

ABSTRACTS OF PAPERS

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ABSTRACTS

ATTENUATION OF VIRULENCE OF COCHLIOBOLUS VICTORIAE AFTER INCUBATION ON SOILS OR LEACHED SAND. C. O. Akueshi, A. B. Filonow, and J. L. Lockwood. Department of Botany and Plant Pathology, Michigan State University, East Lansing, MI 48824.

Conidia of *C. victoriae* were aseptically incubated for 15-30 days on a leached sand apparatus, or for 15-60 days on 5 different soils. Virulence was assessed using susceptible, aseptic oat seedlings in glass vials inoculated with 10^7 treated or untreated conidia/vial. Conidia incubated on leached sand or on soils were generally less virulent than untreated conidia. For example, mean root lengths of seedlings inoculated with 10^7 conidia/vial were 3.1 cm with untreated conidia and 4.8 cm with conidia leached for 15 days; root lengths of seedlings inoculated with conidia after 15 days incubation on soils were 4.1 to 5.0 cm. The reduced virulence was associated with decreased viability, decreased ability to germinate without exogenous nutrients, and retarded rates of conidial germination and hyphal growth on PDA. These results suggest that reduced virulence may be associated with depletion of endogenous nutrients.

IMPROVED TECHNIQUE FOR SCREENING BARLEY LINES AGAINST COCHLIOBOLUS SATIVUS AND PYRENOPHORA TERES. Dennis Berglund and V. D. Pederson. Dept. of Plant Pathology, N. Dak. State Univ., Fargo, ND 58105

Barley seeds were placed embryo end down and 1.5 cm apart along the edge of moistened seed germination paper (Anchor Paper Co., St. Paul, MN). The paper was folded over the seed and rolled together with a waxed paper backing and secured with a rubber band. The rolls were placed upright in 2 cm deep water in plastic trays at 20 C for seed germination. Seedlings in the 2-leaf stage were dip inoculated in a conidial suspension and incubated 15-24 hr in a moist chamber. After 6-7 days the seedlings were evaluated for disease reaction. Optimum incubation time and temperature were 15-24 hr and 20 C. Standardized inoculum from 10-day old cultures gave consistent and reproducible lesion ratings.

INTERACTION OF PREPLANT-INCORPORATED HERBICIDES WITH RHIZOCTONIA SEEDLING DISEASE OF SOYBEAN. J. E. Bowman, J. B. Sinclair, and L. M. Wax (USDA-SEA), Departments of Plant Pathology and Agronomy, University of Illinois, 1102 South Goodwin, Urbana, 61801.

Nine herbicides in combination with soil inoculated with *R. solani* (.02 g/g unsterilized field soil), were studied on Williams soybeans in the greenhouse. Seedlings were harvested at 18 da. after planting. Inoculated pots treated with trifluralin had increases ($P=.05$) in emergence at 12 da., in number of plants with expanded unifoliate leaves at 18 da., and in dry weights of above-ground plant parts compared to inoculated, nontreated pots. Inoculated pots with chloramben had a decrease ($P=.01$) in emergence at 12 da. Noninoculated pots treated with bifenox, alachlor, metolachlor, metribuzin, or trifluralin had decreases ($P=.05$) in root and total seedling dry weights compared to noninoculated, nonherbicide-treated controls. Four of the latter herbicide treatments (alachlor excepted) and chloramben were associated with decreases ($P=.05$) in dry weights of above-ground plant parts.

REACTIONS OF HELIANTHUS TO SEEDLING BLIGHT CAUSED BY ALTERNARIA HELIANTHI. M. L. Carson, Plant Science Department, South Dakota State University, Brookings, SD 57007

A total of 153 entries of *Helianthus* germplasm, including hybrids inbred lines, and open-pollinated varieties of *H. annuus*, several wild species and interspecific hybrids were evaluated in the greenhouse for resistance to seedling blight caused by *Alternaria helianthi*. Infection points appeared as water-soaked spots which became necrotic within 24 hours after inoculation, often killing seedlings. Although some differences among genotypes

in disease reaction were evident, no entry exhibited a high level of resistance to the disease. Mycelial extracts (buffered and non-buffered) of *A. helianthi* caused a rapid collapse and necrosis of tissue when injected sub-epidermally into primary leaves of *H. annuus* (Hybrid 894) seedlings while no such reaction was observed using culture filtrates.

