

# Growth Regulators on Apricots

tests with several regulators indicate 2,4,5-T is best for increasing size, hastening maturity, controlling fruit drop

Julian C. Crane

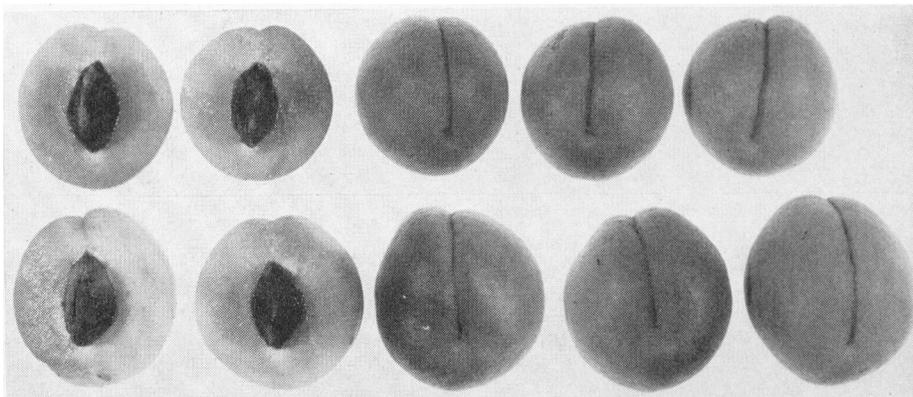
A single spray of 2,4,5-T—2,4,5-trichlorophenoxyacetic acid—applied to apricot trees at the beginning of pit hardening increased fruit size as much as 47%, hastened maturity, practically eliminated preharvest fruit drop, and, under certain conditions, gave a red blush to the fruit.

In 1955—after four years of experimentation with 2,4,5-T—several other growth regulators were tested to determine their effectiveness in comparison with those of 2,4,5-T.

The Stewart variety of apricot characteristically drops from 10% to 30% of its fruits between the time of thinning—usually at the beginning of pit hardening—and the time of harvest, so that was the variety chosen for the tests. Premature fruit drop in the Stewart is associated with seed abortion. Fruit dropping in other apricot varieties—for example, the Tilton—is apparently due to certain environmental conditions because seed development is generally normal.

Commercial proprietary amine salt formulations of 2,4,5-T, 2,4,5-TP—2,4,5-trichlorophenoxypropionic acid—2,4-D—2,4-dichlorophenoxyacetic acid—and NAA—naphthaleneacetic acid—were tested. Aqueous sprays at concentrations equivalent to 100 ppm—parts per million—of the acid were applied to a commercial orchard on April 12, when hardening of the pits had just begun.

The rates of fruit drop from the trees sprayed with 2,4,5-T, 2,4,5-TP and 2,4-D were at relatively constant low levels throughout the experimental period while drop from the unsprayed trees and—with few exceptions—those sprayed with NAA occurred at progressively increasing rates. By June 12, when commercial harvesting was completed, the



Mature Royal apricots that had been sprayed at the beginning of pit hardening with 100 ppm of 2,4,5-T—bottom row, as compared to unsprayed fruits—top row. Increase in flesh thickness accounts for the larger fruit size.

unsprayed trees had dropped 24% of their fruits. Trees sprayed with 2,4,5-T, 2,4,5-TP or 2,4-D had dropped only 3% to 4% of their fruits by June 12. Although NAA significantly reduced fruit drop, it was from three to four times less effective than the other materials.

The percentages of the crops harvested from the variously treated trees on a particular date are given in the table. The earliest fruit maturity was obtained as a result of NAA application, followed in order by 2,4,5-TP, 2,4,5-T and 2,4-D. Approximately one-half of the crop from all of the sprayed trees was harvested five days before harvesting of the unsprayed trees was begun. On June 9, harvesting of the sprayed trees was completed, whereas only 36% of the unsprayed trees was harvested on that date.

Weather conditions were conducive to fruit cracking during the period of fruit maturation. Cracking occurred in varying degrees on all trees.

In the control fruits, the predominant type of crack was 5 mm—millimeters—to 10 mm long and developed in the suture at the blossom end of the fruit. In the sprayed fruits, however, much larger and deeper cracks in the cheek areas occurred with or separately from the blossom-end cracks. The only regulator that significantly increased the percentage of cracking over that of the control was 2,4,5-TP. Fruits that had been sprayed with NAA, on the other hand, cracked much less than control fruits.

