

Progress In Abscission Of Oranges

. . . BY . . .
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Citrus fruit abscission chemicals have received a great deal of attention in the past few years. Teams of research workers at the USDA Research Station, Orlando; Citrus Experiment Station, Lake Alfred; University of California, Riverside; and various chemical companies have been doing their best to make oranges abscise.

These people are looking for a seemingly impossible product. The biochemistry of leaf and fruit abscission is quite similar, but we want a chemical that loosens only fruit. The chemical should not injure the fruit, leaves, roots, or interfere with growth of the tree. It must not reduce the quality of the juice or any by-products. Also, the candidate should be able to abscise mature, but not immature, 'Valencia' fruits. Finally, this miracle product must be relatively inexpensive (relative to alternate means of harvesting), and it must be declared safe by the FDA. In short, we want it to loosen mature fruit, period. We do not have a chemical that totally fits the description, but at least one has good commercial possibilities in spite of a few drawbacks. Chemicals under consideration are as follows:

(1) Ethrel, an ethylene producing chemical, lacks commercial possibilities unless current problems of excessive leaf drop can be solved.

(2) The weak acids (ascorbic, erythorbic, and citric) at 1½% spray concentration have shown some abscission possibilities for early and midseason oranges, although they injure the rind of the fruit limiting their use to fruit for processing. They may cause fruit splitting and are not consistent enough for use early in the harvest season. They are also rather vulnerable to rain dilution within a short time of application. However, late in the harvest season for each variety, the weak acids show some promise as they can be applied even if the tree is beginning its spring growth

flush. Their biggest single disadvantage appears to be the high cost of the chemicals. The weak acids effectively loosen mature 'Valencia' oranges, but are not economically suitable because they injure the small green fruit and reduce the next season's crop. Another weak acid (CZ-150 or cyclamate) was dropped because of FDA restrictions on cyclamates. It was similar in action to ascorbic or erythorbic acids.

(3) The most promising candidate at the present time is cycloheximide (CHI). The manufacturer, TUCO Products Division of the Upjohn Company, plans to market it under the trade name of Acti-Aid. They hope to have limited sales in 1970-71 under an extension of last season's experimental label. (This label extension has not been granted at time of writing.) CHI has shown the best results when applied to early and midseason oranges ('Hamlin' and 'Pineapple') in December and January before the first sign of new vegetative growth. The start of the flush will vary from season to season so that calendar dates could be misleading.

CHI has some limitations that should be known to anyone considering using the product. It is used for processed fruit only due to rind injury, but it has never caused fruit to split.

One extremely important limitation of CHI is that it should not be used on early and midseason oranges when the trees begin their growth flush. (At the first sign of new growth, the pinhead stage, CHI should no longer be applied.) Application during the flush will result in loose fruit, but may cause severe tree injury, complete defoliation, and loss of next season's crop. The grower's motto for CHI should be, "When the flush comes out, you had better be out!!"

On 'Valencias,' it should not be used for at least two months after bloom. The 'Valencia' timing may vary from season to season, but a spray too early can injure both the foliage and the subsequent crop. In any event, it does not appear that CHI should be used on 'Valencia' before about June 1. Further, if a 'Valencia' tree is mixed in with early and mid-season oranges, it will loosen quite readily even though its fruit is sour as a lemon. Unfortunately, 'Valencias' loosen better at this time than at any other!

Some problems have occurred with CHI applied to trees on the East Coast this past season. These problem areas were usually in places which were subject to a high water table with consequent restricted root growth. The problem appeared to be one of higher-than-required application rates rather than

anything really unusual. Research this coming season will be directed toward solving the problem on these type groves.

On well-drained soils, few problems have occurred from the use of the chemical. However, if an obviously weak tree is present, adverse effects from spraying it may occur.

The label recommendations will be 20 ppm CHI in a dilute spray. Coverage is very important—every fruit must be well covered. It is a contact-type chemical so if the fruit is not hit, it does not come loose. We cannot over-emphasize spray coverage. The chemical causes ethylene production which in turn has a growth regulator-type action on the plant and should not be thought of as a normal pesticide. It works at extremely small dosages (20 ppm as compared to one or more thousand ppm for pesticides). Employees accustomed to handling pesticides should be thoroughly briefed on the amounts of CHI to use and then be carefully supervised while using it.

During the 1970-71 season, TUCO Products Company intends to conduct field demonstrations and tests in cooperation with the County Citrus Extension Specialists. Although the manpower is not available to have a demonstration in every county, your County Agent will be letting you know, through his Newsletter and other means, when and where a demonstration near you may be viewed. The larger demonstrations will be in December and January on early and mid-season oranges.