A NEW CERCOSPORA SP. ON LEONURUS SIBIRICUS. R. F. Cerkauskas, O. D. Dhingra and J. B. Sinclair. Depts. of Plant Pathology, Univ. of Illinois, 1102 South Goodwin, Urbana, IL 61801; and University Federal de Vicosa, Vicosa, Brazil 36.570.

Cercospora sp. was isolated from *Leonurus sibiricus*, a common weed in soybean fields in Minas Gerais, Brazil. Circular stem lesions, 1-2 mm in diameter, had white centers and purple margins. Enlarged lesions up to 4-5 cm had dark, concentric rings and abundant sporulation in the white centers. Stroma formed on stems, were multicellular, dark brown to black, 2.6-5.3 μ , fascicles were dense with more than 10 conidiophores; conidiophores multigeniculate, tan-brown, nonseptate, unbranched mostly 53-73 x 5.3 μ ; width was uniform throughout the length, except for mild attenuation near the tip; conidia hyaline, base truncate, tip acute to subacute, 49-214 μ , mostly over 100 μ in length, mostly 10 to 20 septations. This *Cercospora* sp. is distinctly different from other species described on members of the Labiatae and may represent a new species. Inoculation tests confirmed the pathogenicity of the fungus on leaves and stems of *L. sibiricus*.

LIGHT AND TRANSMISSION ELECTRON MICROSCOPE STUDY OF BROWN SPOT OF SOYBEANS. Edwards, H. H., Dept. of Biological Sciences, Western Illinois University, Macomb, Illinois 61455

Pycnidiospores of *Sentoria glycines* germinate on soybean leaves by producing thin germ tubes (0.7 μ dia.). Entry into the leaf is through lower stomata and takes up to 72 hrs. In the spongy mesophyll the larger hyphae (1.8 μ dia.) grow slowly for the next several days. By day 5 host cells, especially palisade and upper epidermis, begin to collapse and become necrotic even though hyphae are mainly in the spongy mesophyll. Early breakdown of the tonoplast and rapid cell organelle disintegration initiate the necrosis. Collapsed cells are brown in color in the light microscope and are uniformly electron dense with starch granules much in evidence in the transmission electron microscope. Maximum necrosis is reached by day 14 resulting in the angular, macroscopic brown spot. In the next few days non-necrotic, uninjured leaf tissues rapidly senesce accompanied by cell organelle disruption but without cell collapse. This tissue becomes extensively invaded by the fungus. Pycnidia are formed during the 3rd week.

INTERACTION BETWEEN ECHINODONTIUM TINCTORIUM ELL. & EV. AND AN UNKNOWN BASIDIOMYCETE FROM SUPPRESSED ABIES GRANDIS (DOUG.) LINDL. Wallace E. Eslyn and Paul E. Aho. Forest Products Lab, Madison, WI 53705, and Pacific Northwest Forest & Range Experiment Station, Corvallis, OR 97331.

The basidiomycete (UB) most often isolated from suppressed grand fir on the Malheur National Forest, Ore., has not been identified. Its role in decay of grand fir and its relationship to *E. tinctorium* (ET), which caused most decay in mature grand fir, were equally obscure. Subsequent soil-block decay tests, conducted for 10 months at 23°C--the optimum temperature for growth of UB and ET in culture--resulted in average weight losses in fir heartwood of 20.0% for ET and 1.4% for UB. Inoculation of ET-infected blocks with UB slightly lessened the decay capability of ET. However, when UB was first inoculated into blocks, followed by ET, no decay occurred even if the UB-infected blocks were first sterilized. Apparently, UB imparted a substance into the blocks which prevented later development of ET. Hence, prior infection of grand fir by UB may provide some protection against decay by ET.

