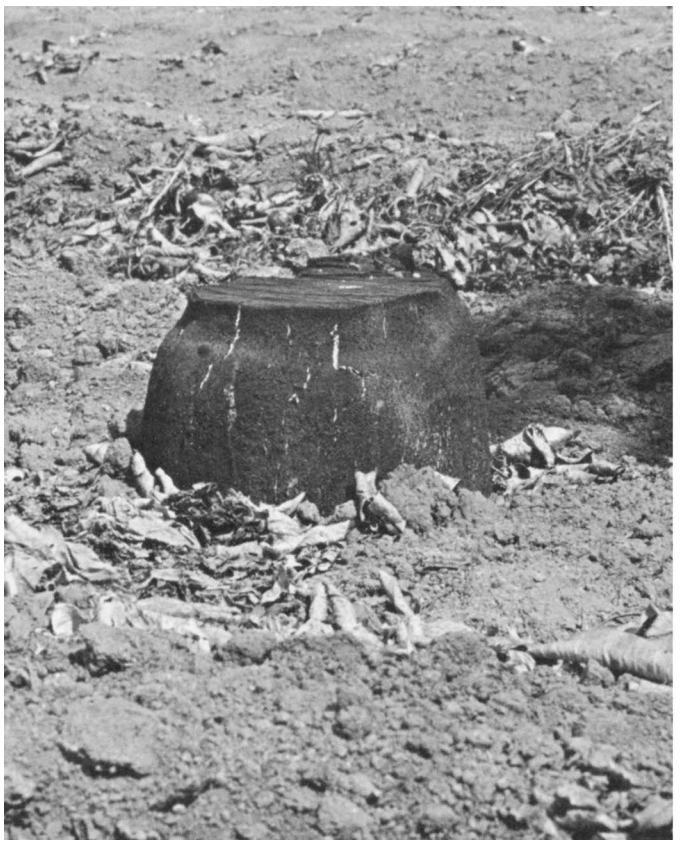

Citrus stump (left photo) treated with 10% 1-propylphosphonic acid on March 16, 1971—photo taken 15 months after first treatment. Right photo, untreated stump five months after cutting shows growth of sprouts.

Chemical control of citrus stump sprouts

S. B. BOSWELL · C. D. MC CARTY, · M. P. MILLER

MANY CLOSE-PLANTED citrus groves have reached the stage where crowding has made it necessary to remove alternate trees. In some cases, the orchards are thinned by bulldozing trees to be removed. In other cases, they are thinned by cutting off the trunks of the trees a few inches above ground level. Sprouts from these cut stumps soon become a nuisance, and if left uncontrolled will produce considerable regrowth. Pruning stump sprouts is costly and results in the forcing of more buds so that the pruning soon has to be repeated.

The use of herbicides to treat cut stumps may result in injury to adjacent trees. Also, rulings from the Environmental Protection Agency have curtailed the application of herbicidal chemicals which would normally be used.

A material that would inhibit sprouting of buds from the cut stumps with no damage to the environment, or phytotoxic danger to adjacent plants, would be of value to the citrus industry. Experimental materials now available show promise for control of stump sprouts and meet the above criteria.

Growth regulators tested

Tests were initiated to evaluate ethyl hydrogen 1-propylphosphonate (NIA-10637) and 1-propylphosphonic acid (NIA-10656), each as a 10% tree paint aerosol spray in an asphaltic base. NIA-10637 was also used as a 5% spray plus 1% naphthalene acetic acid, ethyl ester tree paint (aerosol spray) in an asphaltic base.

Alternate trees were removed from a close-spaced citrus orchard which had

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William W. Paul ..... *Manager*
Agricultural Publications
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TABLE 1. CITRUS STUMP SPROUT INHIBITION, AFTER TREATMENT WITH EXPERIMENTAL GROWTH RETARDANTS

Material	Date treated	Average number of sprouts per stump 6/16/71	9/16/71	12/16/71	3/16/72	6/16/72
NIA 10637 10%	3/16/71	0	0	3	3	3
NIA 10637 10%	3/16/71, 6/16/71	0	0	0	0	0
NIA 10656 10%	3/16/71	0	0	2	2	2
NIA 10656 10%	3/16/71, 6/16/71	0	0	0	0	0
NIA 10637 5%, NAAEE 1%	6/16/71	0	0	0	0	1
NIA 10637 5%, NAAEE 1%	6/16/71, 9/16/71	..	0	0	0	0
Check	.....	5	7	9	9	9

been planted at Riverside in June, 1963. Trees were Frost nucellar navel on Kryder trifoliate rootstock spaced 12 by 22 ft. After thinning, the remaining trees were 24 by 22 ft. The trees were cut off with a chain saw as close to the ground as practical, usually 5 to 6 inches.

