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Abstracts

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Alphabetized by first author's last name

DIVERSITY AND ORIGINS OF ENDOPHYTIC FUNGAL SYMBIONTS IN THE NORTH AMERICAN GRASS, *FESTUCA ARIZONICA*. Z.-q. An, J.-S. Liu, H.-F. Tsai, M. R. Siegel, W. Hollin & C. L. Schardl. Department of Plant Pathology, University of Kentucky, Lexington, KY 40546-0091

Fungal endophytes were isolated from 16 plants obtained from 11 populations of *Festuca arizonica*. Sequences of rRNA gene segments indicated that most were "*e*-endophytes" — closely related to the grass choke pathogen, *Epichloë typhina* (anamorph = *Acremonium typhinum*). Three distinct *e*-endophyte sequences were obtained (e1, e2 and e3), and compared with five *E. typhina* sequences for phylogenetic analysis. The results indicated at least two separate evolutionary origins of the *F. arizonica e*-endophytes. The most common type (e1) was related to *E. typhina* from *Festuca rubra*, a European grass. The others were related to a *Poa ampla* choke pathogen from Alaska. One of the plants surveyed simultaneously hosted e3 and a second, non-*Acremonium* endophyte, which was designated "*p*-endophyte." World-wide surveys of related grass species also identified individual plants which hosted seed-borne *p*- and *e*-endophytes either separately, or in combination. The ecological fitness and adaptability of *F. arizonica* and other grasses may be enhanced by the diversity of endophytes that they possess.

USE OF COLOR-BASED SILVER STAIN FOR DIFFERENTIATION OF FUNGAL PROTEINS. M. D. Bandla, H. A. Melouk, and J. L. Sherwood. Department of Plant Pathology, and USDA-ARS, Oklahoma State University, Stillwater, OK 74078-9947.

Purified total proteins prepared by 85% $(NH_4)_2SO_4$ fractionation from six fungi (Aspergillus sp., Penicillium sp., Trichoderma sp., Sclerotinia minor, Rhizoctonia sp., and Sclerotium sp.) associated with peanut seeds were analyzed by SDS-PAGE on gradient gel slabs (7.5-12.5%). Gels were stained with monochromatic silver staining (Science 211:1437) and by color-based silver staining (CBSS) (Electrophoresis 2:135). The use of CBSS aided in differentiating glycoproteins and lipoproteins by color. The sensitivity and cost is the same as that of monochromatic silver staining. We identified proteins specific for S. minor based on relative mobility and color. These proteins will be used for production of highly specific polyclonal and monoclonal antibodies.

COMPARATIVE TOXICITY OF SELECTIVE CHEMICALS AGAINST SCLEROTINIA MINOR. Carolyn Bowen, H. A. Melouk, and K. E. Jackson. Department of Plant Pathology and USDA-ARS, Oklahoma State University, Stillwater, OK 74078-9947.

Sclerotinia minor can be carried in peanut seed. Chemical seed protectants, including captan, dichloran, carboxin, PCNB, dithiocarbamate, and thiophanate-methyl (TM), were incorporated into potato dextrose agar amended with 100 ug/ml streptomycin sulfate (SPDA) at 0, 2, 4, 6, 8, and 10 ppm. Amended media were inoculated with a 15 mm dia. mycelial plug from the leading edge of a 2 day-old culture of S. minor on SPDA, a 2 mm^2 piece of dry mycelia, or 5 sclerotia from a 2 week-old culture. Plates were incubated at 25 C in darkness and growth was measured periodically to 7 days after plating. TM was most inhibitory to growth of fresh and dry mycelia of S. minor. PCNB and dichloran were less inhibitory to mycelial growth, followed by captan, dithiocarbamate, and carboxin. TM was the only chemical that completely inhibited germination of sclerotia of S. minor at all concentrations.

FIELD VALIDATION STUDY OF AN EXPERT SYSTEM FOR CONTROL OF LEAF SPOT DISEASES OF PEANUT. P. M. Brannen and P. A. Backman. Department of Plant Pathology, Auburn University, AL 36849-5409.

Leaf spot diseases of peanut, caused by *Cercospora arachidicola* and *Cercosporidium personatum*, are currently controlled by application of fungicides on a 10-14 day schedule. AU-Pnuts, a rule-driven, non-computerized expert system, has been tested successfully in small plots by Auburn University. Rules incorporate the number of days with daily precipitation in excess of 2.5 mm, occurrence of evening fogs, and rainfall forecasts. In 1991, validation studies were conducted on-farm with ten peanut producers in five counties. Eight of the ten farmers were able to successfully run the program. The average number of sprays with AU-Pnuts and conventional programs was 5.6 and 6.0, respectively. Spring rains triggered early applications with AU-Pnuts. AU-Pnuts triggered initial sprays at an average of 33 DAP in non-rotated fields and 36 DAP in rotated fields, while first spray applications for the conventional program averaged 42 DAP. Subsequent applications were coordinated with infection periods. The combination of earliness and timeliness resulted in improved disease control as measured by AUDPC's ($p<0.076$), with comparable or better yields.

