California Avocado Society 1963 Yearbook 47: 81-85

EFFECTS OF LOCALIZED MALEIC HYDRAZIDE SPRAYS ON BACON AND ZUTANO AVOCADO TREES

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The authors wish to express appreciation to Dr. T. M. Little, Extension Vegetable Crops Specialist, Agricultural Extension Service, University of California, Riverside for statistical assistance; also William C. Kemper and Richard H. Burnett, Technicians in the Department of Horticulture, Citrus Research Center, Riverside for the oil content analysis; Mr. Theodore J. Todd of Corona, manager and co-owner of grove where plot was located; and also Mr. Jack P. Corking, Area Supervisor, Research and Development Department, Naugatuck Chemical Division, Porterville for materials and advice.

[1] *Furnished by Naugatuck Chemical Company*—(MH-30 *is trade name*)

Maleic hydrazide (MH) sprays on regrowth of mechanically topped Bacon and Zutano variety avocado trees resulted in no significant inhibition of growth or change in fruit shape or quality.

Avocado varieties such as the Bacon and Zutano have an upright growth habit. To facilitate picking the fruit some growers limit tree height by mechanical pruning. The expense of cutting, together with hauling away the brush or brush shredding and spreading, suggests a possible economic advantage by using growth inhibitors. Maleic hydrazide is a chemical growth inhibitor that has been found to reduce or inhibit growth on a number of plants. For a number of years, mechanically cutting the tops of lemon trees has been a commercial practice in California (1). In 1959 the Ventura Coastal Lemon Company conducted promising spray trials on recently topped lemon trees (2). Further measurements on the growth inhibition and effects of MH on yield and quality of lemons were studied by Hield, et al, in 1960 (3).

With this background it was decided to see if similar results could be obtained on avocados.

The experimental grove used is part of a large avocado planting in the Temescal Canyon east of Corona in Riverside County. The trees are eight-year-old Bacon and Zutano variety avocados that are in adjoining blocks. The trees were mechanically top

pruned to a height of approximately 14.5 feet on January 23, 1962. The trees were sprayed May 29, 1962 when top regrowth was approximately six inches in length. MH sprays of 125, 250, 500 and 1,000 ppm active ingredient were applied for comparison with unsprayed controls. The 30 per cent diethanolamine salt of MH' was used with 50 ml of X-77 wetting agent per 100 gallons of spray mixture. A mist spray application was made from one side of the tree, approximately level with the tree top (Fig. 1). A randomized block experimental design was used with five tree blocks and six replications in each of the Bacon and Zutano blocks.

Figure 1. Shows method of spraying and measuring topped avocado trees.

TOP GROWTH

Individual tree height was measured three times (Fig. 1). The first time was May 29, 1962—spray date. The average tree height was then 15 feet. The second time was July 11, 1962, approximately six weeks after spraying.

Table 1 shows that the average increase in tree height at this time was 1.3 for the Bacons and 1.4 feet for the Zutanos. From the data there seems to be a slight increase in height due to treatment in the Bacons and slight decrease or inhibition for the Zutanos. Actually there was no significant difference between treatments.

Seven months after spraying—December 11, 1962—the trees were again measured. Table 2 shows that again there appeared to be an increase in height of the Bacons and a decrease of the Zutanos due to MH sprays. An analysis of the data showed no real

differences. It is interesting that approximately seven months after spraying the average growth increase of the two varieties is so similar—5.1 feet for the Bacons and 5.3 feet for the Zutanos.

The reason for this lack of response by the avocado to MH is unknown. It can be speculated that the waxy avocado leaf greatly reduces the entry of the MH—at least the water soluble amine form used.

No abnormal treatment effects on growth were observed.

Table 1 Effect of MH Sprays on Avocados Approximately Six Weeks After Spraying [1]

		Control	Treatments			
Variety	Rep	0	125	250	500	100 ppm
Bacon	1	1.0	.5	2.0	.5	1.0
	2	.5	1.0	1.5	1.5	1.0
	3	1.5	1.5	1.0	2.5	.5
	4	1.5	1.5	1.5	2.5	1.5
	5	1.0	1.0	1.5	1.0	1.5
	6	1.0	1.5	2.0	1.5	1.5
	Average	1.1	1.2	1.6	1.6	1.2
	Average growth increase for all Bacons — 1.3 feet					
Zutano	1	1.0	1.0	2.0	.5	1.5
	2	1.5	1.5	1.0	.5	1.0
	3	1.5	1.0	1.0	2.0	1.0
	4	1.5	2.5	.5	1.5	1.5
	5	2.0	1.5	1.5	1.5	1.0
	6	2.5	2.0	2.0	1.0	1.5
	Average	1.7	1.6	1.3	1.2	1.3
	Average growth increase for all Zutanos—1.4 feet (No significant differences due to treatment)					

[1] Sprayed May 29, 1962. Regrowth to July 11, 1962—above 14.5 foot cut. Trees topped January 23, 1962.

