UMass Amherst Fruit Program

Early Season Disease Management for Grapes

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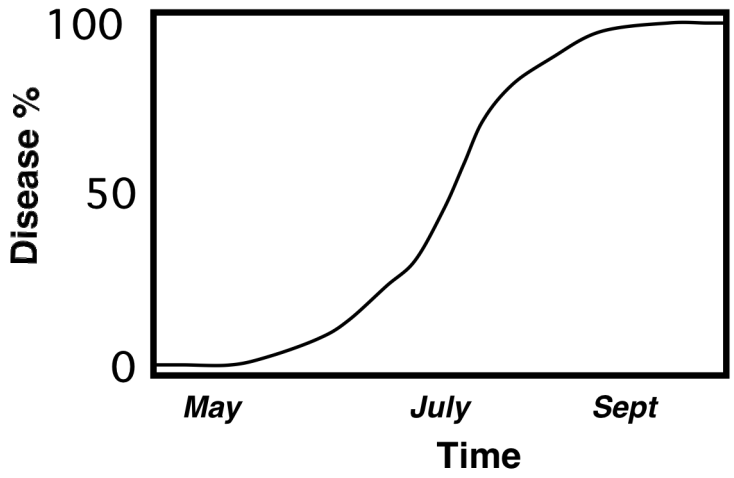
Disease management in grapes starts early. For many diseases, if a grower sees symptoms, it's going to be difficult to keep a disease under control. So, it's best to start disease management before the grapes, and their pathogens, start to grow.

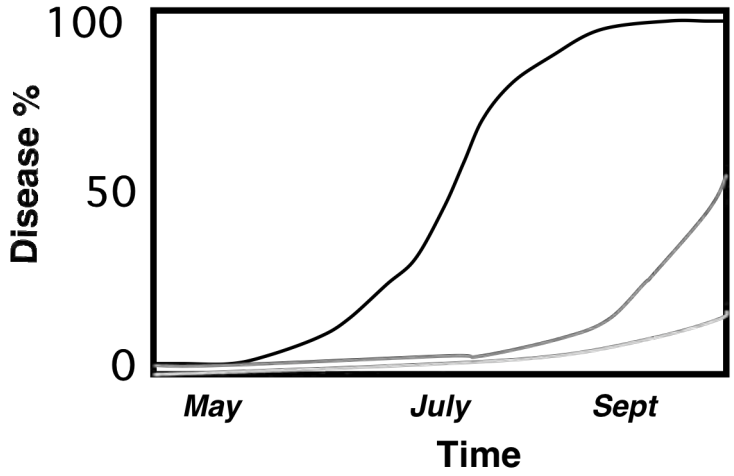
A Short Introduction to Disease IPM. Integrated pest management, IPM, takes an ecological approach to crop production. One of the most important concepts in disease management using IPM is **initial inoculum**. This is the amount of a pathogen that is around to start an epidemic at the beginning of an epidemic. In temperate climates, the fungi that cause grape diseases have to get through the winter, when there are no grapes to feed on, to the next growing season. To do this, they form survival structures, usually in places on or near the grapes. When the weather turns warmer, and the grapes start to grow, then the pathogens produce spores that will allow them to colonize the new grape tissue. The more of these survival structures, the higher the risk of disease, and the more difficult it is to manage the disease.

In general, if a grower does nothing to manage a disease, it will slowly build up, then explode and infect a large number of plants, then gradually slow the rate of new infections as most plants are already infected. A graph of the amount of disease over a typical growing season, where no fungicides or other management is done, would typically look like a stylized S, that is, sigmoid.



By reducing the amount of initial inoculum, an epidemic can be delayed. That is, it will take more time for it to build up to the explosive stage. By that time, maybe the plant will be more resistant because it's more mature. Imagine, in our typical disease in the graph, that the grapes are harvested in September. Under standard, no

control conditions, disease has infected nearly all plants. But if the initial inoculum is reduced, the epidemic takes longer, and the whole curve shifts to the right. In the graph below, the gray lines show how the epidemic would develop with decreased amounts of initial inoculum. By September, for the light gray line, the level of disease is not very high. So, reducing initial inoculum before the growing season reduced the amount of disease at harvest!



Of course, in the real world, it is more complicated, but the idea of reducing initial inoculum is a sound one, used often in IPM.

