Cantaloupe Fruit Set

relationship to fertilization, seed development, and fruit growth studied to determine causes of drop

Louis K. Mann and Jeanette Robinson

Cantaloupe fruit set may be increased by removing competing fruits from the same vine, and by relying on insect pollination.

Flowers are likely to be inhibited from setting, and young fruits from growing, if there are other developing fruits on the same vine. To avoid this inhibiting effect, breeders remove all developing fruits from a vine before making pollinations. The date of this study confirms this common practice.

Breeding work on the cantaloupe and some other cucurbits is hindered by poor fruit set following hand pollination. On vines from which all developing fruits are removed and which should set well, hand pollination rarely results in a set of more than 40%. In experiments using insect pollination the pruned vines consistently set around 70%. This suggests that hand polination is in some way unsatisfactory but more tests are needed to verify this suggestion.

Time of Thinning

A study was made to determine factors responsible for the drop of pollinated flowers in the cantaloupe, *Cucumis melo* L. var. *reticulatus* Naud., Powdery Mildew Resistant Cantaloupe No. 45.

The percentage set of perfect flowers was determined on unthinned vines and on vines from which all developing fruit except the one being studied had been removed. Insect pollination was relied upon exclusively. On unthinned vines, about 10% of the perfect flowers set fruit as compared with 66% on thinned vines.

A plot of 120 plants was divided into six test groups of 20 plants each. The plants were seeded June 22. A single perfect flower, opening on August 15, was tagged in each plant. No developing fruits were removed in the check group. In the five test groups fruits were removed at different times relative to the day of full bloom—anthesis—of the tagged flowers. In one group, the fruits were removed four days before full bloom; in a second group, on the day of full bloom; in the remaining three groups, two, four and eight days after the day of full bloom. All fruits were kept off the vines until the tagged flowers either dropped or developed into fruit 10 cm—four inches—long.

The plants grew vigorously and fruits were setting well at the time of the test. The fruits in group five—thinned eight days after full bloom—showed the extent of setting. Of fruits longer than 3 cm—1⅜"—there was an average of four per vine, with a mean length of about 8 cm—3⅜"; of smaller fruit, there was an average of 11 fruits per vine. Under usual growing conditions, many of these fruits would drop before maturity.

Data from the experiment are shown in the following table:

Day of fruit removal in relation to full bloom of tagged flowers	Number of flowers tagged	Drops %	Number[a] of fruits maturing	Mean seed per fruit
4 days before	17	23.5	12	510
Day of full bloom	19	21.0	14	563
2 days after	19	31.6	11	533
4 days after	19	26.3	12	536
8 days after	19	58.0	5	484
Control. Fruit not removed	18	94.5	1	558

[a] Because of mechanical injury, mostly by insects, one or more fruits from each treatment, except the check, rotted before maturity.

From this table it is clear that growing fruits have a marked effect in preventing further set. However, removing fruit four days after full bloom is essentially as effective as earlier removal. When fruits were not removed until eight days after full bloom, the set was reduced. Of 11 fruits that dropped in the test, seven had dropped before the eighth day. Removal of fruit on the eighth day would be too late. Of the 47 drops in the whole experiment, only five occurred by the fourth day.

The growth-rate pattern was consistent. Regardless of the time of thinning, a fruit grew either at or near normal rate, or not at all.

The group thinned eight days after full bloom required eight days more to reach a length of 8 cm than did the group thinned on the day of full bloom. The difference did not arise from a difference in growth rate but simply reflected a delay in start. An example of a markedly delayed fruit is Fruit 69—see graph below. This fruit belonged to the group that was thinned four days after full bloom, but did not start to grow until the tenth day. From then on it went on growing at a rate comparable to that in fruits that started growing one or two days after full bloom.

The seed content was similar for all lots. Fruit 69 had 515 seeds, indicating that long delay at the start of fruit growth does not seriously interfere with seed development.

Pollination and Fertilization

Growth rate and appearance of fruits which failed to mature were studied.

Perfect flowers were tagged on the day of full bloom, and ovary length measurements made daily until the fruit dropped or approached mature size. No fruits were thinned from the vines.

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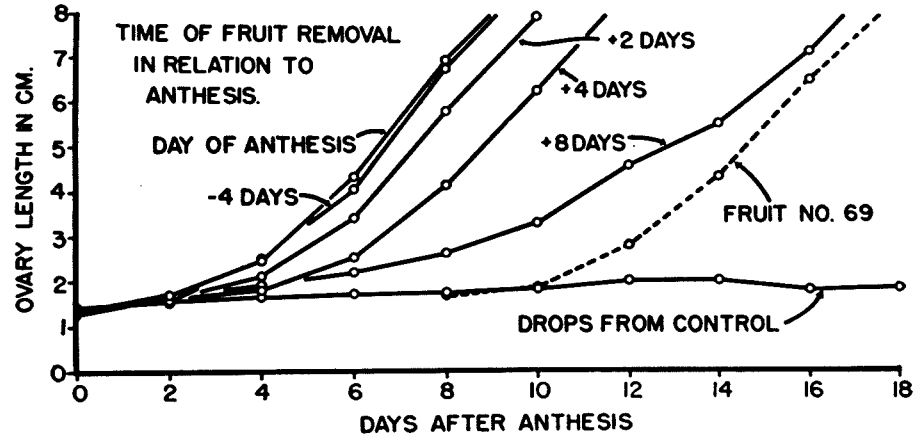
Growth curves of cantaloupe fruit. Fruits developing at the time the perfect flowers were tagged were removed at different times: four days prior to anthesis—full bloom; on the day of anthesis; and two, four and eight days after anthesis. See text for discussion of fruit No. 69.



