fied by probing with a chitinase gene from *S. maltophilia* 34S1; whereas the second gene, *chiB*, was identified with the use of degenerate primers designed from N-terminal sequences of the protein. Analysis of *chiA* indicates this gene shares significant homology to *chiA* from the related biocontrol strain N4-7 (>90%), but less to *chiA* from strain 34S1 (70%). Both genes are currently being characterized for their roles in fungal antagonism.

Fusarium cone tip blight: A new disease of *Humulus lupulus*. J. C. BIENAPFL (1), C. M. Ocamb (1), R. Klein (2), and M. Nelson (3). (1) Department of Botany & Plant Pathology, Oregon State University, Corvallis, OR 97331; (2) California Pistachio Commission, 1318 East Shaw Ave., Fresno, CA 93710; and (3) Washington State University, 24106 N Bunn Rd, IAREC, Prosser, WA 99350. Phytopathology 91:S9. Publication no. P-2001-0059-AMA.

A necrosis at the tip of cones was observed on hop (*Humulus lupulus*), cultivar 'Nugget', grown in Oregon. Isolations were made from symptomatic cones collected from 5 different fields, and *Fusarium sambucinum* and *F. avenaceum*, were recovered. To complete Koch's postulates, 60 cones of each hop cultivar were collected from each of 3 different fields and placed in moist chambers. Spore suspensions of individual *Fusarium* species were sprayed onto cones and necrosis was noted 5 days later after incubation in ambient light at 24 C. Inoculations with *F. sambucinum* yielded 60% and 65% necrotic cone incidence for cultivars 'Nugget' and 'Willamette', respectively. Inoculations with *F. avenaceum* yielded 65% and 61% necrotic cone incidence for 'Nugget' and 'Willamette', respectively. Cones sprayed with pure water had 32% (cv. Nugget) and 34% (cv. Willamette) necrotic cone incidence. Data by grower field and sample date will be presented.

Distribution and spread of Dogwood Anthracnose and powdery mildew in Michigan forests. Z. BLANKENHEIM and G. C. Adams. Dept. Plant Pathology, Michigan State University, East Lansing, MI 48824. Phytopathology 91:S9. Publication no. P-2001-0060-AMA.

Fifty GPS-referenced permanent impact plots were established in dense stands of *Cornus florida* in Michigan. The plots were distributed throughout the state in regions where the flowering dogwood occurs. *Discula destructiva* was biologically established in Michigan, however, it was absent from most native stands except near the cities of Grand Rapids, Kalamazoo, Muskegon and Paw Paw. Tree ring dating was employed to estimate time of arrival of the pathogen and rate of tree mortality. Infected stands were associated with housing developments located in forests. Infected *C. florida* were evident in the landscapes. Fruiting bodies of *D. destructiva* were found on all sources of *C. florida* and *C. kousa* in four nurseries studied. Apparently, anthracnose was spreading in the nurseries onto all susceptible *Cornus* species prior to resale. *Microsphaera pulchra* with abundant cleistothecia was present in the native stands examined. The mildew caused no apparent detrimental effect on dogwood health in Michigan, in contrast to reports of severe damage in southeastern states.

Stimulation of systemic resistance marker PR1a in tobacco by Oxycom™. K. A. BLEE (1), K. Y. Yang (2), and A. J. Anderson (2). (1) Department of Biological Sciences, California State University, Chico, CA 95929-0515; (2) Department of Biology, Utah State University, Logan, UT 84322-5305. Phytopathology 91:S9. Publication no. P-2001-0061-AMA.

Effectiveness of Oxycom™ in inducing resistance gene expression in tobacco was examined using promoter fusion PR1a::GUS, which responds to salicylic acid (SA), and is indicative of systemic resistance activated through SA-protein-kinase signal transduction pathway. Oxycom™ components A and B each stimulated PR1a::GUS activity by 48 h; response to component A was weaker than with B. Combined application of A and B increased PR1a::GUS activity two-fold over response to B. Repeat A/B treatments stimulated PR1a::GUS activity to levels higher than obtained with single treatment. Increased GUS activity correlated with greater accumulations of PR1 detected by a monoclonal antibody. Aerial spray coverage with the A/B mixture resulted in greatest stimulation of GUS activity that was uniform in leaves. A/B treatment of the growth medium resulted in lesser stimulation with activity localized to vascular tissues in leaves. Application of a single 20 µL droplet to one leaf resulted in the lowest stimulation of activity in treated and also adjacent leaves.

Effect of calcium salts on postharvest cranberry fruit rot and fruit rot fungi. A. B. BLODGETT, R. W. Caldwell, and P. S. McManus. Dept. of Plant Pathology, University of WI, Madison, WI 53706. Phytopathology 91:S9. Publication no. P-2001-0062-AMA.

