

Growth Regulators on Apricot

seeds from apricot trees treated with growth regulators are inhibited in germination and any seedling growth is abnormal

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Stratified Tilton apricot seeds, from trees sprayed in the spring of 1954 with 2,4,5-T — 2,4,5-trichlorophenoxyacetic acid—to increase fruit size and reduce preharvest drop, germinated very poorly after being planted in the nursery row in March, 1955. The few seedlings that did grow from these seeds were very abnormal when compared to seedlings from parent trees of the same variety that had not been sprayed with 2,4,5-T.

In 1955, seeds from trees of several apricot varieties growing in different localities of the state and sprayed with different growth regulators or concentrations were stratified in moist sand at 32° F for 3½ months. All growth regulator applications had been made at the beginning of pit hardening, the optimum time to apply the spray to increase fruit size, hasten maturity and reduce preharvest fruit drop. Seeds of each treatment were planted in sterilized sand in the greenhouse on November 22.

The effects of the various regulators on seed germination and the production of viable plants are shown in the larger table in column 2 on page 14. Viable plants are those with sufficient shoot and root growth that they probably would have survived, even though their growth was slower than normal. It is difficult to compare the effects of specific concentrations of a particular regulator in dif-

ferent geographical locations because environmental conditions markedly affect the response of the trees and fruits to the material and determine in large part the concentration for practical usage. In addition there may be varietal difference in response.

In only one case, and that was at San Jose where 15 ppm—parts per million—of 2,4,5-T were applied, were the percentages of germination and viable plants from seeds of sprayed trees equal to those of seeds from unsprayed ones. The higher concentrations of the series, 25 ppm and 50 ppm, caused progressive decreases in percentages of germination and viable plants. The data show that 2,4,5-TP—2,4,5-trichlorophenoxypropionic acid—was more inhibiting to apricot seedling growth than was 2,4,5-T. Even more striking was the total inhibition of germination in all three seed lots from trees sprayed with 2,4-D—2,4-dichlorophenoxyacetic acid.

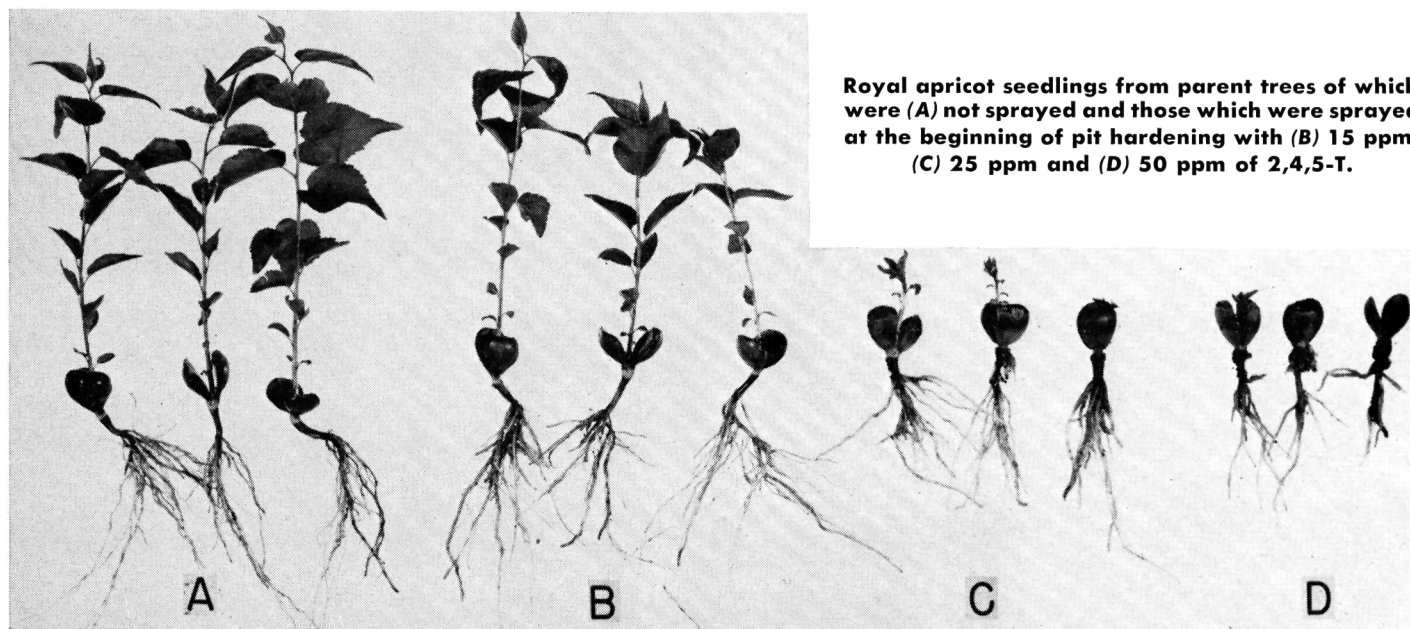
Treatment of trees with NAA—naphthaleneacetic acid—reduced subsequent seed germination and seedling growth to degrees roughly comparable to those of 2,4,5-T at the same concentrations.