ROOTSTOCK

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sweet orange or sour orange roots. Trifoliate orange grows well as a replant and some strains are fairly resistant to nematodes. It grows best in acid sandy loam soils, but is fairly susceptible to injury by high salt content in the soil.

Present use of trifoliate orange as a rootstock should be restricted to oranges and for limited replanting purposes only.

Cleopatra Mandarin

The Cleopatra mandarin is a stock which has done well with all species and varieties in experimental trials of the Citrus Experiment Station.

Oranges and grapefruit budded on Cleopatra stock are tolerant to quick decline. Cleopatra root is equally as resistant as sour orange to gummosis. No other diseases are known to be a factor. Lemon shellbark seems to be less severe on trees budded on Cleopatra than on Rough lemon, grapefruit or sour orange stock. Lemon decline is less pronounced in trees budded on Cleopatra than on other stocks observed.

Yields of all varieties budded on Cleopatra have been equally as good as those varieties budded on sweet orange. Fruit quality of varieties budded upon it is comparable to that of fruit from trees budded on sweet orange or sour orange. Fruit sizes are average. Trees budded on Cleopatra are equally as hardy as trees budded on sour orange stock. It makes a good growth as a replant. Cleopatra does well on heavy soils and is better adapted for saline soils than sour orange or Rough lemon.

Use of this stock in California for all scion varieties is recommended for commercial trial.

Sampson Tangelo

Use of the Sampson tangelo as a rootstock in California has not been extensive except for lemons. Eureka lemons are less prone to shellbark and lemon decline when budded upon Sampson tangelo than on most other stocks. Yields of lemons have been as good or better on trees budded on Sampson tangelo than of trees budded on sweet orange and have increased as the trees become older.

In California, because of quick decline, Sampson tangelo stock should be used only for lemons.

Troyer Citrange

Troyer citrange rootstock is so new that its ultimate value is somewhat speculative.

The Troyer citrange is a hybrid of sweet orange and trifoliate orange and apparently has inherited some of the good qualities of both. It is highly resistant to gummosis.

Oranges budded on it appear to be tolerant to quick decline. The trees come into bearing early and bear good crops of large fruit of excellent quality. The trees are more resistant to cold than trees budded on sweet orange or sour orange. Its ability to grow as a replant in old citrus soils has been outstanding.

Use of this stock should be restricted to oranges and grapefruit. Lisbon lemons are growing well on it, but Eurekas have not as yet proved adapted to it.

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BLACKBERRIES

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vigorous five to seven canes per plant need be trellised.

Trellising should be done soon after harvest, and with as little breakage of canes as possible. If tip-pruned to eight to 10 feet at the time of trellising, the supporting canes will force lateral growth over much of their length. Such lateral growth can either be pruned back to eight to 20 buds in the winter, when the plant is fully dormant, or trellised on the wires. The pruning saves labor and results in larger, more uniformly sized berries, the trellising perhaps gives a greater total yield of fruit. Water must be applied during the fall and winter months, and post-harvest fertilization with nitrogen is desirable. Attempts should be made to control the raspberry horned-tail insect. This insect kills the terminal growth of new canes early in the spring. Lateral growth which arises from such canes is always weaker than the original and is believed more subject to die-back.

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CANTALOUPE

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The experiment showed that fruit which drop do so soon after full bloom, though some ovaries may grow several-fold before dropping.

These drops which showed early growth frequently lengthened at the same rate as fruits which continued on to maturity. They cease to grow suddenly but remain green, turgid, and firmly attached for several days. Finally many of the fruits turn yellow, shrivel, and drop from the vine.

In fruits which drop, abscission always occurs several days after the ovary ceases to grow, and thus appears to have a secondary role in preventing fruit set.

Embryo sac development, pollen-tube growth, and the early stages of seed development were studied in growing fruits and in drops. For the insect-pollinated flowers on unthinned vines, there was no evidence that fruit drop was caused by the misfunction of any of these processes.

The changes which bring about fruit drop apparently first affect the growth of the fruit as a whole and then the development of structures within the ovule. The sequence is just the reverse of what could be expected if processes associated with fertilization or embryo or endosperm development were the cause of fruit drop.

Fruit set in this test did not appear to be limited by the number of ovules fertilized. Counts of fertilized and nonfertilized ovules were made from sections of 13 growing fruits, and from sections from 13 comparable drops.

Of 78 ovules in the fruits growing normally, 13% were not fertilized; of 116 ovules observed in the drops, 10.2% were not fertilized. Although more extensive data are needed, there is no present indication that drops have fewer ovules fertilized.

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The above progress report is based on Research Project No. 1175.

CHICKEN

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chickens which would meet specifications for USDA Grade A and most of those which would be included in the USDA Grade B classification.

A grading system at retail would focus consumers' attention on quality as one aspect of their buying and would serve to reduce the price spread noted for each grade.

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The above progress report is based on Research Project No. 1401.