Table 2 Effect of MH Sprays on Avocados—Approximately Seven Months After Spraying [1]

Variety	Rep	Control 0	Treatments 125	250	500	100 ppm
Bacon	1	4.5	5.0	5.5	4.0	5.5
	2	4.0	4.5	5.5	5.0	4.5
	3	6.0	5.0	3.5	6.0	4.5
	4	5.5	4.0	5.5	6.5	5.5
	5	5.5	5.0	6.5	4.5	6.0
	6	4.0	5.5	5.5	6.0	5.5
	Average	4.9	4.8	5.3	5.3	5.3
Average growth increase for all Bacons — 5.1 feet						
Zutano	1	5.5	5.0	6.0	4.5	5.0
	2	5.0	5.5	5.5	3.0	6.0
	3	5.5	6.0	5.0	6.5	4.0
	4	5.0	5.5	4.5	5.0	5.5
	5	6.0	5.0	5.0	6.0	5.0
	6	6.5	6.0	5.5	4.5	6.0
	Average	5.6	5.5	5.3	4.9	5.3
Average growth increase for all Zutanos—5.3 feet (No significant differences due to treatment)						

[1] Sprayed May 29, 1962. Regrowth to December 11, 1962—above 14.5 foot cut. Trees topped January 23, 1962.

FRUIT QUALITY

On December 11, 1962, approximately seven months after spraying, fruit samples were obtained for quality tests.

To see if there were any differences due to proximity of spray treatment and location of fruit on the tree, fruit samples were picked at two heights —approximately five feet from the ground and also in the tops (12'-14'), as close to sprayed area as possible.

Lemons from the tops of trees sprayed with MH have shown some increase in rind thickness (3)—this did not prove to be the case with avocados. Table 3 shows fruit measurements in centimeters—from controls and highest MH concentration (1,000 ppm) sprayed trees—four fruit per tree, six replicates of both varieties. Here again there were no significant differences. Fruit picked higher in the tree had a somewhat larger seed and total fruit diameter than those picked at shoulder height—both controls and high MH sprays. The difference in diameter appears greater on the Bacon fruit than the Zutano.

Table 3 Avocado Fruit Measurements—Approximately Seven Months After MH Sprays [1]

Variety	Position [2]	Treatment ppm	Dia. Seed	Dia. Fruit	Length Fruit [3]
Bacon	High	0	4.3 cm	6.9 cm	10.3 cm
"	"	1000	4.6	7.2	10.4
"	Low	0	3.5	6.4	10.7
"	"	1000	3.9	6.3	10.1
Zutano	High	0	4.5	7.0	11.1
"	"	1000	4.1	6.8	11.1
"	Low	0	4.2	6.5	11.2
"	"	1000	4.2	6.7	11.0

[1] Sprayed May 29, 1962—fruit picked December 11, 1962.

[2] Position of fruit on tree; High=12'—14' and Low =5'±above ground.

[3] Average of 12 fruit—two from each of six trees.

The average length of the Zutano fruit (11.1 cm) was one centimeter longer than the Bacons (10.1cm). This would be expected since the Zutano is described as pyriform and the Bacon as ovoid.

There were no real differences in oil content between the control and highest MH spray—more variation between samples than between treatments or varieties. The Bacon fruit varied from 6.9 per cent to 14.1 per cent oil and the Zutanos from 7.8 per cent to 13.5 per cent. The average oil content for both varieties was similar—10.7 per cent for all the Bacon fruit tested and 10.3 per cent for the Zutanos. Fruit of both varieties, picked higher in the tree were somewhat higher in oil content than those at shoulder height. Hatton, et al (4) in Florida found that Lula fruit from the top halves of the trees were higher in percentage of oil than were those from the bottom halves.

SUMMARY

Young regrowth shoots of mechanically top-pruned Bacon and Zutano variety avocado trees were sprayed with 125, 250, 500 and 1,000 ppm MH in the spring of 1962. There was no inhibition of this regrowth. There were also no significant changes in fruit quality. It should be emphasized that the University of California does not recommend the use of meleic hydrazide on lemons or avocados. Future trials with different formulations of MH and other growth inhibitors are planned since harvesting problems with these two avocado varieties are expected to increase.

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