Phomopsis symptoms on Grenache grape leaf.

Chemical control of phomopsis grapevine cane and leaf spot disease

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Dormant or spring chemical applications controlled phomopsis

W. J. Moller

Tendrils exude from fungal fruiting bodies on section of grapevine bud spur.

Phomopsis cane and leaf spot of grapevine, a fungal disease formerly known as dead arm, was first reported in California from vineyards near Sacramento in 1935. Since then it has been consistently present in, but restricted to, the Central Valley. In years when spring rains occur after shoot growth begins, the disease can become severe. The most susceptible varieties are Tokay, Grenache, and Thompson Seedless.

Life cycle and symptoms

The causal fungus, *Phomopsis viticola* Sacc., overwinters in the outer bark of bud spurs infected the previous growing season. As temperatures increase in late winter, spores form in the fungal fruiting bodies (pycnidia) developed in the bark tissue. During spring rains, these spores exude from pycnidia in a tendril-like mass (cirrhus) and are subsequently dispersed by splashing rain droplets onto the young shoots, where infection occurs. Symptoms become visible about 30 days after infection.

High summer temperatures suppress activity of the fungus and disease development. In the fall and winter the fungus resumes activity in the bark tissue and produces the inoculum for the following season.

J. Hall

Symptoms of the disease are most prominent on the basal leaves and lower portion of the shoots. Leaf symptoms consist of pinpoint, reddish brown spots surrounded by a zone of chlorotic tissue creating a halo effect. If lesions are numerous, the leaf becomes distorted and tattered; occasionally the blade falls off at the petiolar junction.

Phomopsis leaf and shoot symptoms.

On shoots, symptoms appear as small brownish black spots that may expand to oval-shaped lesions. If numerous lesions occur at the base, they often coalesce and blacken that portion of the shoot. The vine is damaged primarily by death of severely infected shoots. Although rains before harvest favor infection and subsequent rot of fruit, this phase of the disease is rare in California.

The two methods used to control this disease are selective pruning of infected spurs and applications of chemicals. Chemical control commonly practiced consists of a single application of sodium arsenite or dinoseb while the vines are still dormant (dormant treatment), or two applications of captan or mancozeb (foliar protectants) at the time of bud break and 7 to 14 days later, depending on the weather. Dormant treatments should be made at least four weeks after pruning and before bud break to avoid phytotoxicity. Foliar protectants should be applied just after bud break but before spring rains.

There is little experimental evidence on the efficacy of these chemicals in controlling phomopsis in California. Therefore, we investigated their effects on inoculum levels, disease severity and yield of infected vines.

Field plot studies

The study was conducted during 1979 and 1980 in a 10-acre section of a commercial Tokay vineyard near Lodi, California. Treatments were randomized in a complete block design with six replications. Single applications of sodium arsenite or dinoseb during dormancy and two spring applications of captan were compared using the same vines for the two consecutive years.

The number of active pycnidia was monitored by counting exuded cirrhi containing infective spores on bark strips taken from infected spurs. Samples were periodically examined to determine how the chemicals affected activity of the fungus and whether this effect was carried over to the following season.

Disease severity was evaluated in the late spring of each year. Symptoms on leaves and shoots were visually rated on a scale of 0 to 3 (3 being the most severe symptoms); these values were weighted and averaged to give an index of disease severity for each treatment. At the end of each season, the yield from various treatments was determined by counting and weighing all fruit on the vines that previously had been rated for disease.