ENHANCED LOSS OF ENDOGENOUS NUTRIENTS FROM FUNGAL PROPAGULES TREATED WITH AMMONIA. Filonow, A. B., D. Chun and J. L. Lockwood. Department of Botany and Plant Pathology, Michigan State University, East Lansing, MI 48824.

Sporangia of *P. ultimum*, conidia of *C. victoriae*, and sclerotia of *M. phaseolina* were labeled with ^{14}C , then were incubated on leached sand, followed by exposure for 2-3 h to NH_3 at 100, 10³, and 10⁴ ug/ml, in physiological saline solution. Effluents from the propagules were assayed for NH_3 and ^{14}C . Lethal concentrations were 100 ug/ml for *P. ultimum*, 10³ ug/ml for *C. victoriae*, and 10⁴ ug/ml for *M. phaseolina*; sudden and drastic loss of ^{14}C occurred when the cells died. Sub-lethal concentrations of NH_3 also induced losses of ^{14}C ; hyphal growth and sporulation of propagules transferred to PDA were delayed. *C. victoriae* conidia made nutrient-dependent by long-term diffusive stress, also lost ^{14}C when treated with NH_3 at 10, 50, and 100 ug/ml. Sclerotia of *M. phaseolina* lost more ^{14}C to soil treated with urea than to non-treated soils. These results suggest that NH_3 , a fungistatic agent, may enhance the drain of endogenous nutrients from propagules to microorganisms in soil.

EFFECTS OF POWDERY MILDEW ON GRAIN YIELDS OF WINTER WHEAT. Jerry D. Franklin and Ervin Williams, Jr., Department of Plant Pathology, Oklahoma State University, Stillwater OK 74078.

Effects of powdery mildew, caused by *Erysiphe graminis* f. sp. *tritici*, on winter wheat (cultivar TAM W-101) yields were studied using a randomized block design with split plot arrangement of spray treatments. Gradations in powdery mildew severities were attained by spray intervals of 10, 20 and 30 days with sulfur (92% WP; rate 5.6 ai kg/ha for each application). Each main plot represented a spray interval treatment and consisted of two 1.54 X 6.15 m subplots; sprayed and nonsprayed. Yield determinations were made by harvesting 2.46 m of the two center rows of each plot. Two locations were established in an area with a history of mildew problems. Severities on a 0-9 scale (0 = none; 9 = totally diseased) peaked at 5.5 at anthesis at location one compared to 5 at boot stage for location two. Overall grain yields irrespective of spray intervals were increased by 13.5% (significant $P = 0.05$) at location one and by 8% (NS) at location two. This work indicated that *E. graminis* can be a serious pathogen for wheat in the central plains.

EFFECT OF HEAT STRESS ON ELECTROLYTE LEAKAGE FROM CORN LEAVES WHICH VARY IN SUSCEPTIBILITY TO NORTHERN CORN LEAF BLIGHT. M. O. Garraway* and W. R. Findley#. *Department of Plant Pathology, Ohio State University, Columbus, OH 43210 and Ohio Agric. Res. Dev. Cntr., and #USDA, SEA, AR, Department of Agronomy, Ohio Agr. Res. Dev. Cntr., Wooster, OH 44691.

Uninoculated detached leaves from four corn inbreds (W64AN, Oh 07, Oh 509, Oh 514) which varied in susceptibility to NCLB were immersed in distilled water then subjected to heat stress as alternating 12 hr cycles of 40 C in the light and 30 C in the dark. Electrolyte leakage (EL) as $\mu\text{mhos}/25\text{ ml DW}/\text{mg dry wt}$, was measured every 24 hr for a duration of 120 hr. The EL rate was moderate during the first 72 hr, but increased significantly thereafter. It was greatest for the susceptible inbred W64AN, less for the less susceptible inbreds Oh 07 and Oh 509, and least for the least susceptible inbred Oh 514. The presence of the Ht_1 gene caused a further decrease in the EL rate. Thus EL from corn leaves under heat stress may aid in screening for resistance to NCLB.

