

# CALIFORNIA PLANT PATHOLOGY

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## APRICOT PATHOGEN ASSOCIATED WITH CEANOOTHUS LIMB DIEBACK IN CALIFORNIA

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It has long been known that heavy pruning of some species of *Ceanothus* (California wild lilac) can lead to limb dieback and even death of plants; in the monograph on the genus *Ceanothus* van Rensselaer wrote: "A heavy cut frequently causes the branch to die back and eventually the whole top dies." However, the reasons for this have been obscure. Recently the disease has been studied in Australia where various species of *Ceanothus* have been introduced from North America as cultivated ornamentals. *Eutypa armeniaca* (imperf. *Cytosporina*), the ascomycetous fungus responsible for limb dieback in apricot (*Prunus armeniaca*), has been consistently associated with the *Ceanothus* disease.

During the past year, numerous cultivated *Ceanothus* plants were examined in California gardens and the disease symptoms were frequently found, especially where specimens had been severely pruned. The following species were found to be susceptible: *C. cyaneus*, *C. megacarpus*, *C. spinosus*, and *C. thyrsiflorus*, and symptoms were also seen in various other hybrids. Some striking examples were seen in the Arboretum of the University of California at Davis (UCD); it was unfortunate that a strong wind storm in January 1967 left many plants in bad condition and heavy pruning was

necessary to help the plants become re-established.

Cankers develop near pruning wounds and appear similar to those produced on *Eutypa*-infected apricot branches but with little or no gum exudation. Infection occurs by means of airborne ascospores which enter fresh pruning wounds during fall or spring rains, as is the case with apricot. The fungus is most active during the warmer months and sudden wilt and collapse of branches above the canker commonly occur in late spring. It invades the tissues above and below the point of entry moving primarily into the xylem, then the phloem, resulting in marked external discoloration of the affected bark tissues. Some *Ceanothus* cankers extend for several feet before eventually girdling and killing the limb or entire plant.

The perfect stage of *E. armeniaca* is produced on diseased wood some years after it has been killed by the fungus, and dead *Ceanothus* wood carrying mature and developing stromata was found on a wilt specimen of *C. thyrsiflorus* in Sonoma County, as well as a cultivated specimen of *C. megacarpus* at UCD. Mycelial isolates obtained from canker margins of diseased plants gave rise to typical *Cytosporina* cultures. Pathogenicity was reconfirmed by mycelial inoculation into apricot and the production of limb-collapse symptoms. In California *E. armeniaca* has previously been reported as a pathogen on apricot and western choke cherry (*Prunus virginiana* var. *demissa*), and also as a saprophyte of grape (*Vitis vinifera*).

The discovery of this pathogen on *Ceanothus* in California is also of interest in relation to *Cytosporina* dieback of apricot. This disease is

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serious in the major apricot-producing areas on the west side of the San Joaquin Valley but known sources of ascospore inoculum are limited. It was initially thought that native *Ceanothus* species in areas of the coast range might supply some inoculum, but preliminary surveys in the Mt. Oso and Mt. Diablo regions (predom. *C. cuneatus*) have not supported this. Native *Ceanothus* specimens are unpruned—except near roadsides—and infection from this source is therefore unlikely.

#### ETHOXYTRICHLOROMETHYL THIADIAZOLE AND PLASTIC VIALS

Some pesticides react with packaging materials. The fungicide 5-ethoxy-3-trichloromethyl-1,2,4-thiadiazole<sup>2</sup> reacts with polystyrene. This was discovered when small quantities of the 30% wettable powder were placed in 10 dram polystyrene vials with polyethylene caps. Captan and Dexon<sup>®</sup> [p(dimethylamino) benzenediazo sodium sulfonate] did not react with the polystyrene. Ethoxytrichloromethyl thiadiazole did not react with polyethylene plastic bags. Glass might be the best container for small samples.

#### COMMON NAMES OF FUNGICIDES

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Many of the fungicides in use have common or coined names which refer to the active ingredient and which can be used regardless of who manufactures or formulates a finished product. There

are, however, some notable exceptions. Most of the modern fungicides have long chemical names which are difficult to remember and pronounce. Trade names are generally used when there is no common name. Unfortunately, the composition of trade named products can and does change. For example, Tersan<sup>®</sup> at one time referred to a product which was 75% thiram. Today Tersan<sup>®</sup> 75 contains 75% thiram; Tersan<sup>®</sup> 1991 contains 50% benomyl; Tersan<sup>®</sup> LSR contains 80% maneb; and Tersan<sup>®</sup> SP contains 65% chloroneb. Tersan<sup>®</sup> OM which has been discontinued contained thiram and an organic mercury compound. There are similar naming patterns for other trade name products.

Thiram, which is a coined name, is the common name for tetramethylthiuram disulfide which can also have the chemical name bis(dimethylthiocarbamoyl) disulfide and  $\alpha, \alpha$  dithiobis(dimethylthio) formamide. It also is in the following products: Arasan<sup>®</sup>, Delsan<sup>®</sup>, Turf-tox<sup>®</sup>, Panoram<sup>®</sup>, Thiramad<sup>®</sup>, Thylate<sup>®</sup>, etc.

Some manufacturers supply a common name as soon as a fungicide is developed to the point that it is likely to be registered for use. In contrast, there are manufacturers that prefer not to supply common names. Because there may be several trade names for the same fungicide, it is important that each have a common name. This is especially useful in the reporting of results of fungicidal tests. However, in reporting such results, the trade name of the product used should be included. This is because differences such as adjuvants, inert materials and particle size can vary from one product to another.

