

# 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 com-

ination 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% emul-

sifiable 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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## CYCLAMEN MITE

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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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