Cyclamen Mite Investigations

control of cyclamen mite on ornamentals may be possible with spray treatments of endrin, azobenzene, and isodrin

William W. Allen

The cyclamen mite—*Tarsonemus pallidus*—is a dreaded pest to both the strawberry grower and the nurseryman.

In the greenhouse, the cyclamen mite can cause severe damage to a wide variety of ornamentals such as African violets, azaleas, begonias, cyclamen, and English ivy. Although it cannot survive on many of these hosts when grown outdoors, it is, nevertheless, a serious pest of field-grown strawberries.

The cyclamen mite, since its discovery in 1898, has been notorious for the severe damage it causes as well as for the extreme difficulty in controlling it. Not only is it comparatively resistant to most pesticides but it also has certain protective habits—secreting itself in folded leaves and under scales—which make contacting all the mites with a pesticide almost impossible. In addition, the rapid reproductive rate of the cyclamen mite means that a high initial mortality must be obtained if control is to last for a practical length of time.

Many pesticides have been tried as sprays and dusts for control of the cyclamen mite, but in general they have not been effective. Some materials such as thiocyanoethyl laurate, toxaphene and parathion, which had promising experimental results, did not prove satisfactory when tried commercially because of the difficulty of contacting all the mites.

Other methods of control included hot-water immersion treatment of nursery stock—110 F for 30 minutes—and methyl bromide fumigation for two hours at the rate of two pounds per 1,000 cubic feet. Although these methods have been effective, they are not too satisfactory because of the labor involved and the undesirable effect on the plants.

The Effectiveness of Several Pesticides Applied as Sprays for Control of the Cyclamen Mite on Strawberries

Material	Pounds active ingredients per 100 gals.*	Pre-treatment count	Post-treatment count after				
			7 days	14 days	21 days	36 days	49 days
Endrin	0.4	3351	10	17	8	201	789
Azobenzene	4.0	2854	208	39	14	91	506
Isodrin	0.4	3071	103	78	131	413	654
Diazinon	0.5	3215	34	169	459	1144	...
Check	..	2352	1369	1402	1042	1273	1311

* Sprays applied at the rate of 800 gallons per acre on July 27.

The urgent need for a cyclamen mite control spray led to a series of tests being conducted over the past three years to evaluate the effectiveness of the many pesticides available. These tests, involving more than 50 different chemicals, were carried out by means of replicated field plots on strawberries. In all tests the sprays were applied at the rate of 800 gallons per acre, and additional wetting agent was added to insure maximum penetration. By eliminating the poorer materials and retesting the better materials, it was possible to select three pesticides—endrin, azobenzene, and isodrin—which were most effective against the cyclamen mite.

A typical example of the results obtained with these materials can be seen in the accompanying table. Endrin when used at the rate of 0.4 pound actual per 100 gallons gave a high initial mortality, and the mites were held at a low level for several weeks. Azobenzene, at a much higher dosage—four pounds—was also very effective, but its action was somewhat slower. Isodrin was slightly less effective in all of the tests. The superior effectiveness of these pesticides is apparently due to their long residual nature which means that the mites are killed as they crawl from one protected niche to another. While both Diazinon and parathion—similar to each other in action—kill numerous mites actually contacted by the spray, the remaining mites are not killed and soon build back up to original levels.

The long residual action of endrin, azobenzene, and isodrin should make it possible to control the cyclamen mite on

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Left: **Strawberry plants showing retarded growth, flattened appearance, and distorted leaves resulting from cyclamen mite feeding.** ***Right:*** **Strawberry plants in the same field on which the cyclamen mite has been controlled with endrin.**

New Acaricide for Citrus Mites

chlorobenzilate formulations have low toxicity to warm-blooded animals but in tests gave effective control of mites on citrus

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Chlorobenzilate—*ethyl* p, p′-*dichlorobenzilate*—offers certain advantages in citrus pest control: it has a very low toxicity to warm-blooded animals which places it in the same category as Ovotran and Aramite; its application does not seriously affect insect parasites and predators or bees.

Chlorobenzilate has a low order of toxicity to insects, therefore applications do not control populations of injurious insects, but may adversely affect populations of predaceous mites.

The formulations of chlorobenzilate currently available for use on citrus are wettable powders containing 25% of the technical compound, and emulsifiable concentrates containing two pounds technical material per gallon.