Some abnormal development was found in all seedling lots from trees sprayed with 2,4,5-T or 2,4,5-TP. No qualitative differences in the effects of these materials appeared, but when ap-

plied at the same concentration and under the same growing conditions, 2,4,5-TP caused more extreme abnormality than did 2,4,5-T.

Among seedlings of any given treatment the degrees of abnormality varied, probably due, at least partially, to differences in amounts of regulators translocated to the individual seeds. When a series of concentrations was applied to parent trees in the same orchard, the average extent of seedling abnormality increased with increasing concentration. For example, seedlings from trees sprayed with 15 ppm of 2,4,5-T were only slightly atypical, the chief effect of the regulator appearing as somewhat retarded growth of the shoot and primary root and in more tendency toward leaf epinasty. The accompanying illustration shows representative seedlings from this as well as the 25 ppm and 50 ppm treatments in the same orchard at San Jose; at the two higher concentrations growth of shoots and primary roots was increasingly slowed, hypocotyls were shortened and swollen and produced adventitious—out of the usual place—roots. These symptoms were even more accentuated when a concentration of 100 ppm had been used, and in addition proliferative outgrowths appeared on the bases of the cotyledons; roots, many fasciated—mal-

Concluded on page 14



Royal apricot seedlings from parent trees of which were (A) not sprayed and those which were sprayed at the beginning of pit hardening with (B) 15 ppm, (C) 25 ppm and (D) 50 ppm of 2,4,5-T.

APRICOT

Concluded from page 5

formed—emerged from cotyledon proliferations—tumors—as well as from those of the hypocotyls. Shoot growth was drastically retarded or completely inhibited, and when leaves developed at all they tended to be small, extremely narrow and distorted.

None of the abnormal growth found after treatment with the phenoxy compounds appeared in seedlings from NAA-treated trees. Although NAA inhibited germination to a considerable degree and reduced the percentage of viable plants, its only unfavorable effect on seedling growth was slowed development. Otherwise the seedlings from NAA-sprayed trees were like those from unsprayed trees.

Seeds from sprayed trees were as normal in appearance as those from unsprayed ones, aside from a somewhat greater tendency toward splitting of the seed coats caused by slight stimulation of cotyledon growth. Furthermore, in microscopic studies of seed development from the time of application of 2,4,5-T to fruit maturity, not a single deviation from the normal developmental pattern was found. These observations lead to the conclusion that the growth regulators as applied here with respect to concentration and time of application do not interfere with normal seed development but do stimulate abnormalities during germination.

To determine whether inhibited germination as well as the same types of seedling abnormalities could be induced in apricot seeds treated directly with 2,4,5-T—as those occurring in offspring of sprayed trees—unsprayed Royal seeds were stratified in moist sand at 32° F for three weeks beginning in February 1956.

Pits and integuments were then removed and different lots of seeds were soaked in 1, 2, 4, and 8 ppm solutions of 2,4,5-T with three durations of treatment for each concentration, 12, 24, and 36 hours. Seeds were also soaked in distilled water for the same periods of time. After treatment the seeds were planted in vermiculite in the greenhouse and germination data were recorded during the following seven weeks.

The smaller table in column 2 shows that consistent decreases in the percentages of germination and viable plants accompanied either increasing concentration of 2,4, 5-T or increasing duration of treatment. For the seeds soaked 24 and 36 hours, however, part of the reduced germination must be attributed to exposure to liquid for those periods of time, since germination of seeds soaked in water alone was decreased with lengthened time of treatment.

