

Suppression of apple bitter rot (*Colletotrichum* spp.) by calcium salts. A. R. BIGGS. West Virginia University, P.O. Box 609, Keameysville, WV 25430. Phytopathology 87:S9. Publication no. P-1997-0057-AMA.

The effects of three calcium salts on conidial germination, germ tube elongation, growth in vitro, and infectivity were studied for the apple pathogens *Colletotrichum gloeosporioides* and *C. acutatum*. Calcium chloride (CC), calcium propionate (CP), and calcium silicate (CS) had no effect on conidial germination. CC and CP inhibited germ tube growth by about 50% relative to the control. All three calcium salts reduced fungal dry weight in liquid culture media. Apples were wounded, sprayed to the drip point with calcium salt solutions (1,000 microgram/ml calcium), and then allowed to dry. Fruit were then inoculated with 10^5 conidia of either fungus and incubated at 22 C. Fruit treated with CC and CP exhibited 30% smaller lesions than those treated with CS or the control, which were similar. Fruit treated with CC and CP exhibited delayed formation of acervuli relative to the control and CS, which were similar. When fruit were inoculated with varying concentrations of conidia, from 10^3 to 10^5 conidia/ml, fruit treated with CC exhibited reduced incidence of infection after inoculations with 10^3 conidia/ml. In all tests at 10^4 and 10^5 conidia/ml, the control and calcium salt treatments exhibited similar incidences of infection after inoculations.

Impact of alternative cropping systems on *Pratylenchus penetrans* in potato production in Michigan. G. W. BIRD, F. W. Warner, R. L. Gore and J. Davenport. Dept. Entomology, Michigan State University, East Lansing, MI 48824-1115. Phytopathology 87:S9. Publication no. P-1997-0058-AMA.

A long-term cropping system study was initiated in 1991 to evaluate the potential of 10 cropping regimes on *Pratylenchus penetrans* in potato (*Solanum tuberosum*) production in Michigan. From 1992-1994, tuber yields associated with continuous potato production declined. Yields associated with this cropping system increased in 1995 and stabilized in 1996. In 1993-1995, the highest tuber yields were associated with two years of alfalfa before a potato crop. Population densities of *P. penetrans* were always greater following first year alfalfa, compared to second year alfalfa. In 1996, a first-year potato crop following buckwheat plus 30 ton/A of cow manure compost over-yielded the alfalfa standard. Tuber yields for the buckwheat-compost system were 115 cwt/A greater than those from the continuous potato system. Final nematode population densities associated with these two systems were 4 and 585 *P. penetrans* per 100 cm³ soil plus 1.0 gram of root tissue, for the buckwheat/compost and continuous potato cropping systems, respectively.

Sources of powdery mildew resistance in the USDA cucumber germplasm collection. C. C. BLOCK. North Central Regional Plant Introduction Station, Iowa State University, Ames, IA 50011. Phytopathology 87:S9. Publication no. P-1997-0059-AMA.

Eight hundred and ninety-nine cucumber (*Cucumis sativus*) accessions were evaluated for resistance to powdery mildew, caused by *Sphaerotheca fuliginea*. Ten plants per accession were spray-inoculated with a spore suspension adjusted to 50,000-75,000 conidia/ml of deionized water (0.02% Tween 20). Plants were inoculated when the cotyledons were fully expanded, and then twice more, at 3-day intervals. Each plant was rated at 14 and 18 days following the first inoculation. Plants were scored as susceptible, intermediate, or resistant, based on fungal growth and sporulation on the hypocotyl and first true leaf. Accessions showing any level of resistance were retested, with two replications of ten plants. The highest-rating accessions were all from Asian sources, including China (PI's 418962, 418964, 432860, and 432870), India (PI 197088), Japan (PI's 288238, donated to USDA via Egypt, and 390258), Pakistan (PI 330628), the Philippines (PI's 426169 and 426170), and Taiwan (PI's 321006, 321008, and 321009). Accessions showing resistance in the greenhouse were even more resistant in field tests.

*** Water stress releases *Sphaerotheca sapinea* from latency to result in *Pinus resinosa* seedling mortality.** J. T. BLODGETT, G. R. Stanosz. Dept. Plant Pathology, University of Wisconsin, Madison, WI 53706. Phytopathology 87:S9. Publication no. P-1997-0060-AMA.

Sphaerotheca sapinea can persist on or in lower stems of asymptomatic red pine seedlings and can cause collar rot of previously healthy-looking seedlings after planting. The potential for host water stress to release *S. sapinea* from latency and induce collar rot was tested in a greenhouse. Two-yr-old seedlings were obtained from a nursery where the pathogen was present. Only asymptomatic seedlings were used. Transplanted, noninoculated seedlings were subjected to six watering regimes to maintain mean predawn needle water potential above -0.66 MPa (unstressed) or to allow it to decrease to -1.1, -1.7, -2.0, -2.5, or -3.2 MPa before watering (100 seedlings/

regime in each of two separate trials). Mortality increased from 7.5% for the unstressed treatment to 50% for the driest treatment ($P < 0.001$ for both trials). Seedling death was associated with development of girdling cankers in the lower stems/root collars of seedlings from which *S. sapinea* was isolated. The demonstration of a physiological alteration that affects release from a quiescent state and development of disease confirms that *S. sapinea* is a latent pathogen.

