Citrus Red Mite

new chemical gives promising results in control experiments

L. R. Jeppson

Known by the code K-1875 the new chemical, bis (p-chlorophenoxy) methane, promises aid to the citrus grower in his fight to control the citrus red mite.

Of the hundreds of compounds which indicated toxicity to insects or mites only a few have actually shown outstanding possibilities for use in the control of the citrus red mite.

As inadequacies in the citrus red mite control became evident, the Citrus Experiment Station intensified its program of investigation of new materials.

One of the chemicals tested with encouraging results was the acetal, bis (p-chlorophenoxy) methane, now available commercially under the name of Neotran.

In laboratory research studies the chemical proved to be very toxic to the citrus red mite in all stages, including eggs. The residues remained toxic to the mites for a relatively long time after application to foliage and fruits.

In field applications, formulations containing K-1875 in such solvents as kerosene, methylated naphthalenes, and tetrahydro naphthalene, were found to be toxic to both the mites and their eggs.

The resulting field controls were generally comparable to the conventional petroleum oil sprays.

Formulations of K-1875 compounded as dry powders and applied as water suspensions appeared as effective in field control as the solvent formulations.

Field experiments have shown that the citrus red mite moves about sufficiently to contact the toxic residues of K-1875 and that the residues remain effective for one to several weeks.

Applied as Concentrate

Possibilities of applying spray concentrates of the chemical rather than full coverage applications are suggested by these studies.

The cost per acre of applying spray concentrates is but 1/10 to 1/5 that of complete coverage spray because many more acres can be treated within a given period of time.

More consistent results have been obtained when this chemical is applied as concentrate sprays than with dust applications. A greater deposit of K-1875 per unit of vegetative area is usually obtained when applied as a concentrate water suspension than as a dust using the same application equipment.

The deposit of the toxicant in concentrate spray applications is not as subject to moisture conditions and unfavorable air movements as are dusts, so an adequate deposit can be counted on under a greater variety of weather conditions.

Formulations of K-1875 have been applied to 1,400 acres of citrus trees in 150 groves located in all the major areas where citrus red mite is a pest.

Tests using one or more formulations of this material have been in progress during the majority of weather conditions of the past two years and no injurious effects to the citrus trees or fruit have been evident.

As a result of investigations so far conducted with K-1875 it is suggested that in conventional spray applications, 1½ to two pounds of a wettable powder be used per 100 gallons of a spray. In concentrate spray applications 10 pounds of a 40% wettable powder may be used in 100 gallons of spray and applied at about 100 gallons per acre.

K-1875 appears to be compatible with many of the insecticides, fungicides, and deficiency treatments presently used on citrus.

No apparent loss of toxicity occurred when both dry and paste concentrates of these mixtures were held in storage for eight months. No plant injury or loss in toxicity to the mites was found when normal dosages of K-1875 and each of the following were applied to citrus: Cryolite, nicotine sulfate, derris, zinc oxide, zinc sulfate, soda ash, manganese sulfate, Fermate, Zerlate, oil and parathion.

Experimental work done by a commercial laboratory and reported to the Citrus Experiment Station indicates it is of a low order of toxicity to warm blooded animals, and that it is about one-tenth as toxic as is DDT when judged on the basis of both acute and chronic oral toxicity.

It is not absorbed through the skin in significant quantities and it is not significantly irritating to the skin.

This material is judged to be one of the least toxic insecticides ever developed. Its handling hazards are negligible and—when compared with other commonly accepted insecticides—its formulations can be regarded as safe to apply to food crops.

K-1875 appears to be rather specific in its toxicity to citrus red mites.

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It is easily crushed and stemmed. If the grapes are not overmature, the free-run juice is light green in color, a characteristic maintained in the wine of grapes from the cooler coastal regions.

There is a great demand for wine of this color in commercial channels. The juice does not separate readily from the pulp and is likely to be somewhat thick, a characteristic of its Muscadelle parentage. This often results in a slow fermentation.

In order to complete the fermentation to dryness, too much aeration may be given, which can cause some undesirable oxidation. This has been especially noticeable in the small quantities of must, usually eight to 10 gallons, that have been handled in the experimental lots at Davis.

The wines have not scored well in such instances. This defect can apparently be easily overcome by the correct cellar treatment, either by handling larger quantities, not using musts too high in sugar, or by blending in a small quantity of juice of a variety easily fermented.

In a commercial winery test, made in the 1946 season, the wine was produced without special care, kept a good color, and cleared rapidly. Tasters consider it very promising.

The yield of alcohol is high, and the fermentation is clean, even when some browning from overoxidation occurs. Once fermented, the wine becomes brilliant in a short period of time and is quite stable.

At first, some tasters discount the acidity as being too high, but on aging this sharpness disappears. The best samples in many respects resemble the Chablis of France, being tart and fresh.

The wine is heavier in body than either the Folle blanche or French Colombard and develops much more character on aging.