The seedlings from seeds soaked in

2,4,5-T solutions showed the same general types of external abnormality as those from sprayed parent trees. Primary root growth was inhibited to greater or lesser extent according to dosage. Swellings appeared on the hypocotyls and cotyledon bases and roots emerged from them. Seedlings from seeds given the higher dosages showed slight epinasty of the first few leaves. Of the seedlings classified as viable, in all but those from the lightest treatments, average shoot growth was retarded, with the slowed growth approximately in proportion to the severity of the treatment.

In view of the greatly reduced percentages of seed germination and viable seed-

The Effect of Soaking Stratified Royal Apricot Seeds in Water and in Various Concentrations of 2,4,5-T Upon Subsequent Germination and Viable Plant Production

Treatment	Germination %	Viable plants %
12 hours		
Water	100	100
2,4,5-T, 1 ppm	100	100
2,4,5-T, 2 ppm	83	83
2,4,5-T, 4 ppm	58	42
2,4,5-T, 8 ppm	25	8
24 hours		
Water	90	90
2,4,5-T, 1 ppm	82	64
2,4,5-T, 2 ppm	60	40
2,4,5-T, 4 ppm	45	9
2,4,5-T, 8 ppm	45	0
36 hours		
Water	69	69
2,4,5-T, 1 ppm	64	27
2,4,5-T, 2 ppm	36	7
2,4,5-T, 4 ppm	31	0
2,4,5-T, 8 ppm	15	0

The Effect of Plant Growth Regulator Application to Apricot Trees at the Beginning of Pit Hardening on Subsequent Germination and Seedling Viability

Variety and locality	Treatment	Germination %	Viable plants %
Royal San Jose	Control	100	100
	2,4,5-T, 15 ppm	100	100
	2,4,5-T, 25 ppm	84	41
	2,4,5-T, 50 ppm	50	22
	Control	94	67
Tilton Hollister	2,4,5-T, 25 ppm	56	45
	2,4,5-TP, 25 ppm	59	14
	2,4-D, 25 ppm	0	0
	NAA, 25 ppm	54	32
	Control	67	40
Royal Green Valley	2,4,5-T, 50 ppm	47	17
	2,4,5-TP, 50 ppm	28	0
	2,4-D, 50 ppm	0	0
	Control	50	27
	2,4,5-T, 100 ppm ...	23	6
Stewart Winters	2,4,5-TP, 100 ppm ...	30	2
	2,4-D, 100 ppm ...	0	0
	NAA, 100 ppm ...	15	6
	Control	50	27
	2,4,5-T, 100 ppm ...	23	6

lings as a result of growth regulator application to parent apricot trees, nurserymen should avoid using seeds from sprayed trees for propagation even though they appear normal.

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LEMON INDUSTRY

Continued from page 2

women born in 1945-55 will commence to enter the 20-39 age category. There will be the potential for a really explosive population upward surge after 1965 should early marriage and large families be popular at that time.

The projections of the national population may be at different degrees of high, depending on whether the projector assumes the continuance of recent birth rates or a gradual return to the prewar level, or—an even more extreme assumption—that births might drop low enough to fit the long-time prewar trend line. National population projections to 1975 may be set at a high of 230 millions; a medium of 220 millions; and a low of 210 millions.

Along with the growing numbers of consumers, the capacity for gross consumption has risen, and prospects are favorable to a continuation of this expansion in the next 20 years.

The President's Materials Policy Commission has forecast a 100% rise in production of all goods and services from 1950 to 1975. With the prospect of more than 200 million persons in the United States by 1975, this forecast implies a gross national product of about \$2,650 per capita, which is 52% higher than the 1950 figure.

During the past 30 years, per-capita disposable income has averaged about 75% of per-capita gross national product. However, this figure is affected by the relatively lower tax rates of the 1930's. During the last five years, the per-capita disposable income has averaged only 71% due to higher taxes. Assuming no tax increases but only a maintenance of the present structure in 1975, per-capita disposable income then should be about 48% higher than it was in 1950.

When people in low-income categories obtain an increase in income, they may spend as much as one half of their additional income on food. But in the higher income categories, an increase in income has much less effect on food demand—perhaps no more than 10% of the increase is spent for food. It is generally