purple scales were dead. In the untreated area, the rate of parasitization was 19.8 percent, and 77.5 percent of the purple scales were dead. About 1,200 live scales occurred in the eradication zone for each 0.1 live scale in the untreated control area—a 12,000 to 1 ratio.

Conclusions

Our results support previous findings that insect eradication programs cause environmental disruptions and involve both known and unknown dangers inherent in toxic chemical use. Carbaryl was more injurious to most natural enemies than to pest insects; the insecticide was not highly selective to the target pest, the Japanese beetle, and also is suspected of having a physiological effect on citrus that makes the foliage more suitable for citrus red mite reproduction. Dicofol, the acaracide used to control exploding citrus red mite populations, was 50 times more effective at killing the most prevalent predaceous mite than at killing the target pest. Chlordane, which was broadcast over lawns and planting beds in a high-density residential area, is now severely restricted in its use by the Environmental Protection Agency, because it has been shown to be carcinogenic.

Because of the magnitude and scope of both the probable and the unforeseen deleterious effects on the environment, wildlife, and humans, we believe that any decision to use chemical eradication must be supported by multi-disciplinary, in-depth studies of all aspects of the issue. Ecologists, biologists, and economists, at least, should be brought into the decision-making process to decide whether eradication is a proper approach or whether other methods, such as biological control, might make eradication attempts unnecessary.

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Fungicides protect apricot trees against dieback

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California produces more than 95 percent of the nation's apricot crop and this versatile tree fruit is also a favorite for home orchards. Limb dieback is a major cause of premature tree decline and death in the northern part of the state. The causal fungus, *Eutypa armeniacae* (impf. *Cytosporina*), spreads by means of spores carried in the air during rainstorms, and, when the spores find their way into fresh pruning wounds, the disease begins. Unpruned apricots are not affected.

Spores germinate and grow in the wood tissues, and darkened, malformed branch or trunk cankers become apparent around the old pruning wounds 2 to 3 years later. Diseased branches frequently wilt and collapse in mid to late summer. The dead branches on otherwise green apricot trees are a striking symptom of *Eutypa* dieback (fig. 1). Most orchardists remove recently collapsed branches from trees with a chain saw while they are readily visible.

Studies were made to determine the best time for removal of dead, infected branches and to find a satisfactory method of protecting resulting wounds. Various pruning wound treatments have been tried in the past with only limited and inconsistent success.

Five hundred, 15-year-old Tilton trees in a Westley (Stanislaus County) apricot orchard were used for the experiment. Large pruning wounds (2 inches or more) were made with chain saws, at an average of two sites on each tree, thus simulating removal of *Eutypa*-affected branches. Branches were removed in either the summer (August) or fall (October). With five trees per plot, there were ten saw cuts per plot and ten replications of each of the eight treatments distributed in a randomized block design, making a total of 800 treatment sites in the experiment.

Apart from nontreated checks, fresh wounds were treated by brush applications (fig. 2) of one of the following: Benlate 50W at 0.2 pound per gallon (2.4 percent) (active ingredient, benomyl, 10,000 ppm), Mertect Flowable at 2.84 fluid ounces per gallon (2.2 percent) (active ingredient, thiabendazole, 10,000 ppm) or Latex paint (flat oyster white, interior type).

Inoculations were made on the day following October branch removal and treatment. A *Eutypa* spore suspension was prepared, and, by calculating the concentration, it was possible to deliver approximately 100 spores directly onto the outer sapwood of the pruning wound.

Two years later (1973), the treatment sites were evaluated for external signs of infection (gummosis and cankering). Treatment combinations and results are summarized in the table.

The results indicate that:

■ Trees from which branches are removed in August would escape high infection rates in most years, simply because the following weeks are relatively rain-free in California and infectious spores of *Eutypa* are spread only during rain. This emphasizes the value of summer pruning of young apricot trees as a means of preventing serious infection of the main tree framework.