Certain fungicides commonly used at present do not have common names. Therefore, I am proposing the following common names for the fungicides listed under the following trade names:

<sup>2</sup>Sold for use on turf as Koban<sup>®</sup>; for use on ornamentals as Truban<sup>®</sup>; and in combination with PCNB as Terraclor<sup>®</sup> Super X and Terratreat.

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Trade names	Chemical name	Common name
Koban <sup>®</sup> , Truban <sup>®</sup> , Terrazole <sup>®</sup>	5-ethoxy-3-trichloromethyl-1, 2,4-thiadiazole	ethazol
Dexon <sup>®</sup>	p(dimethylamino)benzenediazo sodium sulfonate	diazoben

### MYCOPLASMATALES VIRUSES

The first issue of CALIFORNIA PLANT PATHOLOGY (No. 1, January 1971) contained an article entitled "The role of mycoplasma-like organisms in plant diseases." It is interesting that these small organisms are subject to infection by viruses. Eleven mycoplasmatales viruses are known. The viruses are naked, rod-shaped particles (Liss and Maniloff, 1971. "Isolation of mycoplasmatales and characterization of MVL1, MVL52, and MVL51." Science 173:725-727).

### SILVER LEAF ON PEACHES

W. J. Moller

During the spring, Yuba County Director Dave Chaney brought in samples of silvered peach branches which turned out to be caused by the vascular fungus pathogen *Stereum purpureum*. Subsequent surveys in the 75-acre affected orchard near Gridley revealed that several hundred trees were infected.

Symptoms are a characteristic silver-gray appearance of some or all of the leaves; this damage appears much earlier than that due to leaf-silvering mites. The fungus can attack a wide range of deciduous trees and woody shrubs and the disease has been reported throughout the temperate regions of the world. It is a disease of economic importance in New Zealand, Canada, Chile, and parts of Europe. In California the disease has occasionally been seen on apricot in the coastal counties but, as far as could be determined, not on peaches until this year.

Windblown spores of the fungus are produced on small fleshy-bracket-like fruiting structures (sporocarps) which are borne on wood previously infected and killed by the disease. When these spores land on fresh pruning wounds during rain, they enter the wood tissue and germinate. Here the fungus mycelium produces toxins which are translocated in the plant xylem sap throughout the branch. Symptoms can occur 8-10 weeks after infection. The fungus itself does not invade the current season's growth but the silvery appearance is attributed to effect of the toxins on the leaf tissues. Severely affected leaves may curl, develop some necrosis, and fall prematurely. This can lead to limb sunburn and other problems.

The wood tissue invaded by the fungus becomes darkened in color and after it has been killed, the fungus grows out from the inner wood and may emerge through the bark to produce the sporocarps—especially during mild, wet winters. These small bracket-like structures are less than 1 inch in diameter with a gray-white upper surface and smooth, purple lower surface. Nearby poplars and willows are a frequent source of spores in other countries although those hosts are rarely diseased; the fungus is saprophytic on the dead wood.

Silver leaf is a moisture-dependent disease: fruiting structures do not develop on rapidly drying wood. Most infected trees in our surveys showed symptoms on the northern side of the tree. Damp locations near or in the orchard should be examined first, especially on recently killed wood near ground level where the surface is kept moist by weed growth and irrigation.



Once sporocarps have been produced, spores can be discharged during any period of rain. There is no spore discharge when they are dry, so infection can only occur during wet weather.

Pruning wounds made during dormancy are the common sites of entry and under suitable conditions, this is even reported to occur when trees are headed back in the nursery. Some plants do recover from silver leaf disease but if the tree has been severely weakened because of poor nutrition, over-cropping or nematodes, etc., it may die.

Silver leaf is not spread by pruning shears and there is no evidence of spread in the soil. It is not transmitted in bud wood. There is no known cure for infected plants but wound protection by fungicidal sprays may well be possible in the future. The current outbreak of the disease in Sacramento Valley peaches should be kept under close observation. Every effort will be made to determine how and when the trees became infected and also if further spread is likely.

#### LICHENS AND MOSSES ON TREES

W. J. Moller

LICHENS flourish in shady, damp locations, especially on the cooler, northern side of trees and shrubs; their

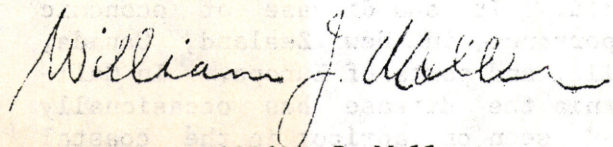
growth may occasionally kill twigs or branches or weak plants. They cause indirect damage to trees by stopping light or air reaching the plant surface rather than being active parasites. Lichens are part fungus-part alga, the two organisms benefitting from a symbiotic relationship in which one provides food and shelter for the other; no food is taken from the plant. They have a wide host range and there are three types found on plants: crustose, a crust-like growth on the bark; foliose, leaf-like and prostrate but not so firmly attached to the bark; fruticose, brush-like, erect or hanging. If they become too disfiguring or abundant for plant health, lichens can be easily controlled with bordeaux mixture or even spray lime. Spray when plants are dormant and the lichens are dry. Sulfur sprays are also effective but may damage some plants.

MOSSES and liverworts, by contrast, are miniature land plants generally found in cool, damp locations on the ground or where some soil has collected, e.g., on rocks, buildings, tree branches or trunks, etc. Like lichens, mosses are not parasitic but have primitive roots which obtain nutrients and moisture from the soil. They do not harm plants but are strong indicators of moist spots in a garden. If unwanted they can easily be removed from trees with a wire brush which eliminates their soil substrate as well.

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CALIFORNIA PLANT PATHOLOGY is a periodical compiled and edited by the Extension Plant Pathologists. It is written primarily to keep University of California Agricultural Extension Personnel informed of developments in the control of plant diseases.

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