CHEMICAL CONTROL OF *SCLEROTINIA* STALK ROT OF SUNFLOWER. T. J. GULYA. Agric. Res., Science and Educ. Adm., USDA and North Dakota State University, Fargo, ND 58105

Hybrid 894 sunflower seed was pelleted at 2000 and 4000 ppm a.i. with Benlate, Botran, Mertect, Orthocide, Ronilan, Rovral and Topsin-M and planted in a field with a previous history of severe *Sclerotinia* stalk rot. Nine weeks after planting, only Mertect at the higher rate inhibited stalk rot. This control did not persist for the remainder of the growing season, nor did any of the treatments result in significant yield increases. The seven fungicides plus Terraclor were tested as soil-applied, pre-plant, incorporated treatments, at rates of 5 and 20 kg a.i. per hectare. Only Ronilan at the higher rate exhibited significant disease control, and none of the treatments resulted in significant yield increases over that of control plots. Control of *Sclerotinia* stalk rot of sunflower with seed or soil-applied fungicides does not look promising at present.

EFFECTS OF FUNGICIDES ON REDUCING LEAF SPOT AND MELTING-OUT ON KENTUCKY BLUEGRASS, M.C. Hirrel, Dept. of Plant Pathology, University of Illinois, Urbana, IL 61801

Epidemic development of leaf spot and melting-out caused by *Dreschlera poae* was studied with respect to fungicide treatment. Two methods for estimating disease severity were used: a qualitative estimate for the crown rot phase and a quantitative measure of lesion number in a 5 cm² area. The 19 fungicide treatments fell into three groups based on apparent infection rate (r): for group I and the control, $r=0.148$ and 0.138 , respectively; for group II, $r=0.072$, and for group III, $r=0.042$. The quantitative method of measuring disease severity is not only more accurate for calculating r but also is a better indicator of when fungicide application would be most effective. This is because incubation period, based on leaf lesion development, more closely coincides with the infection period of the pathogen than does the incubation period based on crown rot development.

EFFECT OF AGAR MEDIA AND TEMPERATURES ON GROWTH AND SPORULATION OF *BOTRYODIPLODIA HYPODERMIA*. J. M. Krupinsky, USDA-SEA-AR. Northern Great Plains Research Station, P.O. Box 459, Mandan, ND 58554.

Culture growth and pycnidiospore production of three isolates of *Botryodiplodia hypodermia* were determined on fifteen different culture media and at different temperatures. Fungal growth and spore production were greatest on potato dextrose agar-Difco (PDA-D) or potato dextrose agar-"home made" (PDA-L) followed by yeast malt extract agar (YMA) and V-8 juice agar (V-8A). Growth and spore production were best at 25±1°C for PDA-D and PDA-L, while 21±1°C was the optimum temperature for V-8A and YMA. Thus, fungal response to temperature differences was not the same on all media and the temperature x medium interaction was significant. Sterile wheat kernels added to the surface of these media promoted additional growth and pycnidiospore production and provided a convenient inoculum for inoculations.

HELMINTHOSPORIUM LEAF SPOT RESISTANCE IN *AGROPYRON* INTERMEDIUM. J. M. Krupinsky and J. D. Berdahl. USDA-SEA-AR. Northern Great Plains Research Center, P.O. Box 459, Mandan, ND 58554.

Through four glasshouse inoculations with *Helminthosporium sativum*, 8,792 *Agropyron intermedium* plants were progressively reduced to 29 resistant and eight susceptible genotypes. Inoculum, a composite of isolates from *A. intermedium*, was sprayed onto the plants which were then maintained in a mist-saturated atmosphere for 48 hours. Single plant selection in the first two inoculations resulted in a higher percentage of resistant plants compared with an unselected check population. Clonal replication improved the reliability of disease scores relative to scores on single plants. Although the genotype x inoculation interaction was significant, the difference between the most resistant and susceptible genotypes was maintained in the third and fourth inoculation of clonally replicated genotypes.

TRANSMISSION OF MAIZE WHITE LINE MOSAIC VIRUS. Raymond Louie, D. T. Gordon, and P. E. Lipps, USDA-SEA-AR and The Ohio Agricultural Research and Development Center, Wooster, OH 44691.