Preliminary results indicate the wine is long-lived and does not reach perfection without proper aging. The Davis samples of 1941 are still improving in bottle.

Commercial tests seem warranted to determine the suitability of this high-acid variety for the production of champagne.

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Sweet Root Orange Trees

symptomless hosts of the quick decline virus

H. S. Fawcett and J. M. Wallace

Infected sweet root orange trees can serve as carriers of the virus of quick decline even though they remain symptomless.

The results of studies present experimental evidence that orange trees on sweet orange roots can become infected with the virus of quick decline under field conditions and that the virus maintains itself in such trees.

Early in studies of quick decline it became clearly evident that sweet orange rootstock did not develop symptoms of quick decline. The question naturally arose as to whether or not trees of sweet orange on sweet root could harbor the virus even though they showed no symptoms of disease, and thus serve as reservoirs of the virus from which it could be spread to other trees.

Transmission Tests

Many tests are now in progress to determine experimentally if sweet orange seedlings and/or budded sweet orange on sweet root trees are actually capable of becoming infected and of maintaining the virus.

These tests involve transmissions into healthy trees of Valencia on sour root by means of buds taken from sweet seedlings and from budded sweet orange on sweet root that were inoculated previously from quick decline trees.

Earlier tests of this nature consisted of transmissions from healthy-appearing orchard trees of sweet orange on sweet root that were adjacent to, or in close proximity with plantings of sour root trees showing a high percentage of quick decline.

In July, 1946, buds were taken from two orchard trees of Valencia on sweet root and from one navel on sweet root, and placed in young Valencia on sour test trees growing in a relatively isolated experimental planting in the vicinity of Baldwin Park.

The three sweet root trees were symptomless, and were growing in close proximity to Valencia sour root trees severely affected with quick decline.

Buds from the sweet root trees were placed as inoculum into both the sweet top of some of the test trees and into the sour rootstock of others.

Inoculations into the rootstock were made in many experiments to determine if orange trees could be infected through the sour portion. The buds were used as inoculum and not for propagating a new top.

Controls, or checks, consisted of test trees in which no buds were placed and trees in which disease-free buds were placed in the sweet top of one group and in the sour rootstock of the second group.

Results

The results of these tests are summarized in the accompanying table.

A total of 127 check trees showed no quick decline in January, 1948. This is strong evidence that no tree in this experimental planting has developed quick decline symptoms as a result of natural infection.

On the other hand, nearly one half of the test trees, that had buds from the two Valencia and one navel tree placed in the sweet tops, are showing symptoms within 17 months after inoculation.

Inoculations into the sour rootstock have so far resulted in less infection, or at least in slower symptom expression.

This may possibly be due to a delay in movement of the virus into the top when the inoculation is placed low in the trunk of the tree.

Some of the test trees began to show top symptoms within 11 months after inoculation. Premature flowering and fruiting, which seem to be the first obvious symptoms of quick decline, were observed on numerous trees within nine months after inoculation.

Some of these same trees, when first examined seven months after inoculation showed some degeneration of the bud-union tissues. At the same time, in the controls, the bud-union tissue was normal.

Many investigations are now in progress to determine if other combinations of citrus will develop symptoms of the disease when infected.

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Results of Transmission Tests from Valencia and Naval Orange Trees on Sweet Orange Rootstocks

(Inoculations made July, 1946)

Source of inoculum	No. of test trees	Place of insertion of inoculum (buds) in test trees	Test trees showing symptoms Jan. 1948	
			Number	Per cent
Valencia No. 1*	24	Valencia top	9	37.5
Valencia No. 1	20	Sour orange stock	3	15.0
Valencia No. 2*	24	Valencia top	14	58.3
Valencia No. 2	21	Sour orange top	4	19.0
Navel No. 1*	19	Valencia top	9	47.4
Healthy Valencia† (Riverside)	24	Valencia top	0	0.0
Healthy Valencia (Riverside)	24	Sour orange stock	0	0.0
——‡	79	Not inoculated	0	0.0

* Healthy-appearing orchard trees growing near diseased trees in quick decline area.
† Disease-free outside quick decline area.
‡ Additional check trees in which no buds are placed.

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According to unpublished data gathered by the Experiment Station, 50 times the concentration of this compound is required to kill the two-spotted spider mite, *Tetranychus bimaculatus*, as is necessary for the citrus red mite.

Experimental work is in progress to determine its effectiveness on the various plant-feeding mites.

Formulations of K-1875 which have been used in field tests have not given satisfactory control of the citrus bud mite *Acaria sheldoni* and the citrus rust mite *Phyllocoptruta oleivora*.

It appears to be relatively nontoxic to most beneficial predators and parasites and there has been no evidence of an increase of insects or other mites when this material has been applied to citrus trees.

The several favorable properties of K-1875 and the results obtained in experimental tests so far, suggest that this compound may be effective in aiding the citrus grower to control one of the major pests affecting citrus—the citrus red mite.

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