

ETHEPHON RESPONSE FAVORABLE ON FRESH MARKET TOMATOES...

Pre-and postharvest studies show earlier production and more uniform ripening

WILLIAM L. SIMS • ROBERT F. KASMIRE

PREVIOUS STUDIES of both processing and fresh market tomatoes have shown the plant regulator, Ethrel—Amchem Products, Inc. brand name for plant regulators containing ethephon [(2-chloroethyl) phosphonic acid]—to produce earlier and more uniform ripening when applied either to the foliage of the plant or the harvested mature green fruit. Recently, two new fresh market tomato varieties for machine harvest, Pakmor and Calmart, were released by the University of California. Both varieties have a medium small size determinate-type vine with a concentrated fruit set and large fruits. Pakmor matures seven to 10 days earlier than Calmart and has a green shoulder when the fruit is unripe, as compared with the uniform green color of the Calmart.

Greenhouse and field

Greenhouse and field experiments were designed to study the effect of variety and storage temperature on tomato fruit response to pre- and post-harvest ethephon treatments—information of real benefit to growers, shippers, receivers, and consumers of fresh market tomatoes.

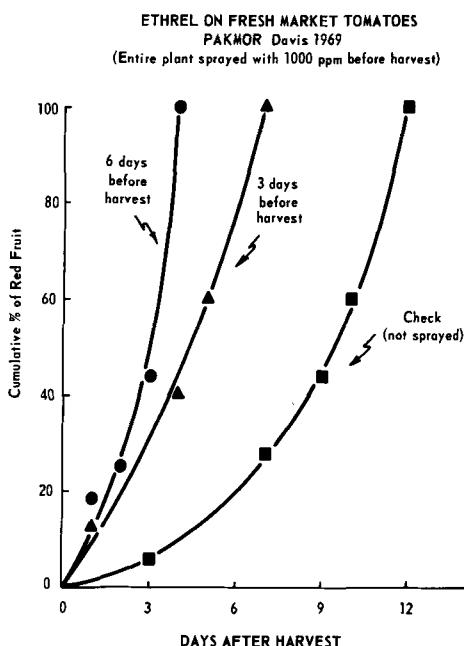
In a greenhouse experiment, tomato

seeds were sown in 5-gallon cans containing a greenhouse soil mix. Seedlings emerged in seven days. Plants were later thinned at the first true-leaf stage to a single plant per can. The experiment was conducted from September to March, 1969 to 70. The ethephon treatments were applied to both varieties as single applications at a concentration of 1,000 ppm. The plants were sprayed to run-off. Each treatment consisted of 12 plants of each variety. The treatments were: (1) plants sprayed six days before harvest, (2) plants sprayed three days before harvest, and (3) the unsprayed check. The fruits were considered mature-green at time of treatment. Treatment 1 was applied 42 days after pollination, or when approximately 90% of the fruit growth period of the first fruit cluster had elapsed before harvest. Treatment 2 was applied 45 days after pollination, or 95% of the fruit growth period had elapsed.

Chlorophyll degradation in the leaves of both varieties began on the fourth day after ethephon treatment. All fruits were harvested, but those less than 1½ inches in diameter were discarded (generally less than 25 days after pollination).

The earliest fruit ripening in both varieties occurred with the treatment ap-

plied six days before harvest, but both ethephon treatments were earlier than the check. The results shown for the variety Pakmor in the line graph were the same for the Calmart variety. Field experiments at Davis with these varieties have shown similar tomato ripening response to pre-harvest ethephon treatments and in addition the treatments