DEVELOPMENT OF MUSCADINE (*VITIS ROTUNDIFOLIA*) CALLUS CULTURE PROCEDURES FOR POTENTIAL USE IN COLD HARDINESS ASSAYS. T-Z. R. Chou, S. V. Diehl, and C. H. Graves, Jr., Mississippi State University, Mississippi State, MS, 39762.

Agrobacterium tumefaciens occurs systemically in both asymptomatic and symptomatic muscadine grapes. Gall formation is initiated in response to injuries associated with late spring freezes. Cold tolerance is believed to be associated with resistance to galling. Evaluation of cold tolerance among cultivars of muscadine is difficult and expensive with traditional procedures. In as much as preliminary studies suggest a differential tolerance of callus cells from certain cultivars to freezing, it is hypothesized that the level of tolerance may be related to cold hardiness. Of several callus culture regimes studied for muscadine, callus initiation was best achieved, beginning with leaf-disc explants, on Murashige-Skoog (MS) medium amended with 1.0 mg/L 2,4-D and 1.8 mg/L BAP. Callus maintenance was best achieved by subculturing on MS with 0.15 mg/L NAA, and 3.0 mg/L BAP. Freezing assays using callus tissues will be compared with traditional assays to determine the potential for developing a quick cold hardiness assay.

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BIOLOGICAL AND CHEMICAL CONTROL OF RHIZOCTONIA AERIAL BLIGHT OF ROSEMARY (ROSEMARINUS OFFICINALIS). K.E. Conway, C.J. Foor, and N. E. Maness[1], Dept. of Plant Pathology and Hort. & L.A.[1], Oklahoma State University, Stillwater, OK 74078-9947.

Aerial blight of Rosemary, incited by Rhizoctonia solani (AG-4), is a serious problem in propagation of cuttings in greenhouses. Natural inoculum associated with field cuttings and small pieces of infected roots embedded in the foam blocks reused for propagation were found to be inoculum sources. Biological treatments (Trichoderma harzianum or Laetisaria arvalis) added to potting soil or the fungicides Banrot, CGA-173506, and Rovral were evaluated for control. R. solani was applied to cuttings as a dried prepared mix or to soil as agar plugs. Biocontrol agents reduced spread of R. solani in soil compared to controls, but only CGA-173506 and Rovral effectively controlled both spread in soil and aerial blight phase (LSD=0.05). Combinations of Banrot with L. arvalis were more effective in reducing soil spread than Banrot with T. harzianum compared to the control (LSD=0.05).

ELECTROPHORETIC KARYOTYPE OF PHYMATOTRICHUM OMNIVORUM. V. W. Crouch, S. D. Lyda and J. M. Magill, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

Phymatotrichum omnivorum is a soil borne fungal pathogen that effects over 2,000 species of dicotyledonous plants. A molecular karyotype of P. omnivorum is being established using contour-clamped homogeneous electric field gel electrophoresis. Two chromosomal bands have been resolved and size estimates of these molecules are 2.0 and 5.7 megabase pairs, respectively. Due to staining intensity, it is speculated that the smaller band may be a doublet. Chromosome number in P. omnivorum has not been definitively established. Previous research has suggested a chromosomal number that ranges from 4 - 8. Resolution and characterization of the remaining chromosomes is ongoing.

FUMIGANT-METALAXYL COMBINATIONS FOR CONTROL OF TOBACCO BLACK SHANK-ROOT KNOT COMPLEX. A. S. Csinos and A. W. Johnson, UGA and USDA-ARS, Coastal Plain Expt. Stn., Tifton, GA. 31793.

Phytophthora parasitica var. nicotianae (Ppn) and Meloidogyne spp. infested plots were used to evaluate 1, 3, dichloropropene (1,3 D) and 1,3 D + chloropicrin (17%) (1,3 D & C) with metalaxyl at 0.56 kg ai/ha preplant incorporated (PPI) and layby (L) for control of black shank and root knot nematode (RKN). Coker 371 Gold (Ppn resistant (R), RKN susceptible (S)) Speight G-70 (Ppn moderate R, M. incognita R) and K-326 (Ppn S, M. incognita R) were used. Plant heights recorded, 8 wk postplant, were greater for all fumigant treatments than control on all cultivars except for the 1,3 D at 56 l/ha treatment for K-326. Plots treated with 1,3 D at 56 l/ha or 1,3 D & C at 98 or 65 l/ha had lower disease and higher yields than control in Coker 371 Gold. Plots treated with 1,3 D & C at either rate had higher yield than control for K-326 and Speight G-70. All fumigant treatments and plots treated with 1.12 kg ai/ha metalaxyl plus 6.72 kg ai/ha fenamiphos PPI plus metalaxyl 0.56 kg ai/ha L had less RKN than the control.

EFFECT OF TANK MIX COMBINATIONS OF CYPROCONAZOLE AND CHLOROTHALONIL ON LATE LEAF SPOT OF PEANUT. A. K. Culbreath, T. B. Brenneman. Dept. of Plant Pathology, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793.