Maize white line mosaic virus (MWLMV) was serially transferred in the greenhouse by planting Seneca Chief sweet corn (*Zea mays* L.) in field soil previously containing diseased plants (eight transfers), in sterile soil to which diseased roots were added (three transfers), and by immersing 2 to 4-day-old corn seedlings in a water suspension of chopped diseased roots for 48 hr (one transfer). MWLMV transmission was confirmed by enzyme-linked immunosorbent assay in leaves and roots of symptomless and MWLMV-symptomatic corn plants previously exposed to root inocula or a water suspension of diseased roots. It was also detected in a water suspension that passed thru a 20 then a 12 μ polycarbonate membrane, the supernatant and pellet fraction of the filtrate centrifuged at 10,000 rpm for 10 min, and in the fraction of the filtrate retained by a 0.45 μ millipore filter. Several kinds of microorganisms were associated with MWLMV in the centrifuged pellet and filtered fractions, but zoospores of an *Olpidium*-like fungus was considered the most likely vector.

PATTERN RECOGNITION ANALYSIS OF SPATIAL AND TEMPORAL DISEASE SPREAD. David S. Marshall and Gregory Shaner, Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN. 47907.

Pattern recognition analysis utilizing two measures of similarity was applied to spatial and temporal wheat leaf rust development. Prototype classes of temporal disease progress patterns were determined for five distances from a point source in plots of the susceptible winter wheat cultivar Monon. Temporal disease progress data in different Monon plots were compared to the prototypes. The distance from the point source in the different plots was determined with an accuracy of 86 and 82 percent for Euclidean and Mahalanobis distance, respectively. The results of this study indicate that distance from a point source can be determined by monitoring temporal disease progress. Disease progress data, for each distance from the source, were averaged over the four compass directions. Consequently, wind direction was not a factor.

REUSE OF MDMV-A COATED ENZYME-LINKED IMMUNOSORBENT ASSAY PLATES. M. A. Mikel, Cleora J. D'Arcy, and R. E. Ford. Department of Plant Pathology, University of Illinois, Urbana, 61801.

The technique developed by Bar-Joseph et al. (Phytopathology 69: 424-426) was modified for reuse of maize dwarf mosaic virus strain A (M-A) specific γ -globulin coat on polystyrene microtitre plates. Treatments were 0.1 M glycine-HCl at pH 2.1, 2.5, or 2.8, each for 2, 30 or 60 min. Control wells were untreated. The treatments were applied to plates where the reaction had been stopped earlier either by addition of 3 M NaOH, or by transferring individual well contents into NaOH. For NaOH-stopped plates, the dissociation efficiency (DE) was 51 to 79% for glycine-HCl, and it was 77% for the control. In plates without NaOH, the DE was 91 to 96% for glycine-HCl, and it was 84% for the control. In a second experiment, 6-12 month old NaOH-stopped M-A and soybean mosaic virus plates were recoated for M-A. Plates were detergent washed and rinsed prior to recoating. Recoated wells were specific for M-A, whereas wells not recoated were at background levels.

Effect of cropping history, cultivar and sampling date upon recovery of fungi from soybean roots. J.D. Mueller, B.J. Shortt, and J.B. Sinclair, Department of Plant Pathology, University of Illinois, Urbana, IL 61801.

The effects of cropping history, cultivar and sampling date upon recovery of fungi from surface disinfested tap roots 26, 40, 54, 68, 82, 96, and 110 days after planting (May 30, 1980) was determined using stepwise multiple regression. Tap root pieces (1 cm) were cut from 2-7 cm below the soil line, dipped in 95% ethanol and surface disinfested in 10% Clorox. The most frequently recovered fungi were *Fusarium* spp., *Gliocladium roseum*, *Macrophoma phaseolina*, *Phomopsis* spp. and *Trichoderma* spp. At all sampling dates recovery of *M. phaseolina* and *Phomopsis* spp. was greater from a field previously planted to soybeans than to corn, and greater for *Trichoderma* spp. from a field previously planted to corn than to soybeans. Recovery of *M. phaseolina* and *Phomopsis* spp. also were affected by cultivar. Recovery of *M. phaseolina* was greater from early maturing cultivars than late. Recovery of *G. roseum* was affected by sampling date and *Fusarium* spp. were unaffected by any factor.

