreated fruits. Rind texture, color, and thickness were not visibly affected. The average weight of the fruits set with gibberellic acid was significantly less than the average weight of fruits set either

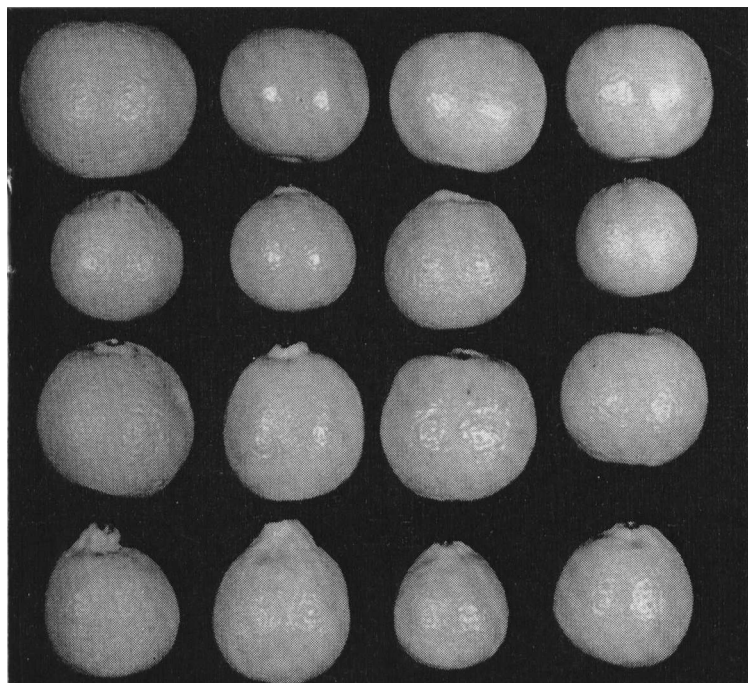
by controlled cross-pollination or open-pollination. It was essentially the same as the two fruits set with the control treatment. Quantitative fruit-quality tests were not made but there was no obvious effect on the interior appearance, texture, or flavor of the fruits set with gibberellic acid.

All fruits set with gibberellic acid, as well as the two fruits set without treatment, were completely seedless. This lack of seeds may be indirectly responsible for the small size of the fruits. Seedlessness may also be affecting fruit shape. The lack of seeds indicates that gibberellic acid did not set fruit by overcoming the self-incompatibility barrier and promoting pollen tube growth but rather had a direct effect on fruit set. In fact, the ethyl alcohol in which the gibberellic acid was applied may have resulted in the inactivation of the pollen.

In one additional trial, no increase in fruit set resulted from drenching water sprays of 10, 100, and 1,000 ppm applied after flowering and initial fruit drop had occurred. The effect of gibberellic acid on fruit set in the initial trial was striking and suggests the possibility of increasing fruit set in the Clementine mandarin under open pollination conditions without increasing seediness, adversely affecting fruit shape, or injuring the trees. To determine if improved fruit set can be obtained under various orchard pollinations with lower dosages of sprays and other methods of treatment, additional experiments are in progress. The use of gibberellic acid on Clementine mandarin as an aid to fruit set is still in the preliminary stage of investigation.

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The above progress report is based on Research Project No. 261.



Rows 1 and 2—top to bottom: fruits from 27-year-old tree. Row 1: No gibberellic acid, cross-pollinated, seedy. Row 2: 1,000 ppm gibberellic acid, self-pollinated, seedless. Rows 3 and 4: fruits from 8-year-old tree. Row 3, no gibberellic acid, cross-pollinated, seedy. Row 4, 1,000 ppm gibberellic acid, self-pollinated, seedless.