Infectivity of pear psylla (*Cacopsylla pyricola* Foerster) collected from pear decline infected trees. C. L. BLOMQUIST, B. C. Kirkpatrick. Dept. Plant Pathology, U.C. Davis, Davis, CA 95616. Phytopathology 87:S9. Publication no. P-1997-0061-AMA.

Pear decline (PD) and peach yellow leaf roll (PYLR) are diseases caused by phytoplasmas in California. The infectivity of the vector, pear psylla has never been measured in field collected insects. Pear psylla were collected monthly beginning in September from PD-infected trees located in three orchards in northern California. Infectivity of groups of 5 pear psylla was measured by a quantitative dot blot assay using a ³²P-labeled, PD-specific cloned chromosomal probe. The numbers of pools infected ranged from 75% in the central valley of California in September to 27% in the Sierra Nevada foothills in October. This corresponds to an infectivity rate of approximately 15% and 5% respectively. PCR assays using primers specific for the PD rDNA were also used to test both pooled and individual insects. The results of these assays generally supported the hybridization results. These results suggest that populations of pear psylla raised on PD-infected trees did not necessarily acquire the PD phytoplasma.

Benzaldehyde, kudzu, velvetbean and, pine bark powder as soil amendments, for the management of *Rhizoctonia solani* and *Sclerotium rolfsii*. L. E. BLUM (1,2) and R. Rodriguez-Kabana (1). (1) Dept. Plant Pathology, Auburn University, Auburn, AL 36849; (2) Financial support CNPq and UDESC, Brazil. Phytopathology 87:S9. Publication no. P-1997-0062-AMA.

The main objective of this research was to study the efficacy of kudzu powder (*Pueraria lobata*), mucuna powder (*Mucuna deeringiana*), pine bark powder, and benzaldehyde as soil amendments, on the disease incidence and severity of *R. solani* and *S. rolfsii*, under greenhouse and field conditions. The amendments were tested at concentrations ranging from 0.2 to 10% (w/w). All experiments were designed as randomized complete blocks with 6-10 replications, and with 5-20 soybean seeds or two tomato plants per replication. Results showed that benzaldehyde (0.1-0.4 ml/kg), pine bark (20-100 g/kg), mucuna (20-50 g/kg), and kudzu powder (20-100 g/kg) added in natural soil stimulated sclerotia germination of *S. rolfsii* at 24 and 48h after soil treatment. Only mucuna (50-100 g/kg) significantly ($P = 0.05$) decreased sclerotia germination in artificially inoculated soil at 24 to 48h after sclerotia deposition. Mycelial growth of *S. rolfsii* and *R. solani* was less abundant in treatments with mucuna. Sclerotia formation of *S. rolfsii* in amended soil was lower compared to the untreated control ($P = 0.05$). Generally, the disease level was lower, on the treated soil with mucuna, kudzu, or pine bark (20-30 g/kg) than on the untreated control ($P = 0.05$) for both pathogens at greenhouse and field level. The pod yield of soybean was significantly ($P = 0.05$) higher on treatments with with mucuna (20-30 g/kg), kudzu (20-30 g/kg), and benzaldehyde (1 ml/kg).

Cross protection inhibits systemic spread of cauliflower mosaic virus isolates in turnips. J. Bobish, K. Agama, A. Clark, and S. M. LEISNER. Dept. Biology, University of Toledo, Toledo, OH 43606. Phytopathology 87:S9. Publication no. P-1997-0063-AMA.

To investigate cross protection in cauliflower mosaic virus (CaMV), we chose isolates CM4-184 and D4 that produced different visible symptoms on turnip plants. Prior inoculation with CaMV isolate CM4-184 protected turnip plants against the D4 isolate, no D4 symptoms were observed on the protected plants. To determine how this protection was mediated we took advantage of differences in the genomes of these two viruses. While the D4 isolate has an intact genome, the CM4-184 genome contains a deletion of most of gene II. Using the deleted region as a probe, we were able to follow D4 infection by plant skeleton hybridization. The D4 virus appeared to replicate and spread from cell to cell in the inoculated leaves of protected plants but its ability to produce a systemic infection was impaired. CM4-184 also protected turnip plants against other isolates of CaMV. This inhibition of systemic spread was specific since prior inoculation of plants with CM4-184 and challenge with turnip mosaic virus did not protect plants against the latter virus.