Dr. Bill Cooper of the USDA, Orlando, who first reported that CHI has abscission properties on oranges, along with Dr. Gordon Rasmussen and Dr. Roger Young, will be trying to determine the basic causes of, and mechanisms for, ethylene production on treated fruit. They will attempt to unfold the interrelationships of ethylene, natural growth regulators, and enzyme systems of chemically treated fruit. Dr. Rasmussen is spending six months at Long Ashton Research Station, England, to study detection methods for growth regulators to aid his abscission work.

Bill Wilson, Florida Department of Citrus, and his able assistants at the Citrus Experiment Station, Lake Alfred, will pursue some of the most promising leads from over 2,000 abscission candidates field tested last season. They will look very closely at anything that shows promise for fresh fruit, particularly specialty fruit. No promises are being made because sometimes it seems like it takes a million candidates to find one product. They also intend to seek a

¹Based on a talk presented at Camp McQuarrie, August 19, 1970.

workable answer to the problems with CHI on shallow rooted trees on the East Coast.

Dr. M. A. Ismail, Florida Department of Citrus, Citrus Experiment Station, Lake Alfred will continue to extract growth regulators from citrus fruits and leaves. He is attempting to find one or more of these chemicals that help to regulate the action of ethylene in abscission.

Our good friends in California will continue to work on abscission, but their limitations are even greater than ours. They have a different climate with very low humidity where the fruit does not respond as it does here, and their crop is primarily destined for the fresh market.

We are a great deal further advanced today on citrus fruit abscission than we were a year ago. An abscission agent that may be tried cautiously under certain conditions will be available this season, providing that the label is granted in Washington. We are a little way down a very long road in getting what we would like in an abscission product. Research is planned for this season to get us further down that road.

References

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FREEZE DAMAGE NOT SEVERE

Florida's exceptionally early first freeze of the season, on the morning of Nov. 25, inflicted some citrus damage but apparently fruit loss will be light, according to Tom Osborne, assistant general manager of Florida Citrus Mutual.

Florida Citrus Commission Chm. O. D. Huff, Jr., said that "From all reports available, there isn't enough fruit hurt to necessitate a public hearing on the need for an embargo."

Citrus district temperatures ranging from 18 to 24 degrees were reported, but only for short periods.

STATE, NATIONAL HORTICULTURAL GROUPS MEET AT MIAMI BEACH

O. R. "Dick" Minton, Fort Pierce citrus grower, was elected president of the 1000-member Florida State Horticultural Society at the group's annual meeting last month in Miami Beach.

Continuing in their accustomed posts were Dr. Herman J. Reitz, head of the University of Florida Citrus Experiment Station at Lake Alfred, secretary; R. R. Reed, Cities Service Co., Tampa, treasurer; Ralph P. Thompson, Winter Haven publisher, publications secretary; W. L. Tait of Winter Haven, editing secretary.

Gerald Norman, Division of Plant Industry, Gainesville, was named program coordinator.

Newly-elected section vice-presidents are Dr. Richard T. Poole, Apopka, ornamental section; Thomas L. Carpenter, Clewiston, vegetable section; Paul J. Driscoll, Fort Pierce, citrus section; Dr. Richard F. Matthews, Gainesville, handling and processing section; Roy O. Nelson, Homestead, Krome Memorial section.

Members-at-large are J. Bryan Dye, Jr., Fort Lauderdale; Dr. A. H. Krezdorn, Gainesville; J. D. Thullbery, Tampa. Honorary memberships were bestowed on Dr. Reitz, Reed and Burt Colburn of Miami.

The American Society for Horticultural Science, also meeting in Miami Beach last month, elected Dr. Alvin L. Kenworthy, Michigan State University professor of horticulture, as its president.

Out-standing paper awards presented by the ASHS included the Joseph Harvey Gourley award for best paper in the area of general pomology to W. J. Wiltbank and A. H. Krezdorn, University of Florida department of fruit crops, for their paper entitled "Determination of Gibberellins in Ovaries and Young Fruits of Navel Oranges and Their Correlation With Fruit Growth."

Among 15 outstanding horticultural scientists elected as fellows of the ASHS was William C. Cooper, physiologist, Crops Research Division, ARS, USDA, Orlando, Fla.; for his research on citrus rootstocks, salt tolerance, cold-hardiness and fruit abscission, and outstanding administration of a research organization.



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Leon W. Miller (left), chairman of the Florida Fruit and Vegetable Association's research committee, presents the FFVA Annual Research Award to Dr. Ernest P. DuCharme (center) and Dr. Ross F. Suit, both plant pathologists at the Citrus Experiment Station, Lakeland. The joint presentation in recognition of outstanding contributions to Florida agriculture in the field of research was made during FFVA's recent convention in Miami Beach.