Field experiments were conducted in one location in 1990 and two locations in 1991, in which all possible combinations of six rates (0, 0.012, 0.024, 0.048, 0.073 and 0.097 kg ai/ha) of cyproconazole and four rates (0, 0.21, 0.42, and 0.63 kg ai/ha) of chlorothalonil were used as treatments applied biweekly in randomized complete block experiments. Significant cyproconazole X chlorothalonil interactions on percent of peanut leaflets with leaf spot lesions occurred in both years. Combinations of low rates of the two fungicides on leafspot severity were synergistic for severity. In 1990, combination of 0.024 kg ai/ha of cyproconazole with 0.42 kg ai/ha of chlorothalonil provided leaf spot control as good as that of the highest rate of either fungicide alone. In 1991, combination of 0.42 kg ai/ha of cyproconazole with 0.21 kg ai/ha of chlorothalonil gave control equal to that of the highest rate of cyproconazole or the combination of the highest rates of both materials.

DIFFERENCES IN RESISTANCE TO DOLLAR SPOT AND BROWN PATCH AMONG TWENTY BENTGRASS VARIETIES. J. C. Doney Jr., P. C. Vincelli and A. J. Powell Jr. Univ. of Kentucky, Lexington KY, 40546-0091.

Different levels of Dollar Spot (DS) and Brown Patch (BP) were observed in a Bentgrass variety trial. Replicated plots (RCB) were evaluated for DS (discrete lesions) and BP (% of plot affected) on 4 dates. Twelve varieties exhibited partial resistance (lower disease levels, P=0.05) to DS on 4-25 and 5-27. Partial resistance to BP was exhibited by eleven varieties on 5-7 and 6-27. Cobra, National, Penneagle, Providence and 88 CBL exhibited partial resistance to both diseases. For each variety, recovery from disease was evaluated as follows: one half of each plot was treated with cyproconazole on 8-2, and disease levels in the treated and untreated subplots on 8-11 were compared to each other and to the disease level on 8-1. Some varieties recovered (P=0.05) from disease only in treated subplots. Other varieties recovered equally well in both treated and untreated subplots. Some varieties recovered significantly without treatment but exhibited even greater recovery with treatment. There appear to be different levels of resistance to DS and BP, and different recuperative abilities from DS and BP, among bentgrass varieties.

DISTRIBUTION OF BLACKEYE COWPEA MOSAIC VIRUS IN COWPEA SEED. A. G. Gillaspie, Jr., M. S. Hopkins, and D. L. Pinnow. USDA, ARS, Plant Introduction Station, Griffin, GA 30223-1797.

Over 500 seeds from blackeye cowpea mosaic virus (BlCMV)-infected plants derived from three different seed lots of cowpea (Vigna unguiculata cv. Coronet) known to have seed transmission were evaluated either by double-antibody sandwich ELISA or NADP-amplified ELISA. Seeds were hydrated for 2-16 hr in deionized water before testing. Seeds were separated into embryonic axes, cotyledons, and seed coats. BlCMV was not detected in the embryonic axes, but was in 2.5% of cotyledons and 16.3% of seed coats. Tests are underway to determine whether infection of the cotyledons or the seed coats is an accurate representation of seed-borne infection.

GILBERTELLA ROT OF PEACHES IN SOUTH CAROLINA. C. Ginting, E. I. Zehr, and S. W. Westcott. III. Dept of Plant Pathology and Physiology, Clemson University, Clemson, SC 29634-0377

Four to ten rotted peaches with fruiting structures characteristic of members of the Mucorales were collected from each of 14 orchards in five South Carolina counties. *Gilbertella persicaria* (Eddy) Hesseltine was isolated frequently. Effects of temperatures on the pathogen were studied between 4 and 40 C at six-degree intervals. Sporangiospores germinated in potato-dextrose broth between 10 to 40 C. When transferred to room temperature (21-24 C) after 48 hr at 4 C, all sporangiospores germinated within 24 hr. Mycelial growth on potato-dextrose agar was most rapid at 28-34 C. The growth rate was 1.7 mm per degree-day (base of 7.7 C) between 10 and 28 C. The fungus sporulated at 16-34 C, with maximum sporulation at 28 C. Symptoms developed at 22-34 C, and were most rapid at 28 C. Infected peaches incubated at 4, 10 or 40 C for 4 days and transferred to room temperature occasionally developed symptoms. In packing houses, viable propagules of *G. persicaria* found in hydrocooling water and at several sites along the packing line were pathogenic on peaches. This is the first known report of Gilbertella rot of peaches in South Carolina.

EPIDEMIOLOGY OF TOMATO SPOTTED WILT IN SPRING TOMATOES AND PEPPERS IN GEORGIA. Gitaitis, R.[1], Dowler, C.,[2] Glaze, N.,[2] and Chalfant, D.[1] UGA-CPES [1] and ARS-U.S.D.A.[2], Tifton, GA 31793-0748.

