Fruit Set in Melon Breeding

hand pollination found to be less effective than pollination by honeybees in experiments at Davis

Louis K. Mann

That field-grown Powdery Mildew Resistant Cantaloupe No. 45 drops fewer pollinated flowers when insect-pollinated than when hand-pollinated was confirmed in a recent comparative study of fruit set on thinned vines.

This is of interest to the cantaloupe breeder who usually finds that over one half of his laboriously hand-pollinated flowers fail to form fruit. While the breeder may not be able to use bees directly in his program, the superior technique of the bee is worthy of study.

Throughout these experiments, all pollinations, hand or open, were made on thinned vines—vines from which all previously set fruit had been removed—and the flowers in each treatment were randomized throughout the area of vines being used.

To protect perfect flowers from insects prior to pollination, they were covered with one half of a size 00 gelatin capsule the day before full bloom. On the day of pollination, the capsules were removed, and for open pollination—principally by honeybees—the flowers were simply tagged. For hand pollination, the flowers were emasculated, tagged, pollinated, and then covered with a paper bag or with one half of a size two gelatin capsule.

On July 15, buds of about 40 perfect flowers, which were to open the next day, were capsuled, and all fruit was thinned from the vines. On July 16, between 10 a.m. and noon, approximately half of these perfect flowers were emasculated by splitting the corolla in two or three places and removing the stamens with forceps. Each flower was then pollinated—using previously capsuled staminate flowers—and was covered with a bag and tagged. The remaining perfect flowers were decapsuled, tagged, and left for open pollination. Seven days after pollination, all untagged fruits were again thinned from the vines.

The above test, which is described for July 15 and 16, was set up and repeated on eight successive days. The averages from the nine replications were 39% set for hand pollination and 67% set for open pollination.

Fruit set from hand pollinations in three additional experiments were 60%, 30%, and 48%, as compared with open-pollinated fruit set of 91%, 50%, and 78%. The set from open pollination was much more uniform from day to day than from hand pollination.

The mature fruit from open-pollinated flowers averaged 0.17 pound per fruit heavier than fruit from the hand-pollinated flowers—a significant difference. Seed counts showed an average of 180 more seeds per fruit from open-pollinated flowers—a highly significant difference.

The data collected in these studies indicate that fruit is set on thinned vines more successfully by bees than by hand pollination, but there is no suggestion as to why this is so.

Studies of bee activity on cantaloupe flowers showed that each flower was visited repeatedly during the one day it remained open. During this day, perfect flowers were visited an average of 53 times and staminate flowers 42 times. This frequency difference may be associated with the larger corollas of perfect flowers, which averaged 1.3 times the diameter of corollas of staminate flowers. Bees remained on perfect flowers an average of 1.5 times as long as on staminate flowers.

Individual perfect and staminate flowers produced about equal quantities of pollen, ranging from 8,000 to 13,000 grains. During the day, bees removed all but 2,000 of these pollen grains with removal most rapid in the morning hours.

In hand pollination, the flowers are usually pollinated but once, are injured by emasculation, and in the control tests in this study, were pollinated with pollen from the same plant.

In experiments designed to check the above hand techniques, flowers which were hand pollinated three times set no more fruit than when pollinated once; mutilated flowers left for open pollination gave significantly higher set than those hand pollinated and less—but not significantly so—than uninjured open-pollinated flowers. Flowers cross-pollinated by hand set no more fruit than when self-pollinated.

Louis K. Mann is Associate Professor of Vegetable Crops, University of California, Davis.

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

War II levels. Export outlets in Canada and Cuba for American rice appear stable and no drastic change in domestic-territorial demands seems imminent. Of the Asiatic nations to which American rice has been exported since the war, the major immediate potential demand is in Japan. Efforts are being made in that nation to substitute wheat and barley for imported rice. There is little effective demand at present in other Asiatic importing nations for United States rice at the price levels which prevailed for 1953 production.

All evidence indicates a long-run potential for American rice in Asiatic markets. However, two issues are dominant with respect to the immediate market in Asia: *1*, possible decline of world prices, and *2*, difficulty in maintaining dollar exchange in the face of continuously unfavorable trading balances with the United States and the decline in extraordinary expenditures by the United States in Asia.

The long-term issues appear to be the degree to which the apparent long-run per-capita deficit in Asiatic rice supplies can be met by United States exports—at world prices in the face of a domestic support-price system, which may hold United States farm prices above world prices.

Two contingencies can not be predicted. Price-support legislation may be amended or the flexible provisions of the present law may become effective. Second, if war in southeast Asia should be extended, both the demand for American rice and the supply of competing rice may be drastically affected.

George L. Mehren is Professor of Agricultural Economics, University of California, Berkeley.

Nicholas Thuroczy is Research Assistant, Giannini Foundation, University of California, Berkeley.

The above report is based on Giannini Foundation Mimeographed Reports No. 162, The Market for United States Rice: Domestic, *and No. 163,* The Market for United States Rice: Foreign; *March 1954.*