

Fruit-Stem Die-Back

reduction is extra benefit of application of 2,4-D to citrus for fruit drop control

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Fruit-stem die-back, a malady occurring throughout California citrus orchards, is more severe in some localities than in others and affects oranges and grapefruit particularly.

The disease is characterized by a dying of the fruit stem, starting near the button of the fruit and extending a few inches to as much as three feet up the stem.

Die-back may be accentuated late in the harvest season when the trees are carrying two crops of fruit at the same time—mature fruit of the current crop and the young fruit of the following year's crop.

Causes Not Defined Clearly

The causes of fruit-stem die-back have not been defined clearly but are presumed to be adverse climatic and soil factors acting to modify the physiology of the tree.

One possible explanation is that during periods of water stress citrus fruit act as reservoirs which supply water to the twigs and leaves. If this stress becomes sufficiently severe, a dehydration of the carbohydrates in the fruit stem takes place resulting in the production of gums. The gums clog the water conducting vessels and interfere with the transport of water from the soil and from the fruit.

Another possibility is that the abscission or separation layer between the fruit-stem button and the fruit may mature and likewise interfere with the supply of water entering and leaving the fruit reservoirs. These factors may play a part in initiating fruit-stem die-back.

The likelihood that parasitic organisms also may be playing a part in fruit-stem die-back also has been considered.

Fungi and Bacteria

Isolation cultures from dying and dead fruit stems yielded several species of fungi and bacteria, none of which is considered capable of initiating primary parasitism and injury as extensive as found in die-back. The fungi included species of *Colletotrichum*, *Alternaria*, *Diplodia*, *Phomopsis*, *Macrosporium*, and *Chaetomella*. *Diplodia* and *Phomopsis* have been found capable of causing bark and wood lesions when inoculated into stem wounds and rapidly to involve bark

that has been injured by frost, oil, or other chemical. These fungi probably play an important secondary role in the killing of the fruit stems after the initial injury has taken place.

Effect of 2,4-D

Because of the demonstrated influence of 2,4-D—2,4 dichlorophenoxy-acetic acid—in delaying abscission and fruit-drop, its effect on the occurrence of fruit stem die-back was observed and recorded during the 1947 season.

Important reduction of die-back was observed with all three types of citrus fruit where the 2,4-D was applied one to three months prior to dates of observation. In the one plot where 2,4-D was applied 11 months before observation, there was less reduction in die-back than in the plots where it was applied one to three months before observation.

Dual Action

It is assumed that the growth regulator, 2,4-D, reduces fruit drop by delaying maturation of the abscission or separation layer which holds the fruit to the stem. Since stem die-back has been generally recognized as one cause of fruit drop, it is not surprising that the observed reduction in die-back should parallel a



Right, fruit-stem die-back of Valencia orange: note absence of leaves and exposed button remaining where one fruit has dropped off; **Left**, fruit stem showing no die-back, presence of leaves, and a healthy button on the orange.

reduction in fruit drop. Because the fruit drop is reduced by maintaining the abscission or separation layer in an immature, juvenile condition and since die-back was also decreased by 2,4-D, it seems likely that maturation of the abscission layer plays an important part in die-back.

It is quite possible that a water stress may prematurely initiate the changes in the fruit stem which, without 2,4-D, would otherwise lead to maturation of the abscission layer.

The reduction of fruit-stem die-back appears to be an extra benefit resulting from the application of 2,4-D for fruit-drop control.

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Effect of 2,4-D sprays on the amount of fruit-stem die-back.

Plot	Spray treatment	No. of trees	Total No. of fruit stems observed	Percentage of fruit stems with die-back	Percentage reduction of die-back as a result of 2,4-D spray
Valencia oranges, I Sprayed 5-26-47 Observed 8-7-47	Checks, not sprayed	12	973	38.9	
	8 ppm* 2,4-D in water	12	1083	6.5	83.3
	16 ppm 2,4-D in water	12	944	7.8	80.0
Valencia oranges, II Sprayed 5-26-47 Observed 8-7-47	Checks, not sprayed	10	1092	7.7	
	8 ppm 2,4-D in water	10	1135	1.4	81.9
Valencia oranges, III Sprayed 10-15-46 Observed 8-7-47	Checks, not sprayed	9	910	21.3	
	5 ppm 2,4-D in water	7	640	10.9	49.0
	25 ppm 2,4-D in water	7	768	15.4	18.0
Thomson navel oranges, IV Sprayed 2-28-47 Observed 5-20-47	Checks, not sprayed	1	84	87	
	Oil spray only†	1	72	87	
	Oil spray + 10 ppm 2,4-D	1	73	8	90.8
Grapefruit, V Sprayed 6-6-47 Observed 7-21-47	Checks, not sprayed	10	1023	29.8	
	8 ppm 2,4-D in water	10	1077	2.6	91.6

* Ppm = parts per million.

† Light medium 1½ per cent oil.