TABLE 1. EFFECT OF ETHEPHON ON THE INDICATED MATURITY OF BELL PEPPERS 22 DAYS AFTER TREATMENT (APPLICATION AT 10% MATURITY)

Treatment	% of Total Yield					
	Red	Red Breaker	Green Breaker	Mature Green	Undersize	Culls
Check	20.4	18.2	25.7	20.8	3.2	11.6
.75 lbs/A Ethephon	44.9	25.2	9.8	3.8	2.9	13.4
$LSD_{.05}$	4.4	3.4	4.4	4.3	N.S.	N.S.

EFFECT OF ETHEPHON ON BELL PEPPER FRUIT RIPENING

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Application of 0.75 lbs per acre ethephon to bell peppers (variety Keystone Resistant Giant) when 10% of the fruit were red or in the breaker stage resulted in highly significant increases in yield of red fruit at harvest 22 days after treatment. Ethephon treated plants produced almost twice as much red fruit as the untreated check. In a subsequent experiment, ethephon treatment at 40% field maturity resulted in no significant change from the untreated check. Results indicate fields should be treated early to obtain maximum ripening response. A concentrated fruit set with a majority of mature green fruit should give the best response. No detrimental effects on foliage or fruit quality were observed.

THE EFFECTS of ethephon on pepper ripening have been studied for several years in both greenhouse and field experiments. Earlier reports (see *California Agriculture* February 1970 and June 1974) have indicated that ethephon increases ripening of fruit depending on rate of application, concentration of fruit maturity, plant condition, and air temperatures during the fruit-ripening period. Significant difference in ripening was not obtained in all trials of a 1973 statewide testing program.

In 1974, a field trial was conducted in Stanislaus County to obtain further information on treatment-harvest interval, proper time of application, and effects on fruit quality.

Procedure

Two experiments were conducted, each consisting of two plots (check and 0.75 lbs per acre ethephon) with eight replications. In the first experiment plots were 60 feet long; the ethephon was applied when 10% of the fruit were in the red or red breaker stage (10% maturity). Maturity was determined by sampling 50 feet of row adjacent to the plots at the time of treatment. The material was applied with a backpack sprayer in 50 gallons of water per acre at 30 psi in a 20-inch band over the row. Treatments in the second experiment were delayed until 40% maturity. Checks were sprayed with water to eliminate bias. The treatments were paired and alternated from one row to the other, with an intervening buffer row to protect against drift. Ten feet of row from each plot was harvested at three-day intervals, commencing seven days after treatment and ending 22 days after treatment. The second experiment consisted of paired plots 10 feet long harvested 14 days after treatment.

All plots were hand-harvested. Fruit were picked, sorted into six categories, weighed and counted. The categories were red, red breakers (greater than 50% of the fruit area red), green breakers (less than 50% red), mature green, undersize (less than 2¼ inches in diameter), and culls. The great majority of the culls were due to sunburn spots.

Results

Analysis of variance for red fruit in the multiple harvest date test showed highly significant values for treatments and harvest dates. Similar results were obtained for the other fruit categories. Data from the final harvest date (22 days after treatment) are presented in table 1. Treatment with ethephon significantly increased the percentage of red and red breaker fruit while significantly reducing the percentage of green breaker and mature green fruit. There were no significant differences in the amount of culled or undersized fruit, substantiating visual observations that ethephon did not have any detrimental effects.

TABLE 2. YIELDS (TONS/ACRE) OF BELL PEPPER MULTIPLE HARVESTS (APPLICATION AT 10% MATURITY)

Harvest	Check	.75 lbs/A Ethephon
1	20.8	21.2
2	23.1	20.8
3	22.0	22.3
4	22.7	19.9
5	21.6	19.4
6	23.8	22.7
Mean ($LSD_{.05}$ = 1.19 T/A)	22.4	21.1

The total yields for each harvest date are given in table 2. The mean yield of the ethephon-treated material was lower than the mean of the check. Such a reduction in total yield is not unexpected because ethephon-treated fruit ripens faster than untreated fruit, reaching the red-ripe stage at a slightly smaller fruit size. However, as shown in table 3, on the basis of a once-over harvest, the pronounced shift from the mixed (breakers) and mature green categories to the red category more than offsets the overall yield reduction.

Results of the test in which ethephon was applied to a relatively mature field (40% maturity) are given in table 4. The ethephon treatment significantly reduced the percent of green fruit at harvest. There were no other differences due to ethephon treatment.

The results obtained from these trials indicate that fields should be treated early to obtain maximum ripening. Treatment at 10% maturity produced a significant increase in ripening. Treatment at 40% color was too late to obtain a useful increase in the rate of ripening. These results point out the need for more research to refine the treatment-harvest interval.

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TABLE 3. COMPARISON OF YIELDS OF ETHEPHON TREATED AND UNTREATED BELL PEPPERS 22 DAYS AFTER TREATMENT (APPLICATION AT 10% MATURITY)

Treatment	Yield (Tons/Acre)					
	Red	Red Breaker	Green Breaker	Mature Green	Undersize	Culls
Check	4.94	4.27	6.24	4.91	.72	2.72
.75 lbs/A Ethephon	10.31	5.64	2.31	0.89	.66	2.92
$LSD_{.05}$	2.56	N.S.	2.65	2.67	N.S.	N.S.

TABLE 4. YIELDS OF ETHEPHON-TREATED AND UNTREATED BELL PEPPERS 14 DAYS AFTER TREATMENT (APPLICATION AT 40% MATURITY)

Treatment	Total Yield Tons /A	% of Total Yield					
		Red	Red Breaker	Green Breaker	Mature Green	Undersize	Culls
Check	26.4	55.6	17.9	10.6	10.5	3.1	2.3
.75 lbs/A Ethephon	23.0	60.6	18.2	10.6	3.7	3.6	3.3
$LSD_{.05}$	N.S.	N.S.	N.S.	N.S.	3.6	N.S.	N.S.