Fruits from all of the spray treatments were materially larger—11% to 14%—in diameter when harvested than were the unsprayed fruits. There were no significant differences in the diameter of the fruits from the different spray treatments. Increases in average fresh weight per fruit ranged from a minimum of 12% for fruits sprayed with NAA to 35% for fruits sprayed with 2,4,5-T.

The only compound that brought about lasting deleterious effects on the vegetative growth of the trees was 2,4-D. This regulator killed 4" to 6" of the terminal portions of the shoots. However, lateral buds immediately below the injured portions produced shoots so that trees sprayed with 2,4-D did not appear greatly different from the unsprayed trees by the end of the summer.

The foliage on trees sprayed with NAA was severely flagged the day after the spray was applied. The trees appeared as if they were suffering from an

Effect of Growth Regulators Applied April 12 at 100 ppm Concentrations on Date of Harvest, Cracking, Diameter and Fresh Weight of the Stewart Apricot

Treatment	Per cent of crop harvested			Per cent of fruits cracked				Fruit diam. mm	Fresh wt. per fruit gms
	June 4	June 9	June 13	June 4	June 9	June 13	Total		
Control	..	36.0	64.0	..	0.0	3.0	3.0	38.8	35.4
2,4,5-T	43.2	56.8	..	0.2	1.1	..	1.3	44.4	47.9
2,4,5-TP	53.4	46.6	..	2.2	3.7	..	5.9	44.3	46.9
2,4-D	41.6	58.4	..	0.7	2.6	..	3.3	43.1	45.2
NAA	64.3	35.7	..	0.0	0.1	..	0.1	43.1	37.6
L.S.D.* at 5% point							1.8	3.0	1.3
L.S.D. at 1% point							2.7	4.4	1.9

\* L.S.D.—Least significant difference.

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When used during November through February, the amount of 25% wettable powder should be increased to five pounds per acre and applied in dry weather. It is difficult to immediately determine whether or not the scales have been killed by the winter treatment until 10 days to two weeks later.

Excellent control of the scale is possible with a 3% dormant oil emulsion applied as a thorough coverage spray. To avoid injury to trees this treatment can be used only in the full dormant season, from December 20 to February 15.

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## BLACKBERRY

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There was no evidence—throughout the season—of plant injury following spraying even on those plants that received four applications at 10-day intervals.

Further experimentation must be conducted before the best timing, the number of applications needed and the most effective concentration for large-scale applications can be determined.

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## PRUNES

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two to four weeks before the beginning of pit hardening. One orchard in San Benito County was sprayed with 25 ppm 2,4,5-T on May 3, about a month before the pits began to harden. About 30% of the fruit dropped before they were mature. Of the fruit that remained on the tree until mature 75% were cracked.

In a Sonoma County orchard 51 trees were sprayed with 40 ppm on May 5, about two weeks before the beginning of pit hardening. Approximately half of the sprayed prunes dropped to the ground before they were mature. This fruit and that under the check trees were disked under before harvest. The fruit from the sprayed and unsprayed trees was kept separate through harvesting, dehydrating, and grading. Of the sprayed prunes harvested 30% were off-grade compared to 10% of the unsprayed fruit. Even with the severe pre-harvest loss and the offgrade fruit, the

increased size of fruit—62 prunes per pound compared to 98—made up for this loss. Deducting the cost of hand sorting and 2,4,5-T treatment, the return per tree after the second payment was the same for the sprayed as the unsprayed. No doubt many sprayed fruits which appeared normal may have shown some internal injury. The effect such an early application will have on the next year's crop of flower buds is not known.

Growers who may find it profitable to apply 2,4,5-T to apricots are cautioned to go easy on any trials with prunes. More work is needed to determine if a safe, effective time and concentration can be found for the French prune.

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*Farm Advisors Edward Bowles, Santa Clara; Jack Foott, Tulare; Roy McCallum, San Benito; Fred Petersen, Sutter; Wallace Schreuder, Tehama; Enoch Torpen, Sonoma, cooperated with growers in their counties in testing 2,4,5-T.*

## SEED TREATMENT

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be more severe, but tend to be more uniform with most eggs hatching at about the same time.

