

## Cytospora Canker ("Gummosis")

Cytospora (sigh-tah'-spor-a) canker or gummosis is an extremely destructive disease of stone fruits (i.e., peaches, sweet cherries, apricots, and plums). The canker is caused by the Cytospora fungus that infects the tree bark. On 3-year-old or older peach trees, it has been estimated that at least one-third have cankers present on the trunks, scaffold limbs, and/or the fruiting wood. The usual symptom is the amber gum, or gummosis, which oozes from the infected area. Continued canker growth over a season or two weakens shoots and branches above the canker by reducing flow of water and food between the roots and upper portion of the tree. This can result in death of branches above the canker (termed dieback) within a season or two after infection.

Apples also can become infected with Cytospora canker, but without the gum associated with the disease on stone fruit. The fungus kills the outer bark of branches and eventually may result in dieback as the infected branches become girdled.

Cytospora enters the bark through a wound such as low-temperature injury to the bark, pruning wounds, cultivation and implement wounds, borer damage, and spray injury. The injured cells provide the necessary food for the fungus spore to germinate and grow at this injury point. A yellow or amber gum indicates the presence of a disease organism like Cytospora, while clear gum indicates injury due to a non-disease cause (e.g., cold injury, hail impact damage, etc.). About 30 days after infection and the start of canker formation, a new crop of spores is ready for release from the newly formed pinhead sized fruiting bodies.

Canker development can take place throughout the year, but the greatest growth occurs in the spring. Canker development is at a minimum during the summer when tree growth is greatest. Extensive gumming frequently shows up in early summer on trees with no symptoms of canker the previous fall because of rapid canker growth in the spring. Active tree growth can create a barrier that temporarily halts the fungus.

Viable Cytospora spores can be found on the surface of peach trees all year long, including during below-zero weather, with peak months being July through September. Cytospora spores are carried primarily by splashing rain, pruning tools, or insects. Because trees are constantly being exposed to spores, chemical protection is necessary following any severe damage to bark or pruning injury. Replanting of young peach trees in an older, infected orchard should be avoided wherever possible. Delay pruning until late winter or early spring to greatly reduce risk of infection. The immediate use of wound dressings [See (c) below] on large cuts (over 1 inch in diameter) is helpful, particularly if cuts are made in early winter. The period of lowest spore availability usually is between March and May and corresponds to the period of low relative humidity and temperatures below 85° F.

Attempts to find chemical and nonchemical controls to eradicate and prevent Cytospora canker continue. The following suggestions for canker control can be offered:

- (a) Cultural practices -- promote early hardiness of trees in autumn (avoid excess nitrogen and late summer pruning); use reflective paints on tree bark to prevent sunscald.
- (b) Eradication -- prune off and remove from the orchard any infected twigs and limbs.
- (c) Surgically remove cankers during winter -- where infection is limited to an area less than 50% of the branch circumference, cut with a sharp knife one inch beyond than actual canker to remove all diseased reddish-brown inner bark. Be sure to round the incision edges especially around the top and bottom because wounds with that shape heal more readily. Treatment of wounds with the following wound dressing immediately after cutting and scragging is particular critical. The wound dressing should consist of a diluted alcohol solution (e.g, shellac thinner diluted 1:1 with water) with captan fungicide (4 teaspoons / gal. of spray mix).
- (d) Fungicide sprays for protection of small pruning wounds during wet periods -- use at delayed dormant, petal fall, and shuck fall.
- (e) Avoid injuries to trees -- replace cultivation close to tree trunks by chemical weed control.
- (f) Control all borer insects.



In an earlier study, Biggs, El-Kholi, & El-Neshawy (1994) found three fungicides and one calcium salt to be very effective in preventing growth of the *Cytospora* fungus in culture media over 6 days and on excised peach twigs over 10 days. These included captan (Captan), thiophanate methyl (Topsin), iprodione (Rovral), and the food preservative salt calcium propionate. Both the captan and the thiophanate methyl totally blocked growth of the fungus both in culture media and on the excised, wounded peach twigs. The iprodione totally blocked growth of the fungus in culture media, but did allow a small amount of growth on the peach twigs. There was no discernable growth of the fungus in culture medium with the calcium propionate salt for the first two days and only slight growth after 4 and 6 days; excised, wounded peach twigs treated with this salt had only slight growth of the fungus after 10 days. Thus, there may be some hope that treatment of stone fruit tree canker wounds using one of these materials after canker surgery / removal could help block re-infection with *Cytospora* fungus. Whether they might provide the curative effect that benomyl (Benlate) was able to provide remains to be tested. Captan, Rovral, & Topsin are all registered for use on stone fruit trees at the present time; the calcium propionate salt is not registered at this time for use as a fungicide on any crop.

The rates for these fungicides are as follows:

- captan (Captan 50W; 2 lb product / 100 gal) [= 4 teaspoons / gal carrier liquid]
- thiophanate methyl (Topsin-M 85WDG; 6 oz product / 100 gal) [= 0.75 teaspoon / gal carrier liquid]
- iprodione (Rovral 50WP; 2 lb product / 100 gal) [= 4 teaspoons / gal carrier liquid]

The carrier liquid used effectively with the benomyl previously was a 50% alcohol solution; denatured alcohol purchased at the hardware store as shellac thinner was diluted 1:1 with water and white latex paint (13 fl. oz. / gal) for this use. The mixed liquid with the fungicide was then sprayed onto the canker directly. Treatment was repeated yearly. This treatment with benomyl appeared to kill the fungus and allow the tree to wall off the infection. Whether any of these materials will work as well remains to be seen. The thiophanate methyl material, Topsin-M, is the closest to the benomyl in terms of its chemical classification and thereby could have the greatest potential as a replacement for benomyl. But captan and iprodione may work well as wound protectants in canker surgery situations for which the now long-gone Mertect 340F was used effectively.

A final note: the calcium propionate deserves further study as a potential for organic orchard situations. It might prove to be able to meet the requirements for organic certification if it could be shown to be effective under field conditions. The rates that need study for this salt are:

- calcium propionate ( 400 – 600 mg  $\text{Ca}^{2+}$  / L; = 1.57-2.35 lb anhydrous salt / 100 gal) [= 3 - 4.7 teaspoons of anhydrous salt / gal carrier liquid]

However, please note that this material is NOT currently registered for use on trees and therefore SHOULD NOT be used until such time as it might become registered for use.

#### Reference:

Biggs, A.R., El-Kholi, M.M., and El-Neshawy, S.M. 1994. Effect of calcium salts on growth, pectic enzyme activity, and colonization of peach twigs by *Leucostoma persooni*. Plant Dis. 78:886-890.