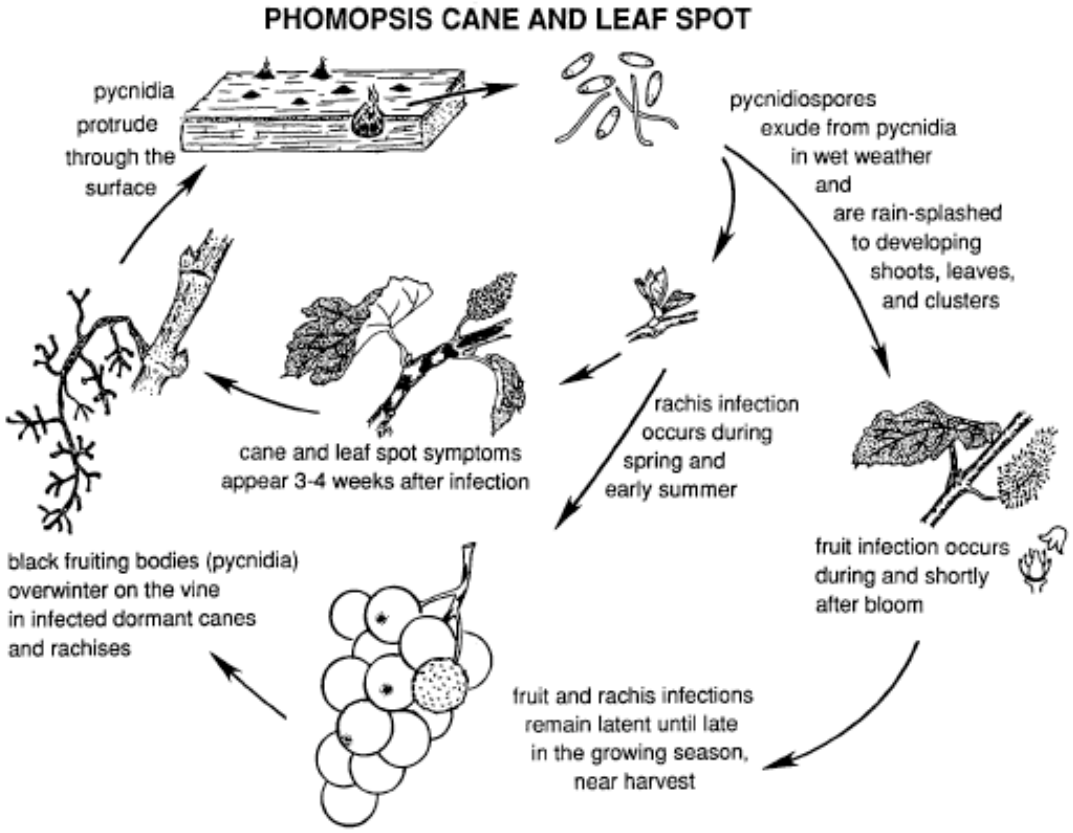
Reducing Initial Inoculum in Grapes. There are some general rules of thumb that can be useful in reducing initial inoculum of grape diseases. Many grape pathogens, for example, ***Phomopsis***, produce fruiting structures on the old wood of the vines. Notice in the disease cycle below (from J. Pscheidt and R. Pearson, Cornell University) that *Phomopsis* produces fruiting structures called pycnidia in the dormant canes and rachises. Each growing season, the Phomopsis epidemic starts when rain releases spores from these pycnidia, and the spores land on developing rachises, shoots, leaves and clusters. To stop or delay Phomopsis, growers have to destroy as many of the pycnidia as possible. This process, pruning diseased plant tissue and removing it from the vineyard, is known as **sanitation**.

If pruning is done by hand, then much of the infected wood can be pruned off. But the fungal fruiting structures in that pruned wood can still produce spores that cause infections. The prunings that have these fruiting structures should be removed from the vineyard before new growth starts.

In addition, inevitably some pycnidia are left on the vines. To deal with this, an early season application of liquid lime sulfur is very useful. Liquid lime sulfur is toxic to most fungi, and a dilute application on dormant canes will destroy many of the *Phomopsis* pycnidia. Mike Ellis, pathologist at Ohio State University, has compared dormant sprays of liquid lime sulfur and copper for efficacy, and recommends a spring application of lime sulfur only. Apply at 10 gal. in 100 gal. of water per acre.

This application will also reduce **anthracnose** inoculum in the vineyard. Currently anthracnose is not a big problem in New England. However, in most moist, relatively warm climates, including the upper Midwest, the disease can be serious.
We aren't sure where the pathogen that causes **ripe rot,** *Colletotrichum*, overwinters. However, there's a reasonable chance that it is on the infected berries and other tissue in the vineyard. And it is not clear what, if any, effect lime sulfur may have on the ripe rot pathogen if it is in a vineyard. However, given that some vineyards experienced high levels of ripe rot last year, and given that growers will get some benefit against anthracnose at least, then, as they say, it couldn't hurt.

As with *Phomopsis,* sanitation will reduce inoculum for ripe rot and anthracnose. Any old, mummified berries, rachises or other tissue that may be on the vines, or lying in the row, should be removed, because that's where the fungus overwinters. It's very hard to get fallen berries out from under vines, though offset rotary hoes may be useful. Whatever cultivation can be done to remove or bury leaves and old fruit in the rows should be done. Failing that, the lime sulfur spray, if it covers debris in the rows, should reduce the fungal inoculum, at least to some extent.



From Pscheidt & Pearson, 1991, *Phomopsis Cane and Leaf Spot of Grape*, Cornell Disease Identification Sheet no. 6

This early season sanitation will also have an effect on **black rot**. The black rot pathogen overwinters in infected berries, old diseased leaves and diseased canes. The first step in making later fungicide applications more effective is removing or burying tissue infected with the black rot fungus.

Finally, there is one other place that potentially harbors initial inoculum for many grape diseases. That is the wild grapes that may grow near a vineyard. Getting rid of wild grapes is a daunting task, but it can help with many pests, both disease and insect. This time of year, it's a little easier to tackle the wild grapes. Any progress in eliminating them will pay off, even if it takes several seasons to complete the job.

So, as a first step in grape IPM, get rid of the initial inoculum using sanitation, a dormant liquid lime sulfur spray, and removal of wild hosts.