The spatial distributions and cumulative incidence of plants displaying tomato spotted wilt virus (TSWV) symptoms were plotted for peppers and tomatoes grown for production and for tomato transplants in 1990 and 1991. Infection rates of log transformed data were 0.10 and 0.03 and yield was negatively correlated with disease, r = - 0.91 and - 0.78, for processing tomatoes in 1990 and 1991, respectively. Disease incidence vs. distance from field perimeters indicated a gradient in tomato transplant beds in 1990 but not 1991. In pepper, TSWV epidemics had infection rates of 0.12 to 0.17. In 1990, a disease gradient (r = - 0.91) incriminated location within the field as the cause of different disease severity levels in pepper cultivars. Both doublet and ordinary runs analyses demonstrated a random distribution of diseased plants in both years.

Shingle Oak, a New Host for Bacterial Leaf Scorch Caused by Xylella fastidiosa. J. R. Hartman, B. C. Eshenaur, and U. E. Järlfors, Department of Plant Pathology, University of Kentucky, Lexington, KY 40546

Bacterial leaf scorch of landscape trees, caused by Xylella fastidiosa Wells et al, has been reported in coastal U.S. states from New York to Texas, and recently in pin and red oak in Kentucky. The disease was identified in a mature shingle oak (Quercus imbricaria Michx.), in Louisville in October, 1991. Symptoms included premature leaf browning and defoliation, and leaves had a marginal necrosis. The disease was confirmed by detecting the pathogen with an ELISA test specific for Xylella (Agdia, Inc., Elkhart, IN) and by electron microscopic observation of the causal agent in leaf petiole tissues. The bacterial cell wall was scalloped or rippled, which is typical for this xylem-limited bacterium. Electron microscopic examination of leaf petiole tissues revealed partially occluded xylem elements. This is the first U.S. report of bacterial leaf scorch of shingle oak. The disease was also found in sycamore (Plantanus occidentalis L.), a new host for Kentucky, in the same landscape.

HOST SPECIFICITY OF *PHOMA PROBOSCIS* IN THE CONVOLVULACEAE. Dana K. Heiny, Department of Plant Pathology, University of Arkansas, Fayetteville, AR 72701, U.S.A.

Plants in 141 genera from 46 families were inoculated with *Phoma proboscis*, a pathogen of field bindweed (*Convolvulus arvensis*), to determine host specificity of the fungus. Of nine reacting species in seven families other than the Convolvulaceae, only one (*Omphalodes linifolia* of the Boraginaceae) developed severe symptoms affecting meristems. The reactions of 67 species in the Convolvulaceae ranged from no symptoms (26 species) to severe stem dieback or seedling death (10 species). Seven sweet potato (*Ipomoea batatas*) varieties developed only a few flecks located only on the youngest leaves. Ten other sweet potato varieties were symptomless. The minor symptoms on reacting species, lack of symptoms on species of economic importance, and absence of severely affected species in areas in which *P. proboscis* might be used argue for the relative safety of use of this fungus as a biological control agent on field bindweed.

PERSISTENCE OF CRIMSON SWEET-INDUCED SOIL SUPPRESSIVENESS TO FUSARIUM WILT OF WATERMELON. D. L. Hopkins, Central Florida Research and Education Center, University of Florida, Leesburg, FL 34748.

Field plots of Fusarium wilt-suppressive soil, developed through a prolonged monoculture of the watermelon cultivar Crimson Sweet, either were planted in bahiagrass or were continued in a Crimson Sweet monoculture and monitored for several years for suppressiveness to Fusarium wilt. Suppressiveness was evaluated by bringing soil from the plots into the greenhouse, infesting it with 100 chlamydospores of Fusarium oxysporum f. sp. niveum race 2 per gram of soil, planting Crimson Sweet, and comparing the percent wilt with that in similarly treated long-rotation soil. After 4 years of bahiagrass culture, the soil was still suppressive to Fusarium wilt of watermelon(60% suppression compared to 83% suppression in the Crimson Sweet monoculture). The biological agent responsible for the suppressiveness appeared to persist longer in the soil than the pathogen.

INFECTION RESPONSE OF PHYTOPHTHORA SPP. TO TEMPERATURE, MOISTURE AND HOST. M.W. Hotchkiss, C.C. Reilly, and F.F. Hendrix, Jr. P.O. Box 87, Byron, GA 31008 and Department Plant Pathology, University of Georgia, Athens, GA 30602.

Detached fruit of 10 cultivars of pecan, *Carya illinoensis* (Wang.) K. Koch, and four species of hickory, *Carya* spp., were spray-inoculated with a mycelium and zoospore suspension of *Phytophthora cactorum* (Leb. & Cohn) Schroet., isolate B-1 from pecan. Detached pecan fruit were inoculated with isolate B-1, placed under wet paper towels for 0, 2, 4, 6, or 8 hours, dried with a fan, and held in plastic tubs with no additional moisture for 7 days. Isolates of *P. cactorum* from pecan and ginseng were grown on cornmeal agar at temperatures from 5 to 35 C. Fruit of all 10 pecan cultivars and the four hickory species were susceptible to the B-1 isolate of *P. cactorum*. Symptoms of infection were on all fruit regardless of the duration of wetness following inoculation. The B-1 isolate had a higher optimum growth temperature (31 C) than the ginseng isolate (25 C). The maximum temperature (31 C) for growth was the same for both isolates. Optimum and maximum temperatures for the pecan isolate *in vitro* correspond to temperatures measured during the 1988 epidemic of Phytophthora shuck and kernel rot of pecan.