Fruit rotting diseases of cranberry are not a major concern in WI. However, late season and postharvest rots can be a problem for fresh fruit production. Previous research has shown chlorothalonil to be effective but phytotoxic. Mancozeb was ineffective and copper has not been tested. Calcium (Ca) salts decrease the incidence of postharvest diseases in several fruit crops. To determine the effects of Ca on incidence of postharvest fruit rot in cranberry, three Ca salts (Ca chloride, Ca nitrate, and Ca propionate), chlorothalonil, and copper hydroxide were applied at three sites in central WI. Rot incidence was calculated at harvest and after storage; fungi were isolated and identified. Major storage rot pathogens were *Physalospora vaccinii, Allantophomopsis lycopodina, Phomopsis vaccinii*, and *Fusicoccum putrifaciens*. To determine if Ca salts inhibit storage rot fungi, five species were grown on medium amended with Ca salts; radial growth measurements were compared with unamended controls. Ca salts do not appear to have an affect on fruit rot incidence. However, in vitro studies show significant inhibition of the fungi by Ca propionate.

Systemic induction of ferulic acid and other phenolic compounds in *Pinus nigra* inoculated with *Sphaeropsis sapinea*. J. T. BLODGETT and P. Bonello. Dept. of Plant Pathology, Ohio State Univ. Phytopathology 91:S9. Publication no. P-2001-0063-AMA.

The objective of this study was to examine systemic induction of phenolic compounds in the phloem of pines inoculated with the fungal pathogen *S. sapinea*. Five-year-old, greenhouse-grown Austrian pines were wounded at the stem base and treated with 1 of 6 treatments: living or killed mycelium of *S. sapinea* (A morphotype); crude lipid or protein preparations from *S. sapinea* ; mock inoculation; no wounding (untreated). Phloem/bark tissue was sampled 25 cm above treatment sites. HPLC analysis of methanol extracts showed that live inoculations significantly elicited accumulation of ferulic acid ($P < 0.001$) over the other treatments. Ferulic acid glucoside and 2 unidentified compounds were also induced in the same treatment. This study supports previous work on systemic induced resistance in pines, a phenomenon well demonstrated in herbaceous pathosystems but not in conifers, and sets the stage for future studies of localized and systemically induced pathways involved in pine disease resistance/susceptibility.

Re-emergence of red root rot of corn in Colorado. T. D. BLUNT (1), B. Ambruzs (2), and W. Brown (1). (1) Department of Bioagricultural Sciences and Pest Management, Colorado State University; (2) Department of Plant Pathology, Iowa State University. Phytopathology 91:S9. Publication no. P-2001-0064-AMA.

Phoma terrestris, the causal agent of red root rot (RRR) of corn, is traditionally associated with pink root of onion. A widespread saprophyte and weak parasite, it is also a soil inhabitant. Observations elsewhere indicate that P. terrestris is one of a complex of fungi (*Pythium irregulare*, *Fusarium* sp.) needed at the root to cause disease. The symptoms, not generally apparent until just prior to senescence, include reddish pink to deep carmine roots (similar to Gibberella stalk rot), root necrosis, grayish-green foliage and stalks with an overall wilted appearance. Severe lodging can occur due to reduced root mass. Diagnosis includes characteristic black pycnidia found on the roots and dark brown/black staining on the first internode above the soil line. Mycelium is hyaline, septate and anastomosing. RRR was first reported in Colorado in the 1940's, but not observed again until re-emergence in 1997. It is generally found in northeastern/eastern Colorado with corn grown under pivot irrigation.

Changes in population structure of *Monilinia fructicola* over the course of a single growing season using microsatellite primers. E. W. A. BOEHM, Z. Ma, Y. Luo, and T. J. Michailides. University of California, Kearney Agricultural Center, Parlier, CA. Phytopathology 91:S9. Publication no. P-2001-0065-AMA.

The population structure of the brown rot of stone fruit pathogen *M. fructicola* was investigated from a Royal Diamond Plum orchard in Reedley, CA along a transect of twelve trees over the course of a single growing season. Single-spored isolates were obtained at three different time points: from apothecia in late February (n=43), from blighted flowers in mid-March ($n = 102$) and from infected mature fruit in September (n=146). A series of microsatellite primers, used alone or in combination, were screened for polymorphisms and included primers designed to fungal telomeric sequences (CCCTAA)4, the M13 core repetitive sequence, the enterobacterial repetitive intergenic consensus (ERIC), the bacterial tRNA intergenic spacer region, (CAC)5, (GTG)5, (TC)8RY, and (AAG)8. Independent segregation of polymorphic amplicons was determined by screening populations of single ascospore isolates derived from the same apothecia. Data will be presented comparing and contrasting