Once-Over Mechanical Harvesting for CUCUMBERS

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Cucumbers (for pickling) can soon be harvested with a commercial machine in a single once-over operation. A commercial prototype machine is available, and the feasibility of the once-over harvesting is enhanced by double-cropping possibilities in California and by date-of-planting information included in one of the two articles describing these studies.

CUCUMBERS FOR PICKLING have been grown on about 4,000 acres in California each year, and the crop is valued at about $3 million. Half of the plantings are in San Joaquin County, and Santa Clara and Alameda counties account for most of the remaining acreage. Prior to 1962, the cost of harvesting cucumbers by hand was about 50% of the value of the crop. With the new government regulations and the uncertain supply of labor, harvest costs have increased.

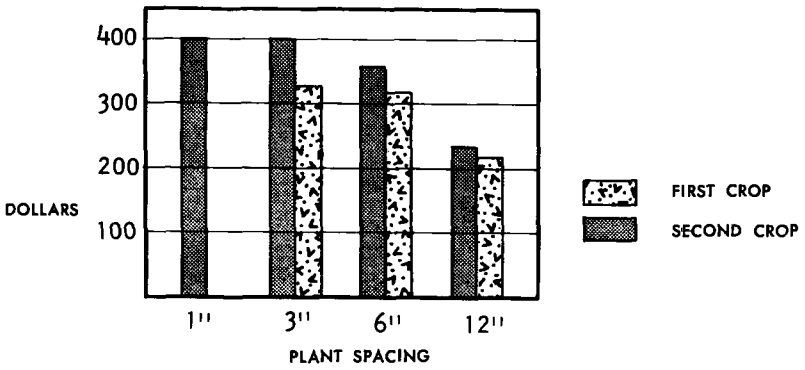
Researchers at Michigan State University developed the principles of a once-over harvester, and the FMC Corporation has built a limited number of experimental machines. Field tests with the machines have been conducted this past season. A multiple-harvest machine is also currently being used in the Midwest and East.

With California's warm spring and long summer, the fast-growing cucumber crop could be double-cropped on the same acreage in some areas allowing two once-over harvests. To obtain economical yields, plant populations per acre need to be increased, and some method of determining when to harvest to get maximum returns is also essential.

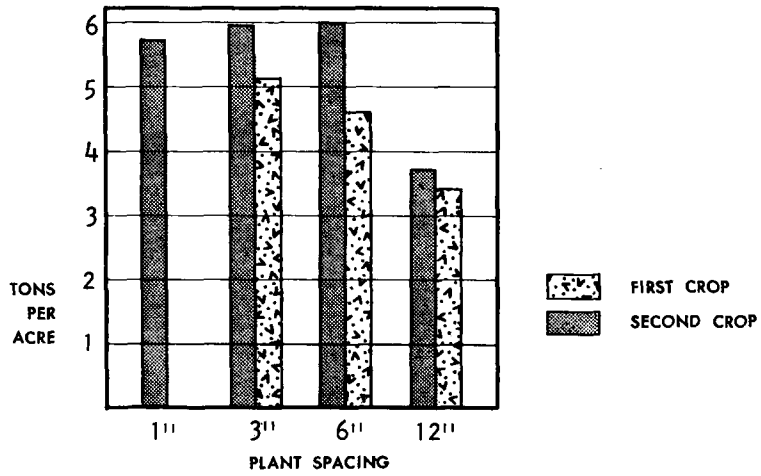
Experiments at Davis during the summer of 1965 were designed to determine the feasibility of double-cropping, determination of the plant population necessary for an economical return per acre, and timing of the once-over harvest. The plots were seeded with the cucumber variety SMR 58, planted in single rows on 40-inch beds. Four plant-spacing treatments (1, 3, 6, and 12 inches apart in the row) were replicated four times in a randomized plot design. After thinning, both plots were fertilized with 120 lbs of nitrogen ($(NH_4)_2SO_4$) per acre as a sidedressing. Six furrow irrigations were required to mature each crop.

In the first crop, 10-ft sections of row (for each treatment) were harvested by hand at different dates to determine the best stage of maturity for once-over harvesting. The 6- and 12-inch spacings were harvested first, at 55 days after seeding, followed by the 3-inch spacing four days later. In the close spacing (1-inch or no-

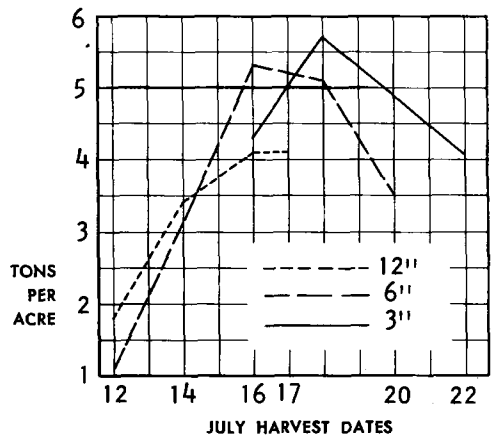
Front view, above, of FMC once-over harvester for pickling cucumbers showing pick-up mechanism. Below left, close-up of cutting and pick-up mechanism of FMC harvester; right, delivery belt carrying cucumbers from harvester to bins.



Gross returns in dollars per acre for pickling cucumbers planted at four different spacings in the row:
First crop LSD: .05–53.75
.01–81.42
Second crop—no thinning—LSD: .05–108.3



Total yield in tons per acre of pickling cucumbers planted at four different spacings in the row:
First crop LSD: .05–0.884.
.01–1.3
Second crop—no thinning—(no significant difference)



Tons per acre yield of cucumbers for pickling (first crop) produced at three plant spacings as harvested on six different dates in July.

thinning) the plants did not produce enough fruit to warrant harvest. These plants produced only a single long stem with no lateral branches. Maximum yields at harvest were obtained when three or four fruits in the 10-ft test row were yellow. The average total yield in tons per acre for the first crop was 5.0, 4.6, and 3.4 tons respectively for the 3-, 6-, and 12-inch treatments. Both intermediate spacings (3 and 6 inches) outyielded the close and wider spacing. In gross returns per acre, the 3- and 6-inch spacings significantly returned higher gross returns than the other two spacings. This difference is attributed to the higher yields of grade 1 and 2 cucumbers at the intermediate spacings.

Total yields

Total yields for the second crop were approximately the same, ranging from 3.7 to 6 tons per acre for the four treatments. In the 1-inch (no thinning) spacing, a considerable yield was obtained in the second crop. This was grown during a period of shorter days and lower temperatures which influences the development of female flowers. All the plants in this treatment in the second crop had three or four lateral branches, but no branching in the first crop. The close-spacing treatments, 1 and 3 inches, produced more grade 1 and 2 fruits. All three close spacings, 1, 3, and 6 inches, produced a large yield of grade 3 cucumbers. With high yields in the first three grades, the returns per acre were higher for the 1-, 3-, and 6-inch-spacing treatments.

Results

Results obtained for the two crops are presented in the graphs. The table below shows plant populations per acre for different treatments.

Preliminary studies with other spacing treatments indicated even higher yields may be obtained with two to four plants per clump at 6-inch spacing between clumps, using double rows on 40-inch beds. Further studies are necessary before spacing recommendations can be made.

CUCUMBER PLANT SPACING TESTS
Variety SMR 58, 1965

Spacing between plants in the row	Number of plants per acre
1 inch (no thinning)	156,816
3 inch	52,272
6 inch	26,136
12 inch	13,068

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