EPIDEMIOLOGY AND CONTROL OF ALTERNARIA LEAF BLIGHT

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OBJECTIVES

1) Monitor population development on leaves, test for latent infections in leaves in early spring, and determine temperature requirements for spore germination.

2) Evaluate fungicides and application timing for disease control.

3) Test the effects of tree architecture on disease incidence.

4) Monitor climate in selected locations to associate environmental conditions with disease.

5) Investigate the genetic variability among isolates of *A. alternata* and determine the relationship to pathogenicity.

SUMMARY

Alternaria leaf spot causes leaf lesions and defoliation and can be found in orchards throughout the state. In most instances, noticeable defoliation occurs only after harvest and causes no apparent damage. Where severe and repeated preharvest defoliation occurs, most commonly in southern valley areas, trees are weakened and yield losses can exceed 50 %. The disease appears to be exacerbated by dews and high humidity and often is worse on trees that have spreading canopies than those that are more upright.

The pathogen, *Alternaria alternata*, is actually a complex of several forms of the fungus. Recent advances in the taxonomy of *A. alternata* have elevated the forms to distinct species. Thus far we have identified three species, *A. alternata*, *A. arborescens* and *A. tenuissima* among our collection of isolates that were derived from lesions on almond leaves. The studies on the genetic variability among these isolates are in progress.

The field experiments were conducted in two adjacent blocks in a commercial orchard in Kern County. In one block, a multiple-year experiment on the effects of tree architecture on disease development was initiated. The details and results ofthis experiment may be found in the report by Mario Viveros.

Treatment timing and fungicide efficacy trials were conducted in the second block on cultivar Sonora trees, and these experiments and our results are reported here. The treatment timing experiment began with treating all trees with iprodione + ziram at full bloom and 2 and 5 weeks after petal fall. This was followed by application of azoxystrobin three times at two-week

intervals in mid spring. The three-application azoxystrobin treatments began at six times, the first series of three started on 6 April and the last on 22 May. Controls included trees treated three times with iprodione + ziram but not abound and non treated. There were four single-tree replications of each treatment arranged in a randomized complete block design. There were no significant differences among the azoxystobin timings although the percent infected leaves tended to decrease with the later treatments. Trees treated with iprodione + ziram then azoxystrobin had least disease, but those treated with iprdione + ziram alone also had less disease than the non treated controls. Thus, the addition of iprodione + ziram applications in the early part of the year may improve the performance of azoxystrobin.

Pathogen population and disease development were monitored in the two treatments receiving only the iprodione + ziram applications and the non treated controls. Leaves were collected at approximately weekly intervals from mid March through June and once each in mid and late July. Pathogen populations were monitored by washing 100 leaves per replication, culturing aliquots of the wash water on dichloran chloramphenicol peptone agar, incubating the cultures for 21-28 days at room temperature and counting the number of *Alternaria spp.* colonies. From these counts, the average numbers of colony-forming units (CFU) per leaf were calculated. Populations remained low from mid March through the end of April. After an increase in early May, population levels remained the same until another increase in mid July and again in late July. Populations were greater on the non treated than treated trees.

Disease development was tracked by counting the number of lesions present on the leaves used for pathogen population studies and by evaluating infection of detached fresh leaves. Forty fresh, healthy leaves per sample were surface sterilized in 10% household bleach for 2-3 minutes, washed in sterile deionized water, and placed on wire screens over water in plastic boxes. The boxes were sealed in plastic bags and incubated for 10 days at 78-80 F. Infection was not detected until mid May, remained low until late May and increased most at the end of July. There were fewer lesions on external than internal external leaves at the beginning of the season, similar amounts in June, and more in July.

Inoculations of cultivar Butte leaves were made at approximately 3 week intervals at Kearney Agricultural Center. Intact healthy leaves on trees were inoculated with one isolate of *A. tenuissima* from Butte County and five isolates of *A. alternata* from Kern County. All isolates produced more lesions than the non inoculated control, and *A. tenuissima* was far more pathogenic than the *A. alternata* isoslates. One isolate of *A. alternata* was used to inoculate surface sterilized and non surface sterilized detached leaves. Detached leaves were incubated for 14 days at 78-80 F. Disease was less on surface sterilized than non surface sterilized and on non inoculated than inoculated leaves.

In spore germination tests, *A. tenuissima* germinated more rapidly at lower temperatures than *A. alternata*. This may partially explain why *A. tenuissima* produced high infection levels earlier in the year than did *A. alternata* in inoculation tests.

Climatic data were monitored through the season and these data are being summarized.

Several experimental fungicides were compared to azoxystrobin in the efficacy trial. Only the strobilurin fungicides (those with chemistry similar to that of azoxystrobin) were effective.