CORRELATION BETWEEN PECAN SCAB DISEASE RATINGS AND NUT QUALITY AND YIELD IN TEXAS. J. D. Johnson, R. S. Halliwell and J. D. Trampota, Dept. of Plant Path. and Micro., Texas A&M Univ., College Station, TX 77843

The pecan scab fungus, Cladosporium carvigenum, is the major foliage and nut disease that affects pecans in Texas. Disease ratings made on shucks and foliage have been used to evaluate disease severity. Although disease ratings have been useful, they have been of little value in relating to economic losses. In 1988-89, Desirable, Mahan and Wichita pecan cultivars were harvested and rated based on percent shuck infection (0% = Rating of 1, 1-25% = 2, 26-50% = 3, 51-75% = 4, and 76-100% = 5). The three cultivars were selected for study based on their different reaction to the pecan scab fungus. Percent kernel and number of nuts per pound were determined for each disease rating. The average of the three cultivars with a rating of "5" was 38% smaller in weight than pecans with a "1" rating. Nut weight showed the most dramatic decrease with increasing disease rating. Yield reduction progressively increased as the disease ratings increased. Disease ratings based on percent shuck infection can be used to determine effectiveness of disease control and to predict pecan yield reduction and nut quality.

COMPARISON OF AERIAL PHOTOGRAPHIC AND VIDEO METHODS FOR DETECTION OF PLANT STRESS ON GOLF COURSES. K.J. Jones, Lucas, L.T. and Shew, H.D. Dept. of Plant Pathology, NCSU, Raleigh, 27695-7616

Near Infra Red (IR) photography has been used for the collection of plant stress data for many years. IR film and video cameras have comparable IR sensitivity. The purpose of this research was to evaluate the use of video for IR image acquisition and a digital analysis system for IR photographs. IR film gives a 6000x4000 pixel image when digitized. This contrasts to the 512x512 pixel image gathered by common video cameras. A 512x512 image does not have sufficient resolution to allow detection of subtle patterns that are signatures of plant stress. Video methods are limited to 256 shades of grey, due to expense of equipment capable of analyzing real time color video. The superior color and spatial resolution of IR film, in combination with the relatively low cost of photographic cameras and the maturity of the interpretation systems, makes current photographic methods the technique of choice for detecting plant stress on golf courses.

PARASITISM OF OOSPORES OF PYTHIUM SPP. BY STRAINS OF ACTINOPLANES SPP. N. I. Khan, A. B. Filonow, and L. L. Singleton. Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078-9947.

Actinoplanes spp. are Gram+, filamentous bacteria that produce motile spores. Actinoplanes sporangia (5 X 10^4) from 16 strains were aseptically incubated in plastic wells with 5 X 10^3 oospores of P. aphanidermatum, P. irregulare, P. myriotylum, or P. ultimum. After 24-96 h at 28C, 100-200 oospores per experiment were observed and the percent parasitism was calculated. There were 2-3 experiments. Parasitized oospores exhibited disorganized cytoplasm with Actinoplanes hyphae, and often sporangia, proliferating from the oospore. The level of parasitism caused by several of the strains varied considerably in oospores of different Pythium species. Oospores of P. aphanidermatum were generally less parasitized than those of other species.

TRANSFORMATION OF *FUSARIUM OXYSPORUM* F. SP. *NIVEUM* RACE 2 WITH RACE 0 DNA ALTERS PATHOGENICITY BUT NOT VEGETATIVE COMPATIBILITY. D. H. Kim, B. R. Lovic, R. D. Martyn, and C. W. Magill. Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

Fusarium oxysporum f. sp. *niveum* race 2 (FON-2) overcomes all currently available resistance in watermelon while race 0 (FON-0) is pathogenic only to cultivars that lack wilt-resistance genes. A genomic library of FON-0 with an average insert size of 40 kb was constructed in cosmid vector, CosHyg1. Differential hybridization of colony replicas with total genomic DNA from FON-0 and FON-2 was used to identify clones that hybridized only to FON-0. Nineteen specific clones and 10 repetitive fragments were selected from 1,000 colonies and used to transform FON-2 protoplasts. Nineteen transformants resulting from 10 specific and 9 repetitive clone-mediated transformations were inoculated onto differential watermelon cultivars to determine changes in pathogenicity. Three transformants, all from specific clones, showed altered pathogenicity: one was less aggressive, one was avirulent on each race-differential cultivar, and one displayed a change to a FON-0 reaction. Vegetative compatibility was determined by pairing *nit* mutants of the transformants with tester strains representing the three FON races. None of the transformants that showed a change in pathogenicity showed a change in vegetative compatibility.

