Tomato Spacing

close spacing increased early yields in 1946–1949 experiments

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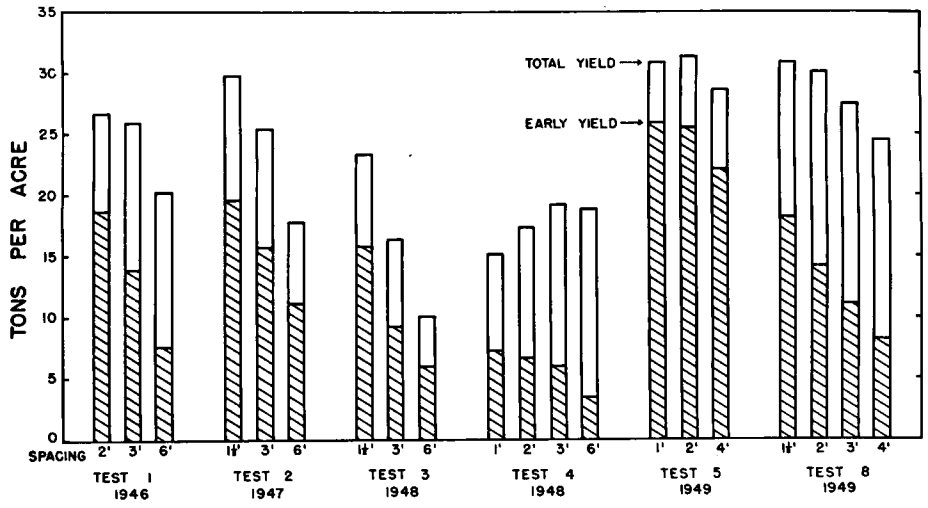
Plant spacing trials for canning tomatoes were initiated in Yolo County in 1946. Since the introduction of the field seeded method plant spacing has become of special interest to tomato growers. In this method, the cost of establishing the field is the same regardless of the spacing, while in transplanted fields the cost will increase with closer spacings.

Five tests were conducted on transplanted and three in field seeded tomatoes using the Pearson variety under commercial field growing conditions. Tomatoes were planted from one to six feet apart in the row and the effects of the spacings studied on yield, size, and quality of fruit. Each plot consisted of two rows of tomatoes ranging from 110 to 125 feet long. The tests were laid out in randomized designs with each spacing replicated four times. The tests were established at the time the field was planted or at thinning. Harvesting was done with regular picking crews.

The first test on a transplanted crop was made in Woodland. Planted May 2, 1946, rows were spaced six feet apart, spacing within the row was two, three, four and six feet. After two pickings on August 28th and September 17th the yield from the two-foot spacing was significantly higher than from the wider spacings as shown in the accompanying graph. After a third picking on October 10th there was no difference in total yield among the two-, three- and four-foot spacings, but all three gave better yields than the six-foot spacing. There was difficulty in picking the plots with close spacings.

The second test, also on a transplanted crop in Woodland, was made in 1947. Planted May 6th, row spacing again was six feet, with plants within the rows spaced 1½, three and six feet apart. Early yields included two pickings, on September 16th and October 2d; total yield included two additional pickings October 18th and 28th. Early yields and total yields were increased by close spacing. Vines on the closer spacings gave better protection of fruit from the sun. Fruit size was the same on the 1½-foot and three-foot spacings, but the six-foot spacing produced somewhat larger fruit.

EARLY AND TOTAL YIELDS OF TOMATOES AT DIFFERENT PLANT SPACINGS



The third test on a transplanted crop was made in Clarksburg. The tomatoes were planted May 11, 1948, in rows spaced five feet apart. Spacings within the rows were 1½, three and six feet. Due to the late season, only two pickings were obtained, one September 30th, the other October 18th. There was a very marked increase in early as well as total yields from the plots with 1½-foot spacing. Total yields might have evened up somewhat if there had been a third picking. Fruit size was practically the same on all three spacings. Plants were relatively small in this field and there was no difficulty in harvesting the close spacings.

The fourth test on transplanted tomatoes was made in Knights Landing, also in 1948. Planted May 16th, rows were spaced six feet apart, plant spacing was tested at one foot, two, three and six feet. Early yields from two pickings, September 29th and October 22d, were higher on the close spacings. Total yields, including a third picking November 11th, favored the three-foot spacing, although the differences among the two-, three- and six-foot spacings were not significant. Fruit set was delayed because of poor conditions for setting, resulting in extra large vines. Some fruit was lost on the close spacings from over-ripeness at the first harvest. Mold was more prevalent on the close spacings as more fruit was mature at the time of the early heavy rains. The one foot spacing appears to be too close for maximum yields. Fruit size became larger as the plant spacing was increased.

Test number five, located in the Clarksburg area was transplanted on April 21, 1949. The rows were 5½ feet apart and the treatments consisted of one-, two- and four-foot spacings between plants. The yields from the first two pickings on August 26th and September 9th showed a slight advantage for the close spacings. The total yields after one more picking on October 7th, were high and quite close for all three treatments. The fruit size was about the same on the two- and four-foot spacings, but slightly smaller on the one-foot treatment.

The sixth, seventh and eighth tests were made on field seeded tomatoes. For the sixth, the field was seeded April 7, 1947 in Woodland. In rows six feet apart the tomatoes were spaced one foot, two, 2½ and three feet. Early yields and total yields, including three pickings, were higher on the one- and two-foot spacings, with little difference between these two close spacings.