In experimental applications during the past three years, chlorobenzilate has generally resulted in more effective control of citrus bud mite, *Aceria sheldoni* (Ewing), than conventional petroleum oil sprays. It has shown promise as summer treatments for control of citrus rust mite, *Phyllocoptruta oleivora* (Ashm.), and the citrus flat mite, *Brevipalpus lewisi* (McG.). Although practical dosages will effectively reduce adult populations of citrus red mite, *Metatetranychus citri* (McG.), higher dosages are required to approach the effectiveness of several other acaricides currently used to control this mite on citrus in California.

Citrus Bud Mite

Thorough coverage applications are essential and are of the type normally required in applying petroleum oil for bud mite control. When citrus bud mite is the only pest which requires treatment, effective control has been obtained with sprays of one pound of the 25% chlorobenzilate wettable powder or one pint of the 25% emulsifiable concentrate formulation per 100 gallons of water.

Experimental tests have indicated that the addition of chlorobenzilate to the regular petroleum oil spray applications used for insect and mite control will generally increase the effectiveness of the treatment against citrus bud mite. Whether the increased control of bud mite obtained over the use of oil sprays alone is of sufficient degree for the combination to be of practical use will depend on the specific situations and the over-all pest control program in operation. Where it seemed desirable, chlorobenzilate was added to petroleum oil sprays at the rate of one pound of 25% wettable powder or one pint of emulsifiable concentrate formulation to each 100 gallons of spray mixture.

Citrus Rust Mite

Chlorobenzilate may be used as an emergency summer treatment for citrus rust mite but should not be considered as a replacement for the winter or spring sulfur applications.

When conventional sprays employing manually operated guns or boom-type applications are made, one pound of the 25% wettable powder or one pint of the 25% emulsifiable concentrate per 100 gallons of water is effective.

Spray-blower applications of the type used for control of citrus red mite have also provided satisfactory reductions of high summer populations of this pest. The successful use of this type of application equipment is predicated on achieving thorough and uniform distribution of the spray droplets. To accomplish this type of distribution, the equipment must be operated at slow ground speed. The droplet size must be commensurate with the volume of liquid applied—the lower the volume of liquid applied the smaller the size of the spray droplets must be to obtain adequate distribution. With spray-blower equipment, 12 pounds of 25% chlorobenzilate wettable powder or 1½ gallons of the 25% emulsifiable concentrate formulation may be used in a minimum of 250 gallons of water per acre.

When citrus red mite control is advisable at the same time as the rust mite control, eight pounds of the 50% formulation of Ovotran or two gallons of the emulsifiable concentrate formulation can be added to the spray mix.

Citrus Flat Mite

Chlorobenzilate may be used as an emergency summer treatment for the citrus flat mite. A spray mixture containing ¾ pound 25% chlorobenzilate wettable powder or ¾ pint 25% emulsifiable concentrate per 100 gallons of water has proved effective. Applications may be made as conventional sprays employing manually operated guns or boom-type sprayers capable of producing equivalent spray coverage. Sulfur applications are more effective than chlorobenzilate and should be used in the spring when the weather permits.

There is limited experimental evidence that spray blower applications of chlorobenzilate employing as low as 250 gallons of spray per acre will reduce summer populations of citrus flat mite sufficiently to avoid fruit injury. This spray should be thoroughly distributed on the trees as for citrus rust mite.

Fruit quality evaluations indicate that the treatment of chlorobenzilate in the above formulas does not retard rate of maturity or adversely affect flavor or content of soluble solids.

Chlorobenzilate has been used under field conditions with Ovotran, Aramite, Neotran, DN-111, parathion, malathion and oil without evidences of incompatibility. In a limited number of tests, the addition of neutral compounds of zinc, copper, and manganese has not altered the effectiveness of chlorobenzilate applications. The chemistry of chlorobenzilate indicates that materials, such as lime and soda ash, that would make the spray mixture highly alkaline should be avoided.

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ornamentals with a limited number of sprayings. On strawberries, however, there are other complications. In the first place, high gallonage sprays are difficult to apply, and—of even greater importance—all of these pesticides will leave a toxic residue on the fruit. Tests are being conducted to determine whether endrin, azobenzene, and isodrin can be used in a practical manner on strawberries.

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