SUPPRESSION OF FOLIAR BLIGHT AND SORESHIN OF TOBACCO CAUSED BY RHIZOCTONIA SOLANI WITH IPRODIONE. T.A. Kucharek, R. Tervola, and A. Tyree. Dept. of Plant Pathology, Extension Service Suwannee Co., and Extension Services Hamilton Co., respectively, University of Florida Gainesville, FL 32611.

Foliar blight and soreshin of tobacco caused by Rhizoctonia solani have increased recently in Florida. Both diseases were suppressed by iprodione (Rovral 4F) at the rate of 2.3 l/ha in 234 l of water/ha in greenhouse and field tests. Iprodione was brushed on individual leaves in the greenhouse and sprayed over the top of plants with a CO_2 sprayer in the field. Inoculations in the greenhouse for foliar blight were done by placing a 3mm mycelial agar plug on a leaf. Natural infection occurred in the field tests. Lesion size in leaves was reduced by 88 and 100% in two greenhouse tests. In two field tests, incidence of foliar blight was reduced by 50 and 73% (P=0.001 and P=0.05). In the field, severity of soreshin was reduced by 70% (P=0.05). Root vigor, stem diameter, plant height and plant dry weight were increased by 88, 22, 27, and 46%, respectively, (P=0.05).

FRUIT AND LEAF DISEASES OF MUSCADINE GRAPE (*VITIS ROTUNDIFOLIA*) IN MISSISSIPPI. N. Kummuang[1], S. V. Diehl[1], B. J. Smith[2], and C. H. Graves, Jr.[1] [1]Mississippi State University, Mississippi State, MS, 39762, and [2]USDA-ARS, Small Fruit Research Station, Poplarville, MS, 39470.

Fruit and leaf diseases were monitored throughout the 1991 growing season on 3 muscadine cultivars at 3 locations in south Mississippi, namely, Crystal Springs (CS), Beaumont (BT), and McNeill (MN). Visual disease identifications were confirmed by isolation of pathogens. Black rot (*Guignardia bidwellii* f. *muscadinii*) was most prevalent on foliage and was found on all cultivars. Bitter rot (*Greeneria uvicola*) lesions were found less frequently. Fruit diseases included black rot, bitter rot, Macrophoma rot (*Botryosphaeria dothidea*), and ripe rot (*Colletotrichum spp.*). Prevalence of all fruit diseases was generally low at CS. However, there was a significant increase in bitter rot and black rot at the other locations. Bitter rot was most prevalent at BT; black rot was most prevalent at MN.

AMPLIFICATION AND CLONING OF cDNA ENCODING KIEVITONE HYDRATASE FROM *FUSARIUM SOLANI* F. SP. *PHASEOLI*. D. Li, C. L. Schardl & D. A. Smith. Department of Plant Pathology, University of Kentucky, Lexington, KY 40546-0091

The correlation between the constitutive production of kievitone hydratase (KHase) by *Fusarium solani* f. sp. *phaseoli* (*Fsp*) and the fungus' ability to cause disease on *Phaseolus vulgaris* suggests that KHase may be a virulence factor. Following the purification of KHase and determination of its N-terminal amino acid sequence, two oligonucleotide mixtures were synthesized. One was in the sense orientation and represented all possible coding sequences for amino acids 2-7. The anti-sense mixture corresponded to amino acids 19-24. The two mixtures served as primers for amplification of *Fsp* cDNA by polymerase chain reaction. The 68 bp products were cloned, sequenced and found to match the KHase N-terminus. Using another sense primer mixture based on these sequences, and the linker-primer $(GA)_{10}ACTAGTCTCGAG(dT)_{18}$, a near-full-length 1.2 kb cDNA was amplified. Its 5' sequence also matched the KHase N-terminus.

SM-9, A POTENTIAL CONTROL CHEMICAL FOR FUNGAL AND BACTERIAL PLANT PATHOGENS. Robert H. Littrell, Mark Gilmore and S. M. McCarter, Coastal Plain Consulting, Tifton, GA 31794 and Department of Plant Pathology, UGA, Athens, GA 30602.

Laboratory studies were conducted to determine the sensitivity of various fungal and bacterial pathogens to SM-9 (SMI Corp.). SM-9 was used in dilutions of 1:80 and 1:325 in these studies. In in vitro tests, SM-9 caused severe to moderate inhibition on fungal pathogens including Sclerotium rolfsii, Sclerotinia sclerotiorum, and Rhizoctonia solani. SM-9, when tested on several bacterial pathogens, caused total inhibition of Clavibacter michiganensis subsp. michiganensis and Bacillus cereus, moderate inhibition of Xanthomonas campestris pv. vesicatoria, and weak to moderate inhibition of Pseudomonas syringae pv. hibisci and P. solanacearum. Field studies are underway to test the effectiveness of this chemical on control of disease in the field.

DEVELOPMENT OF SDS OF SOYBEAN IN IRRIGATED AND NONIRRIGATED FIELD MICROPLOTS INFESTED WITH FUSARIUM SOLANI ALONE OR IN COMBINATION WITH HETERODERA GLYCINES. J. Melgar and K. W. Roy. Mississippi State University, Mississippi State, MS, 39762.