For the seventh test, in Woodland, tomatoes were field seeded May 3, 1948. Rows were kept five feet apart, plant spacing within the rows was five inches, 1½ and three feet. The last two groups were thinned June 23d. The yields were significantly lower on the five-inch spacing. There was no significant difference in yield between the 1½-foot and the three-foot treatments. On all treatments the vines made an extremely heavy growth before the fruit started to set. This heavy growth made it difficult for pickers to harvest the five-inch and the 1½-foot treatments. As a result, some fruit was lost due to incomplete harvesting.

The eighth test, located near Woodland, was field seeded on April 4, 1949 with rows six feet apart. On June 10th the plants were thinned to 1½-, two-, three- and four-foot spacings. The yields after the first two pickings on August 31st

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and September 16th were highest for the close spacings. The total yields after additional harvests on October 1st and 19th showed little differences between the 1½- and two-foot treatments but these were significantly higher than the three- and four-foot spacings. The fruit size ranged from an average of .277 pounds per fruit on the plots with a 1½-foot spacing to .297 pounds per fruit on the four-foot spacing.

Observations

In every test early yields were higher on the close than on the wider spacings. On the closely spaced treatments a high percentage of the total crop usually was harvested in the first one or two pickings. These higher early yields are probably due to the greater number of plants per acre since the rate of ripening of the individual fruit is not influenced by plant spacing.

Some advantages of high early yields are: *1*, a larger portion of the crop might be harvested before fall rains or early frosts; *2*, quality of the crop is usually higher in the early pickings; and *3*, a higher percentage of the crop is harvested when labor is more plentiful and harvesting costs are cheaper.

In most of the tests the total yield was increased by closer plant spacing. The total yield may be materially influenced by the length of the harvest season. When the harvest season is terminated unusually early by adverse weather conditions, the closer spacings may show a considerable advantage in yield.

Plant spacings did not greatly affect fruit size although there was some trend toward larger size on the four- and six-foot spacings.

Neither did spacing appreciably influence the quality of the fruit. In the 1947 test there was less sunburn on the 1½-foot spacing than on the three- or six-foot treatments. Test four in 1948 showed slightly greater loss of fruit from mold on the one-foot spacing than on the two-foot or wider spacings.

Plant spacings of 1½ to two feet in the row appear to be the most desirable for the Pearson variety grown for canning. In areas where plants normally grow rather large, the two-foot spacing may be preferable. Spacings closer than 1½ feet showed no advantage in yields and in years when fruit set is late and vine growth larger than usual, these extra close spacings may be more difficult to harvest. Close spacings are easily obtained on field seeded tomatoes. On the transplanted crop the change from a three-foot to a 1½- to two-foot spacing will mean increased costs for plants and planting. Therefore, growers are advised to determine for their own conditions if the close spacing will increase net returns.

On changing to closer spacings a tomato grower should watch his field carefully to determine if a change in irrigation practice is necessary. With more plants per acre the crop may require more water, particularly late in the season.

Since these tests were conducted on irrigated crops, the results should not be applied to tomatoes grown without irrigation.

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CANTALOUPE

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tip of a leaf, and flew away. Each aphid was moving across the fields in a succession of short flights, feeding for short periods on a large number of plants.

This type of feeding is so very efficient in spreading the virus that an extremely low initial incidence of virus infection was increased very rapidly. Sources of infection may be native gourds, zucchini, or other summer squash plants which are grown through the winter in the Imperial Valley, volunteer melons, or seed-borne infection of melon and squash plants.

Virus infection is extremely rare early in the season. Only one case of seed-borne mosaic was found in the desert areas in 1949, even though a considerable number of plants was scouted. This may be a result of the virus-free seed program. The overwhelming numbers of potential aphid vectors that move over the fields in certain years, pick up this rare and scattered virus inoculum and increase it in an almost geometrical ratio.

It should be noted that the presence of volunteer melon plants in fields in which melons had been grown the previous year may nullify the use of virus-free seed.

Insecticides and Repellents

Attempts were made to control the spread of cantaloupe mosaic by the use of insecticides and repellents. Aphids seemed to be able to fly through insecticide clouds without ill effects. No measurable degree of mosaic control was obtained by any of the treatments tried.

The hope that a repellent could be found was based on the observation that, on approaching a plant, in normal flight, an aphid hesitates for a fraction of a second at a distance of one to 1.5 inches from the plant surface. At this point the aphid appears to be sensing, perhaps smelling, the plant to decide whether or not to land. If the plant could be made unattractive to the aphid, it would fly on without landing, and its potential as a vector would be nullified.

A number of plant oils, known repellents for other insects, and various evil-smelling substances were made into dusts and applied on young melon plants at weekly intervals. The only one of these to show a measurable degree of control was tetramethyl thiuramdisulfide, particularly when used at 10%. But the use of this compound resulted in a delay of only a few days in the appearance of mosaic.

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The above progress report is based on Research Project No. 1085.

WAX

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fruit ratio would be comparable, in which increments of growth made after the wax was applied were known and under conditions in which it was suspected that water might be lacking to the fruit during this time. These conditions would evaluate more critically than has been done the effect of the wax upon cherry size.

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The above progress report is based on Research Project No. 920-F.

INSECT

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in tomato fields by the latter part of August. If environmental conditions favor the establishment of the pest in the early season, there is danger that the increased population by mid-summer may result in defoliation to a point where serious sunburning of the fruit may occur.

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