Area differences with fungicides seem to occur. Captan in some trials was more effective in areas where cool conditions and early plantings occurred. Chloranil showed up to good advantage in certain parts of southern California. The reasons for the differences are not readily apparent.

Insecticides should always be used with adequate fungicides because insecticides used alone on seeds may increase the incidence of seed decay from *Pythium ultimum*.

The full effects of the storage of seeds treated with the several chemicals have not been determined, and for this reason only seed of high germination should be treated and then, as close as possible to date of planting. Storage of seed for periods up to three months—under conditions not adverse to viability—is considered safe.

Tests have indicated some varietal susceptibility—of different kinds of lima beans—to damage from seed treatments. Concentrated Fordhooks seem to be the most sensitive to chemical injury, Venturas more tolerant, and baby limas the least sensitive to treatments.

Seed treated with these chemicals should not be used for food for either human beings or for domestic animals.

Some of these chemicals are quite toxic to warm-blooded animals and operators handling the chemicals should fol-

low the necessary safety precautions suggested by the manufacturers.

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*The above progress report is based upon research Project No. 1275.*

## APRICOTS

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acute moisture deficiency, but six days later the foliage had completely recovered and the trees appeared normal.

Of the four growth regulators used in these tests, 2,4,5-T is superior to the others. Although 2,4,5-TP and 2,4-D brought about increases in fruit size, hastening of maturity and control of pre-harvest fruit drop, 2,4,5-TP significantly increased fruit cracking and 2,4-D killed the terminal portions of the shoots. NAA neither controlled fruit drop nor increased fruit weight to the extent obtained with 2,4,5-T.

The responses of the Stewart variety to 2,4,5-T are typical of those obtained with other commercial varieties produced in California. Although preharvest fruit drop of the apricot is a problem only with specific varieties or under certain environmental conditions, 2,4,5-T has proven to be an effective agent for its control. Whether or not the problem of preharvest fruit drop exists, the application of 2,4,5-T at the critical time brings about increase in fruit size and hastening of maturity.

Five years of experimentation with 2,4,5-T on the apricot has led to rather definite conclusions regarding the optimum time of application and the concentrations to use. To obtain maximum benefits from 2,4,5-T it should be applied at the beginning of pit hardening. The effectiveness of a particular concentration progressively decreases with successively later applications.

Hardening of the pits begins at the blossom end of the fruit and can be determined by cutting through the fruit from the blossom end toward the stem end. When the knife blade meets some resistance at the tip of the pit, it is time to apply the spray, generally 30 to 40 days after full bloom. The foliage should be sprayed to the point of slight drip as thorough coverage is important.

The proper concentration of 2,4,5-T to apply depends upon several factors, the primary one being the general area in which the orchard is located. In coastal valleys—where the period from pit hardening to maturity is relatively long—concentrations above 25 ppm

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## APRICOTS

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have generally stimulated fruit growth to a point where considerable cracking occurred and shoot growth was severely inhibited. In the Sacramento and San Joaquin valleys—where the period from pit hardening to maturity is somewhat shorter than in the coastal valleys—concentrations up to but not over 50 ppm may be used. In the Winters district—where the earliest maturing apricots are produced—a concentration of 100 ppm has consistently brought about considerable increase in fruit size and early maturity with little or no adverse effects on fruit or foliage. Temporary flagging of the foliage following application at a concentration of 100 ppm has occurred during some years and slight inhibition of shoot growth has been noted. A concentration of 75 ppm would seem to be about optimum for this district.

The size of the crop, vigor of the trees and the specific purpose for which the spray is applied must be considered in determining the concentration to use within each general locality. The lighter the crop and the more vigorous the growth, the lower the concentration of 2,4,5-T to be used. If controlling pre-harvest fruit drop is the only purpose, a 25 ppm concentration is about as effective as a higher one, providing it is applied at the beginning of pit hardening. However, because there is a positive relationship of ultimate fruit size and time of maturity to concentration of 2,4,5-T, concentrations higher than 25 ppm would seem to be advantageous, except in the coastal valleys.

There are so many factors that govern the response of the apricot to a particular concentration of 2,4,5-T that experience with this material—under a particular set of conditions—would seem to be the best guide for determining the proper concentration for the maximum benefits.

Only the amine formulations of 2,4,5-T should be used because ester formulations have proven to be very toxic to the apricot. Even the amine formulations should not be applied to trees younger than five to six years.

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