Coker 156 soybean plants were grown in 73.6-cm-diameter fiberglass microplots containing either noninfested fumigated soil (control) or fumigated soil artificially infested with F. solani (FS), H. glycines (HG), or both (FS + HG). Leaf symptoms, initially consisting of small chlorotic blotches, were first detected in the FS + HG treatment 93 days after planting, when plants were in growth stage R3. Two more weeks elapsed before leaf symptoms appeared in the FS treatment. Symptoms progressed to include interveinal chlorosis and necrosis of leaves, pod abortion, root rot, and defoliation. Leaf symptoms were more severe and yield losses were greater in the FS + HG treatment than in the FS treatment. Incidence of leaf symptoms was greater in irrigated than in nonirrigated plots. Fusarium solani was reisolated from living symptomatic plants in the FS and FS + HG treatments only.

EFFICACY OF A MIXTURE CONTAINING THIOPHANATE-M IN REDUCING THE INCIDENCE OF SCLEROTINIA MINOR IN PEANUT SEED. H. A. Melouk, C. Bowen, and K. E. Jackson. USDA-ARS and Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078-9947.

Batches (1,350 seeds each) of Sclerotinia minor-infested seed were treated with a mixture (thiophanate-m, 15%; PCNB, 15%; captan, 40%) (MT) at 113.5 g/45.5 kg seed or talcum (T) as a control and then kept in polyethylene bags at 25± 4 C. Treated seeds were washed with water and detergent at 1 hr and also at 1, 4, 7 or 14 days after treatment and plated on an agar medium (Phytopathology 81:810) to determine the incidence of S. minor. At each sampling date, four sub-samples (250 seeds ea) were taken from the MT- and T-treated seeds. Incidence of S. minor in T-treated seed ranged from 1.4-2.9% as compared to 0.0-0.1% in MT-treated seed from all sampling dates. Germination of T- and MT-treated seed did not significantly differ and ranged from 63-89%.

EXPANDED HOST RANGE FOR *MONOSPORASCUS CANNONBALLUS*. J. C. Mertely, R. D. Martyn, and M. E. Miller, Department of Plant Pathology and Microbiology, Texas A&M University, College Station 77843 and Weslaco 78596, and B. D. Bruton, USDA, ARS, SCARL, Lane, OK 74555.

Thirty two species and cultivars within the family Cucurbitaceae and seven noncucurbit species were evaluated as hosts of *Monosporascus cannonballus* in greenhouse tests by direct seeding into infested soil. Plants were assessed for disease symptoms 8-9 wk after planting. Perithecia were observed in roots of all cucurbit species at frequencies ranging from 40-100% and *M. cannonballus* was reisolated from 25-100% of the plants. Disease symptoms characteristic of those caused by *M. cannonballus* occurred on all cucurbits tested and were most severe on watermelon, moderately-severe on muskmelon and summer squash, and least severe on winter squash. Noncucurbit plants tested included corn, common bean, sorghum, wheat, broccoli, tomato, and cotton. *M. cannonballus* was reisolated from 100, 60, 60, 40, 20, 0, and 0% of the roots, respectively, for each of these seven crops. Fungal perithecia occurred on intact roots of most inoculated bean and sorghum plants, occasionally on corn and wheat, but not on broccoli, cotton, or tomato. Root discoloration was apparent on broccoli, corn, tomato, and wheat; however, only inoculated tomato and wheat plants had significantly reduced dry weights of their respective roots and tops compared to uninoculated control plants.

DEFOLIATION, HOST GROWTH, AND DISEASE PROGRESS DURING LEAF SPOT EPIDEMICS ON WHITE CLOVER. Scot C. Nelson and C. Lee Campbell. Department of Plant Pathology, North Carolina State University, Raleigh, NC 27695-7616.

Non-monotonic disease progress curves are characteristic of the white clover leaf spot pathosystem. To help explain this phenomenon, weekly counts of leaf number and estimates of leaf area (cm^2) and leaf spot severity (% leaf area diseased) for every leaf were obtained for each of 40 white clover (*Trifolium repens*) transplants in a 10-ha white clover/tall fescue (*Festuca arundinacaea*) pasture near Raleigh, NC during two, consecutive 6-wk growth periods (GPs) in 1991. Substantial declines in disease severity between ratings were attributed primarily to defoliation of diseased leaves during the latter part of both GPs. However, for some plants during GP 1 and early in GP 2, rapid foliation (not leaf expansion) in excess of disease increase and defoliation diluted estimates of disease severity. The data confirm and extend our previous evidence for defoliation as the principal determinant of dramatic declines in leaf spot severity in this pathosystem.

INCIDENCE AND ASSOCIATIONS OF WHITE CLOVER LEAF SPOT PATHOGENS IN EIGHT PASTURES IN NORTH CAROLINA. Scot C. Nelson, C. Lee Campbell and Charles R. Harper. Department of Plant Pathology, North Carolina State University, Raleigh, NC 27695-7616.