YIELD LOSSES DUE TO ANTHRACNOSE AND DIPLODIA STALK ROT OF CORN. T. A. Natti and D. G. White. Plant Pathology Department, University of Illinois, Urbana 61801.

Twenty-four corn hybrids were inoculated in the first elongated internode by injection of a spore suspension of *Colletotrichum graminicola* or *Diplodia maydis* to estimate potential yield loss. Experiments were done for 3 years from 1978-80 with a second location and the *D. maydis* treatment added the last two years. Treatments were compared to a water injected control. Depending on year and location, losses due to *C. graminicola* ranged from 0-12.3% for all hybrids and from 0-53% for specific hybrids with C123 combinations having the highest losses. Inoculations with *D. maydis* did not significantly reduce yields. Lodging seemed to be the most important component of yield loss, but kernel weight reductions also occurred. Yield loss from natural infection of *C. graminicola* was 2.4% in 1978 as estimated by paired plant comparisons.

COMPONENTS OF RATE LIMITING RESISTANCE IN 6-ROW SPRING BARLEY TO NET BLOTCH (*PYRENOPHORA TERES*) USING A SEED GERMINATION PAPER TECHNIQUE. F. W. Nutter, Jr. and V. D. Pederson. Department of Plant Pathology, North Dakota State University, Fargo, ND 58105

Varietal effects on disease efficiency (DE), latent period (LP) and sporulation (SP) are cumbersome parameters to estimate because extensive growth chamber space is often required to accommodate the need for defined environmental conditions and large sample sizes. The use of rolled seed germination papers reduces space constraints and labor costs. Paired comparisons were made between 'Glenn' and 'Larker' (moderately resistant and susceptible respectively based on disease reaction). Sporulation was significantly higher on 'Larker' while DE was significantly higher on 'Glenn'. After 5 serial transfers of *P. teres* maintained separately on either 'Glenn' or 'Larker', DE remained higher on 'Glenn', indicating that this attribute is not affected by maintenance on one variety. There were no significant differences for LP. The DE of 7 other 6-row barley varieties was also determined. These experiments suggest that DE as well as disease reaction should be considered as a means of evaluating rate limiting resistance in 6-row barley.

A BACTERIAL KERNEL SPOT OF BARLEY CAUSED BY *PSEUDOMONAS SYRINGAE* PV. *SYRINGAE*. R. A. Peters and R. G. Timian, Department of Plant Pathology, and Agric. Res., Science and Educ. Adm., USDA, respectively, N.D. State Univ. Fargo, ND 58105.

Necrotic spots on developing barley kernels were observed only rarely on spikes before 1977, but were common on sprinkler irrigated Klages barley in southern Idaho in 1977. Necrotic lesions on barley leaves and leaf sheaths were also observed in 1980. Affected kernels had tan to dark brown necrotic spots with distinct margins. Lesions varied in size, were ca 2 mm in diameter, and were predominantly on the lemma. Usually, necrosis did not extend into the seed coat. On leaves, tan to dark brown lesions coalesced into elongated necrotic areas that slowly expanded laterally. A gram negative, oxidase negative, fluorescent bacterium, identified as *Pseudomonas syringae* pv. *syringae* was the causal organism. Inoculation with an air brush was the most reliable of several methods tested for inducing kernel blight. Infection of barley lemmas occurred most often in kernels inoculated before the lemma became attached to the seed.

A COMPARISON OF THE INFECTION OF HEALTHY AND MOSAIC (TMV) *NICOTIANA SYLVESTRIS* BY NECROTIC STRAINS OF TMV. J. L. Sherwood and R. W. Fulton, Dept. of Plant Pathology, Univ. of Wisconsin-Madison, Madison, WI 53706.