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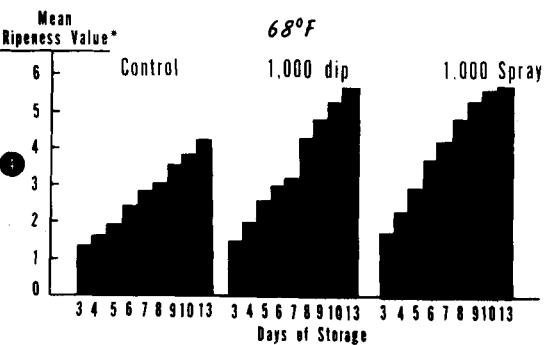
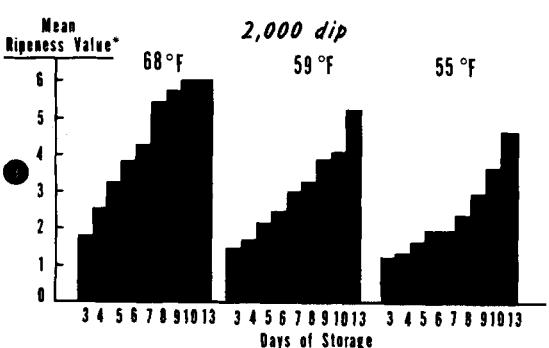
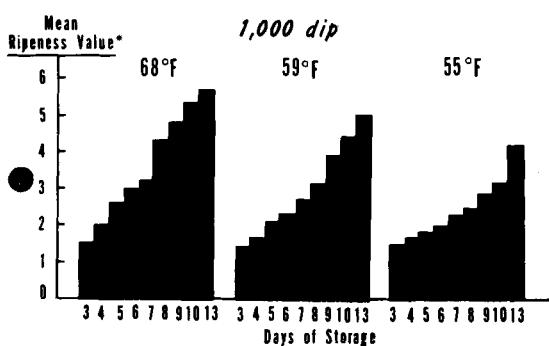
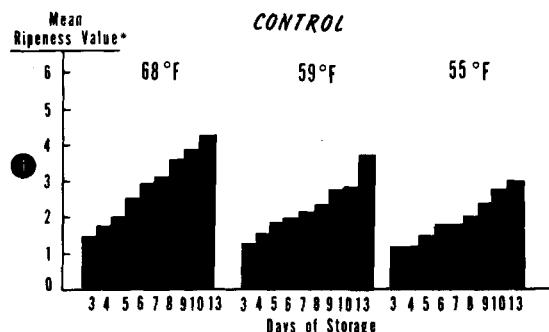
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**TOMATO RESPONSE TO TEMPERATURE AND
POSTHARVEST ETHEPHON TREATMENTS**
PAKMOR



*MEAN TOMATO RIPENESS VALUES: 1 = mature green; 2 = breaker; 3 = light pink; 4 = pink; 5 = table ripe; and 6 = canning ripe.



Post-harvest dipping of tomatoes in a 2,000 ppm concentration of ethephon resulted in quicker ripening during storage particularly at 68° F temperatures (left tray), as compared with 59° F temperatures (center tray), and the untreated check (right tray).

were beneficial in conditioning both vine and fruit for machine harvest.

Post-harvest trials

An experiment was designed in 1970 to study the effect of variety and storage temperature on tomato ripening response to post-harvest ethephon treatments. Fruit of the new tomato varieties Pakmor and Calmart were harvested in Blythe, California on June 7. The fruit was hauled to a packing shed in King City on June 8 and subsequently to Davis where the treatments were initiated on June 9. The ethephon treatments were: (1) 1,000 ppm dipped, (2) 2,000 ppm dipped, (3) 1,000 ppm sprayed, and (4) check. Matched tomato lots of 20 mature-green fruits each for each of the two varieties were used for each treatment. The dipped treatments were immersed in solutions for 10 seconds and a small one-quart plastic hand sprayer was used to apply the spray treatment.

The fruits of each treatment were then stored at 55° F, 59° F, and 68° F and observed daily for a total period of 13 days beginning on the third day following treatment. A ripeness scale of 1 to 6 was used in making the observations: 1 = mature green, 2 = breaker, 3 = light pink, 4 = pink, 5 = table ripe, and 6 = canning ripe.

The results of the experiment are shown in the photo and graphs. Temperature and ethephon concentrations are shown to have an effect on the fruit ripening of tomatoes. The 68° F and 59° F storage temperatures gave increases in

fruit ripening over the 55° F temperature for all treatments, as did a corresponding increases in ethephon concentrations.

Both the dip and spray methods of application were shown to be effective. The spray application of 1,000 ppm ethephon gave a somewhat faster ripening than the 1,000 ppm dip in the Pakmor variety (bar graph 3). The ripening response to ethephon and temperature was less than with the variety Pakmor. The variety Calmart was later maturing than Pakmor and it is believed that the Calmart variety was harvested at an earlier stage of maturity than was the Pakmor. This maturity factor has been observed in previous experiments.

Thus, it appears that commercial ripening and shipment of tomatoes could effectively be controlled by ethephon concentration and storage temperature. However, ethephon is not registered for post-harvest use on tomatoes, and is not recommended by the University of California at this time. Petitions have been approved by EPA for temporary residue tolerances and temporary shipping permits for using Ethrels as a pre-harvest treatment on an experimental basis to promote early and concentrated fruit maturity in tomatoes.

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