Soil was removed to a depth of approximately 4 inches around each stump to expose the base of the roots for spraying. The entire stump and exposed root base were thoroughly covered with spray.

Test plot

The experiment was set up as a randomized block of four replications with two stumps to a replication. One stump of each pair received a second spray three months after the first treatment. The 10% solutions were available in aerosol sprays, and treatments started on March 16, 1971. The 5% plus 1% naphthalene acetic acid, ethyl ester solution, was not applied until three months later, when it became available as an aerosol spray—to coincide with the 10% solution treatments.

Counts on regrowth were made three, six, nine, 12, and 15 months after spraying for the 10% solution, and at three-month intervals for a period of 12 months where the 5% plus 1% naphthalene acetic acid ethyl ester was used.

Two treatments with a 10% solution of either ethyl hydrogen 1-propylphosphonate or 1-propylphosphonic acid inhibited all sprout growth for 15 months. Single applications greatly reduced regrowth over the untreated checks (see table).

Ethyl hydrogen 1-propylphosphonate, used at a 5% concentration, plus 1% naphthalene acetic acid was more effective than the 10% concentration of the chemical alone, when applied as one treatment.

No adverse effects were noted on any of the nearby trees remaining in the orchard. Recommendations for the use of ethyl hydrogen 1-propylphosphonate or 1-propylphosphonic acid cannot be made for agricultural use until approval has been granted by appropriate governmental agencies.

S. B. Boswell is Specialist, Department of Plant Sciences; C. D. McCarty is Horticulture Technologist, Agricultural Extension Service, University of California, Riverside. M. P. Miller, is Farm Advisor, Emeritus, Riverside County. Dr. I. A. Rammer of FMC Corporation, Niagara Chemical Division supplied the chemicals.

"SURVIVAL POWER"

key to successful carrot stands

BURTON J. HOYLE

Obtaining good commercial carrot stands in the San Joaquin Valley has often proven to be unpredictable and sometimes difficult. Carrots are becoming a major crop in this area and growers are using many mulching, irrigation and planting techniques in an effort to improve stands. During the last three years an increasing number of growers have used only large-sized seed in an attempt to guarantee stands. These studies at the U.C. West Side Field Station, Five Points, indicate that under most conditions small seed may be as good or better than large seed.

CARROT SEED SIZE was evaluated as a factor in obtaining good commercial stands using three planting densities for five varieties, at three planting periods (table 1). The tests were conducted at the West Side Field Station and included: Test 1, cool season, planted March 16 and harvested five times in June and July (NK Imp. 58 seed only); Test 2, hot season, planted June 17 and harvested three times in September (NK Imp. 58 seed only); and Test 3, six varieties planted April 15 and harvested five times in July.

TABLE 1. ESTIMATED NUMBER OF CARROT SEED PLANTED PER FOOT OF ROW*

Seed size	Approximate number of seed per lb	Approximate seeds planted per foot from seed plate hole number: 5	7	9
Large	231,595	8–12	18–22	28–32
Medium	295,750	12–16	26–30	40–46
Small	329,000	15–19	32–36	55–60
Very Small	462,626	28–32	40–46	65–75

* Ave. values from static tests with a Planet Jr. planter. Variety, NK imperator 58, especially sized by the plant.

All samples were graded into: total roots, Cello grade, and Jumbo grade (for number and weight). Cello grade consisted of roots 7 to 9 inches long and 3/4 to 1 1/4 inches in diameter. Jumbo grade consisted of roots 7 to 9 inches long and 1 3/8 to 1 3/4 inches in diameter.

Survival power

The ability of a seed to produce a surviving plant of any quality, when disease is not a factor, has been termed "survival power" in these tests. In tests 1 and 2 the surviving plants ranged from near 100% down to 30% of the seed planted, depending on density of planting.

The survival power for each seed size and planting density is shown in table 2 as a per cent of seed planted. Nearly 100% of the large seed survived when planted at 10 to 15 per foot, 50% at 20 seeds per foot and 40% at 30 seeds per foot. For each of the four seed sizes, the highest survival rate was at the lowest planting rate. Actual percentages of sur-