Twenty-one to 242 times more of a necrotic strain of TMV was required to produce an equal number of lesions on mosaic as on healthy *N. sylvestris*, but slopes of infectivity curves were similar. Resistance of mosaic plants to superinfection was not due to inhibition of necrosis; non-necrotic starch lesions did not occur, nor was it correlated with thickness of external epidermal cell walls. No inhibitor of TMV multiplication in mosaic leaf tissue was detected. Growing mosaic or healthy plants at 32 C increased resistance to superinfection or infection, respectively. Catalase activity did not differ significantly in mosaic and healthy plants, but mosaic plants had higher peroxidase concentrations than healthy plants. When mosaic plants were superinfected, peroxidase activity did not significantly increase until after the onset of necrosis. Induction of b proteins could not be correlated with resistance to superinfection.

SOYBEAN SEED QUALITY LOSSES ASSOCIATED WITH BEAN LEAF BEETLES AND *ALTERNARIA TENUISSIMA*. B.J. Shortt, J.B. Sinclair, and M. Kogan, Depts. of Plant Pathology and Entomology, Univ. of Illinois, Urbana, IL 61801.

Abnormally high populations of the bean leaf beetle (*Cerotoma trifurcata*) in 1980 caused extensive injury to soybean pods in some areas of Illinois. Pods and seeds of six soybean cultivars grown near Urbana were examined for injury and assayed for fungal infection and loss of seed viability. Pod injury was most severe on late-maturing cultivars and least on Elf, a heavily pubescent cultivar. The incidence of seedborne *Alternaria tenuissima* was correlated with pod injury ($r=0.53$) and loss of seed viability ($r=0.63$). However, the correlations between pod injury and seed viability losses varied greatly among cultivars. Fungicide seed treatment increased the germination of seeds from damaged pods. In a greenhouse study *A. tenuissima* consistently decayed seeds within artificially injured pods but did not infect seeds within noninjured pods. Nine species of fungi known to infect soybeans were isolated from adult beetles.

LOPHODERMIIUM NEEDLECAST ON PONDEROSA PINE IN NORTH DAKOTA. J. A. WALLA and R. W. STACK, North Dakota State Univ. Fargo, ND 58105

In an 8 ha plantation of mixed red and ponderosa pine in northeast North Dakota a needlecast disease was found defoliating the ponderosa pines. The red pines were not damaged. We first observed that this disease was present in the plantation at low levels in 1977. In 1980, most needles were dead on the lower 2 m of trees that averaged 6 m in height. The fungus was present on needles in the upper crown of several groups of dead trees. Many of the infected needles remained attached to branches after death. The associated fungus was found to be a Lophodermium species. Dr. J. Staley, U.S. Forest Service, identified it as similar to an unnamed species commonly found on red pine in Minnesota. The red pines in this plantation were wild seedlings collected from Minnesota. It seems likely that the disease was introduced to this plantation on the red pine. The disease has since been found in a nearby ponderosa pine plantation. Characterization of the fungus is underway to confirm identification. Level of spore release is being monitored to find optimum time of fungicide application.

AN ISOLATION TECHNIQUE TO QUANTIFY RESISTANCE IN POTATO TO SPECIES OF VERTICILLIUM. P.J. Zambino and N.A. Anderson, Dept. of Plant Pathology, Univ. of Minnesota, St. Paul, MN 55108.

The pathogenicity of isolates of Verticillium dahliae from diverse hosts was tested on potato, tomato, and eggplant. Plants were inoculated by clipping root tips and immersing roots in a suspension of 10^7 conidia/ml. A diagnostic medium was prepared by adding 1 ml ETOH, 10mg streptomycin sulfate and 5mg penicillin G to a sterile solution of 1% agar with 0.5% KSCN at 50°C. This medium was poured over stem sections. All isolates were recovered from all inoculated hosts within 8 wk. In combinations of a susceptible host and a virulent isolate, colonies developed throughout the agar. Ten potato clones were inoculated with 6 isolates of Verticillium species pathogenic on potato. In this test the agar medium was poured over sap expressed from a 1 cm stem section. Colony numbers were correlated with disease resistance. From susceptible Kennebec plants inoculated with V. dahliae or V. albo-atrum, an average of 74.5 or 87.5 colonies per plate were recovered, respectively. From resistant plants of clone CF73531, 2.1 and 1.5 colonies per plate were noted.