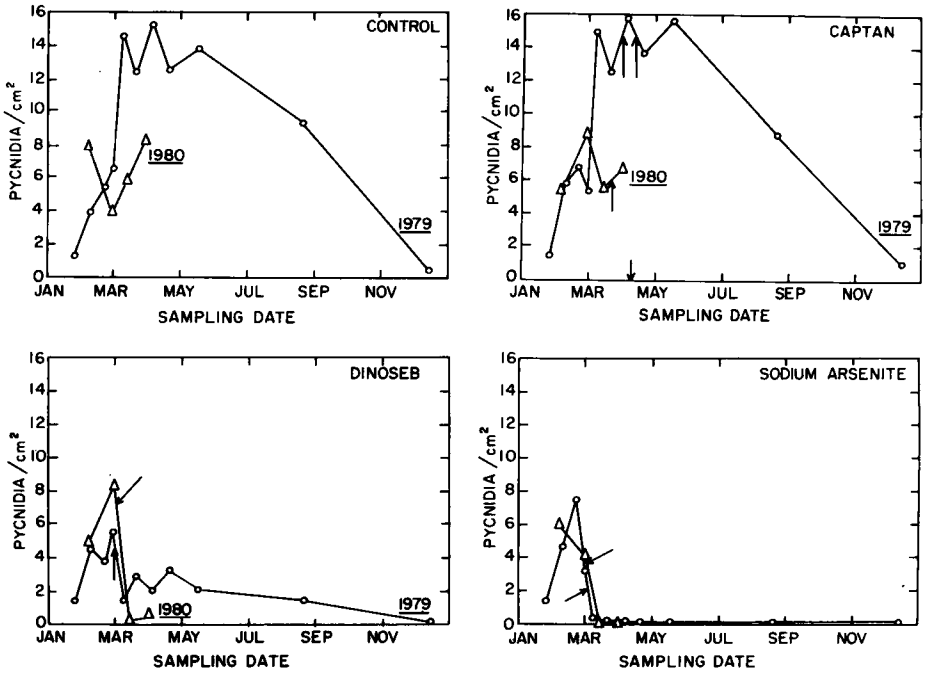
Results and conclusions

The dormant treatment with sodium arsenite or dinoseb significantly reduced the numbers of active pycnidia following application (see graph). This low level of pycnidial activity was maintained throughout the season, suggesting that both chemicals had a lasting effect. The foliar treatment, captan, appeared to have no effect on pycnidial activity: numbers of active pycnidia in treated plots did not differ significantly from those in untreated control plots.

Both the dormant and the foliar treatments significantly reduced disease severity, however, when compared with untreated controls. Sodium arsenite was more effective than either dinoseb or captan in both years. The low levels of disease severity after dormant treatment with sodium arsenite or dinoseb correlate well with the observed reduction in pycnidial activity.

Captan was as effective as dinoseb in the 1980 trial but was less effective the previous year. In 1979 several rains occurred shortly after bud break and before the first captan application. In 1980 the initial captan treatment was made just after bud break and before the first rain, resulting in more effective control than in 1979.

To determine the residual effect of the dor-



Active spore-producing bodies on bark strips showing effects of various chemical treatments. Arrows denote time of chemical application each season.

mant treatments, a trial was conducted in which a set of 12 vines was treated with either sodium arsenite or dinoseb in 1979 but not in 1980. Disease severity on these vines in 1980 was no different from the untreated controls, indicating that the effect of dormant treatments lasted only one season. Furthermore, even though disease incidence in plots treated during dormancy was low in 1979, the inoculum (active pycnidia) increased to a level comparable to that in untreated plots by the spring of 1980 before treatment.

In these trials a significant correlation ($R = -0.51$) was observed between an increase in disease severity and a decrease in vine yield. Vines treated with captan, dinoseb, or sodium arsenite had 3, 6, or 10 percent higher yields, respectively, than untreated controls in 1979. When disease pressure was significantly higher in 1980, the same three treatments had 8, 14, or 15 percent higher yields, respectively, than the controls.

Although yields of treated vines were consistently greater than untreated vines, statistical differences ($p \leq 0.05$) could not be demonstrated. Further investigations are needed to determine if our inability to demonstrate statistically a significant yield response to chemical treatment is related to a low potential for damage by this pathogen, our measurement of disease severity, or inherent variability in fruit weights with inadequate sampling.

In conclusion, phomopsis cane and leaf spot disease can be controlled by chemical treatments. Dormant application of either sodium arsenite or dinoseb is apparently effective in reducing the inoculum and disease, but there is no carry-over effect to the following season. When properly applied before rain, captan is also effective in suppressing disease symptoms. Although there is a correlation between disease severity and vine yield, the effect of chemical treatments on yield is less clear.

Sodium arsenite and dinoseb did not induce phytotoxicity in these experiments. Both chemicals can damage vines if improperly applied, however, and label directions should be strictly observed. There are some restrictions by wineries on the acceptance of grapes from vines to which sodium arsenite has been applied.

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Botrytis rot on grape (7X lifesize). Jack Kelly Clark

Vineyard cultural practices may help reduce botrytis bunch rot

Steven D. Savage ■ Mary Ann Sall

Two-wire trellising and midseason hedging help minimize botrytis bunch rot, possibly by influencing the vine's microclimate.