■ High levels (2.2 to 2.4 percent) of a benzimidazole fungicide—benomyl or thiabendazole—hand-painted onto large wounds afforded protection for six weeks or more, by which time wounds were largely immune to infection. Such a practice would be economically acceptable, because very little fungicide is required.

Based on the information developed in these tests, the California Department of Food and Agriculture has now granted permission to use Benlate as a pruning wound treatment on apricots. The risk of promoting fungicide tolerance in the apricot dieback fungus by a single-application practice is remote, because *Eutypa* has an extremely long generation time (minimum 4 to 5 years), and the imperfect *Cytosporina* stage does not function in the infection process. Latex paint has been commonly employed as a wound protection in the past; data here indicate that it is not effective.

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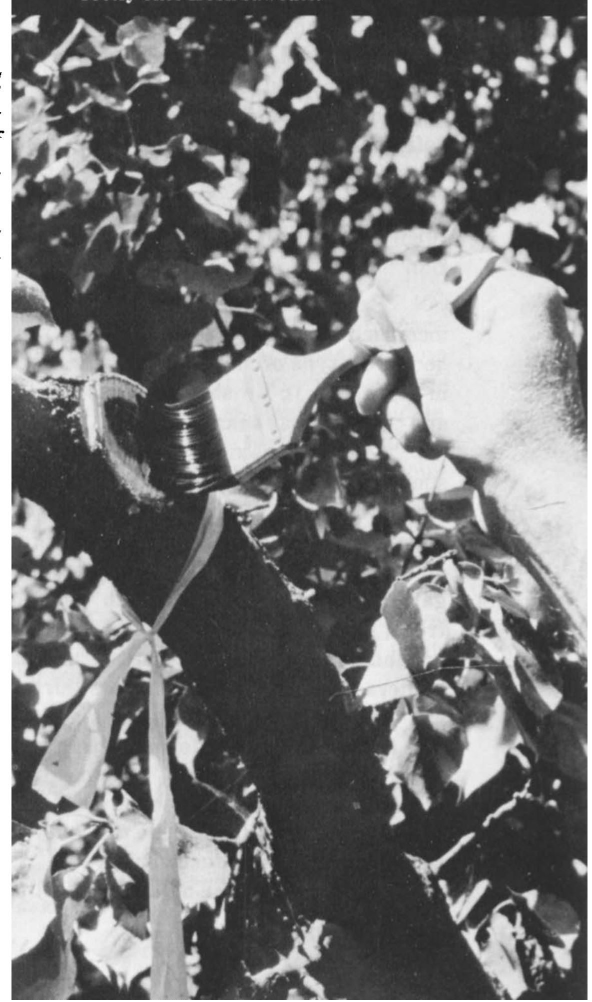
Fig. 1 (above). Recently collapsed branch in late summer is a typical symptom of *Eutypa* dieback. Fig. 2 (below). Test fungicides were brushed directly onto fresh sawcuts.



Evaluation of Post-pruning Brush Treatments of Large Wounds for Protection against *Eutypa* Infection—Stanislaus County

	Cankers 2 years later			
	August pruning*		October pruning†	
Treatment	Average‡	Transformed treatment means**	Average‡	Transformed treatment means**
	%	%	%	%
Control (nontreated)	10.2	2.74	45.0	6.69
Benlate paint (2.4%)	2.1	1.23	2.1	1.23
Mertect paint (2.2%)	3.8	1.58	4.2	1.76
Latex paint (100%)	9.0	2.73	23.7	4.68
LSD		1.26		1.26

*Branches removed in August 1971; wounds treated immediately and inoculated with 100 ascospores per wound 2 months later (on day after October treatment).
†Branches removed in October 1971; wounds treated immediately and inoculated with 100 ascospores per wound 1 day later.
‡Based on 100 sawcuts; 10 replications with 10 cuts per replication.
**Percentages transformed to facilitate statistical analysis.