

CHEMICAL INHIBITION OF AVOCADO TOP REGROWTH

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Two new growth-retardants sprayed on regrowth of topped Bacon avocado trees in Ventura County resulted in significant growth inhibition.

Avocado varieties such as Bacon and Zutano have an upright growth habit. To facilitate harvesting and reduce picking cost some growers limit tree height by mechanical top-pruning. The high cost of topping and hauling away or shredding the brush, suggests a possible economic advantage by using growth inhibitors.

Maleic hydrazide (MH) is a chemical growth inhibitor that has been found to reduce or inhibit growth on a number of plants (6) including lemons (5). However, MH in earlier trials (4) on Bacon and Zutano avocado trees did not inhibit regrowth. Growth inhibitors such as Succinic acid, 2,2-Dimethylhydrazide (Alar) and a new formulation of Maleic hydrazide, potassium salt of 6-hydroxy-3-(2H)-Pyridacinone (KMH), have been tested as growth inhibitors for lemon top regrowth (3). Eight months after application, KMH sprayed lemons showed a significant reduction in top growth and shoot length. Growth was reduced with Alar sprays but not significantly. Height measurements taken one year after spraying showed no significant inhibition of top regrowth with either KMH or Alar.

Recently, a new experimental plant growth-retardant, ethyl hydrogen 1-propylphosphonate (NIA-10637), successfully inhibited lemon top regrowth (3). This same formulation has been shown to retard shoot growth of wild cherry, ash, beech and poplar trees (1) and also eucalyptus seedlings (2).

In the trial to be reported, NI A-10637 and 1-propylphosphonic acid (NIA-10656) were sprayed on top regrowth of Bacon avocado trees.

Materials and Methods

The avocado trees were topped in April of 1970 and sprays were applied June 26, 1970, when regrowth was from 4-8" long. Top growth was sprayed with a mist to minimize runoff, using 1250 and 2500 parts per million (ppm) of two chemical formulations — NIA-10637 and NIA-10656 in water with 0.02% X-77 as the wetting agent. The growth-retardants were sprayed with a 3 gallon sprayer, using a self-propelled man positioner to reach the top of the trees. A randomized block, experimental design was used with five single tree replications. Prior to spraying, the base of new growth was marked with yellow surveyor's flagging tape as a reference point for subsequent growth measurements. Growth measurements were taken on August 4, 1970; six weeks after spraying; March 1, 1971, eight months after treatment; and on June 29, 1971, twelve months after treatment (figure 1). Treatment effectiveness was evaluated by the amount of inhibition of top growth in comparison with the control trees.



1. Measurement of top regrowth on Bacon avocado trees after spraying with growth retardants.

Results

Two weeks after application both concentrations of each chemical showed some degree of leaf distortion in the area of new growth (figure 2). Six weeks after treatment, growth differences were even more noticeable and a greater percent of the larger leaves of 4-8" new growth that had been treated, shriveled and stopped growing. Unsprayed control

trees had normal regrowth (figure 3).

Growth measurements are shown in Table I. Growth reduction, in comparison to the check, was significant for 1250 and 2500 ppm with both chemicals. NIA-10656 at a concentration of 2500 ppm produced the most inhibition, or the least amount of new growth—5.00 inches. The greatest growth was produced on the non-treated trees which was 28.60 inches in twelve months.



2. Characteristic growth deformity accompanying the inhibition in regrowth on avocado trees, using NIA-10656 at 2500 ppm.



3. Normal regrowth from non-treated avocado tree.

TABLE 1. EFFECT OF GROWTH-RETARDANTS NIA-10637 AND NIA-10656 ON REGROWTH OF SHOOTS ON TOP-PRUNED AVOCADO TREES.

<i>Treatments</i> <i>PPM</i>	<i>Mean Regrowth in Inches</i>			
	6/26/70	8/4/70	3/1/71	6/29/71
0 Control	0.0	9.20	16.20Z ¹	28.60Z ¹
1250 NIA-10637	0.0	2.62	4.36Y	7.00Y
1250 NIA-10656	0.0	2.20	4.50Y	7.00Y
2500 NIA-10637	0.0	2.30	3.90Y	6.40Y
2500 NIA-10656	0.0	1.74	2.86Y	5.00Y

¹ All ranking is at the 1% level; means are significantly different if they do not have subscript letters in common. Duncan's Multiple range test was used for determining the significance of difference of the treatment means.

Trees topped April 1970 and sprayed June 26, 1970.

Summary

Regrowth top shoots of top-pruned Bacon avocado trees were sprayed with 1250 and 2500 ppm of both NIA-10637 and NIA-10656 in the spring of 1970. Both these new growth retardants at both concentrations gave significant growth inhibition eight and twelve months after treatment. However, twelve months after application of both growth retardants a new growth flush had sprouted on all sprayed treatments.

However, until these chemicals are registered they should not be used.

LITERATURE

1. Anonymous. 1971. Niagara Chemical Division, FMC Corporation. Technical Report: NIA 10637 Plant Growth Regulator. January 29. P. O. Box 1589, Richmond, California.
2. Boswell, S. B. and H. Z. Hield. 1970. Growth inhibitor experiment. *Agri-Chem. West* 12(3): 14.
3. Burns, R. M., S. B. Boswell and H. Z. Hield. 1970. Chemical inhibition of lemon top regrowth. *Citrograph* 55(7): 251, 252.
4. Burns, R. M., C. D. McCarty, M. P. Miller and H. Z. Hield. 1963. Effects of localized maleic hydrazide sprays on Bacon and Zutano avocado trees. *Calif. Avocado Society Yearbook* 47: 81-84.
5. Hield, H. Z. R. M. Burns, C. W. Coggins, Jr., B. W. Lee, and S.B. Boswell. 1964. Maleic hydrazide retards topping regrowth in lemon test. *Calif. Citrograph* 49(9): 356-359.
6. Sachs, R. M. W. P. Hackett, R. G. Maire, T. M. Kretchum, and J. deBie. 1970. Chemical control of plant growth in landscapes. *California Agricultural Experiment Station Bulletin* 8444.