Pathogen incidence in a leaf spot complex on white clover (*Trifolium repens*) was monitored in 1991 in field plot epidemics and monthly (Jul-Oct) samples of 300 symptomatic leaves from each of 7 pastures in 5 counties in the Piedmont region of North Carolina. Examination of leaves for diagnostic symptoms and pathogen reproductive structures revealed that the disease complex comprises at least ten pathogen genera. The most prevalent diseases were black spot (*Pseudomonas andropogonis*), Cercospora leaf spot (*Cercospora zebrina*) and summer blight (*Rhizoctonia solani*). Seasonal changes in pathogen abundance and great within- and among-county variation in species diversity suggest temperature-dependent population shifts and the potential existence of locally adapted pathogen biotypes. *R. solani* was rarely found with other foliar pathogens, and a test for interspecific associations at the leaf level indicated a net negative association among pathogen species.

SEED TRANSMISSION OF SOYBEAN MOSAIC VIRUS USING MOTTLED SOYBEAN SEEDS. R. P. Pacumbaba, Dept. of Plant and Soil Science, Alabama A&M University, Normal, AL 35762.

A study of the transmission of soybean mosaic virus (SMV) using mottled seeds from virus-infected and non-mottled seeds from virus-free soybeans was initially conducted. Soybean mosaic virus and other seed-transmitted viruses of soybean were transmitted only about 50% of the time through the mottled (black or brown) of supposedly SMV-infected seeds and non-mottled supposedly SMV-free seeds. About 50% also of the soybean seedlings coming from mottled seeds were symptomless or virus-free plants. SMV-infected and symptomless seedlings from mottled seeds as well as SMV-infected and symptomless seedlings from non-mottled seeds were transplanted and grown to maturity for seeds. The mottled and non-mottled seeds obtained from mottled and non-mottled SMV-infected plants were 72 and 74% and 29 and 26%, respectively. The mottled and non-mottled seeds obtained from mottled and non-mottled symptomless soybeans were 53 and 62% and 47 and 38%, respectively. The mottled and non-mottled seeds will be planted again in the greenhouse and determined if mottled seeds all carry SMV and non-mottled seeds are virus free.

INTEGRATION OF CULTURAL AND BIOLOGICAL CONTROL STRATEGIES TO REDUCE TOMATO EARLY BLIGHT. L. D. Ploper[1], P. A. Backman[1], C. Stevens[2], V. A. Khan[2], and R. Rodríguez-Kábana[1]. [1]Dept. of Plant Pathology, Auburn Univ., AL 36849, and [2]Dept. of Agric. Sci., Tuskegee Univ., AL 36088.

Combinations of soil mulch, row cover, chemical, and biological treatments were evaluated under field conditions in Alabama for control of *Alternaria solani* on tomato. Plots were arranged in a split-plot design with 6 replications. Cover systems [bare soil (BS), black plastic mulch (BM), BS + spunbonded polyester row cover (covering the crop for 3 weeks after transplant) (RC), and BM + RC] were whole plots. Foliar treatments (untreated, biological amendment, and chlorothalonil) were subplots. The biological amendment consisted of buffered colloidal chitin (0.5%, w/v), a sticker, and a mixture of two chitinolytic *Bacillus cereus* isolates (10^9 cells/ml). Plots were sprayed 8 times at 8-12 day intervals, starting two weeks after transplant. Plots with RC did not receive the first 2 sprays. BM significantly reduced early blight levels, but RC did not improve disease control. Both foliage treatments were superior to the untreated control ($P<0.01$), while the fungicide was better than the biological only late in the season. The efficacy of BM plus biological treatment was similar ($P<0.01$) to BS plus chlorothalonil, indicating that integration of cultural and biological strategies can reduce early blight to levels near those of commercial fungicides.

SMUT INCIDENCE AND SEVERITY AFTER INOCULATING DEVELOPING CORN EARS WITH *USTILAGO MAYDIS* USING DIFFERENT METHODS. D. D. Pope and S. M. McCarter, Department of Plant Pathology, University of Georgia, Athens, GA 30602

In field tests during 1990 and 1991 at Athens, Blairsville, and Midville, Georgia, different inoculation methods were compared by treating developing ears of Silver Queen corn with a heterogeneous mixture of six sporidial lines of *Ustilago maydis*. Sporidia were applied by various methods to different ear tissues to imitate putative natural infection conditions. Among the treatments, maximum disease incidence and severity occurred when ears were injected with 3 ml of inoculum at 10^6 cells/ml through the husk when silks had emerged 10 cm. This method produced disease incidence ranging from 70 to 97% and disease severity from 3.5 to 4.5 on a 0-7 scale. Less than 4% of the ears were infected when inoculum was placed on intact silks, which was not significantly different from disease incidence on noninoculated controls.

VARIABILITY OF PHYMATOTRICHUM OMNIVORUM BASED ON RESTRICTON FRAGMENT LENGTH POLYMORPHISM ANALYSIS. J. L. Riggs and S. D. Lyda, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

Phymatotrichum omnivorum is a fungus with a large and heterogeneous host range. Restriction fragment length polymorphisms (RFLP) were used to measure the presence and the distribution of genetic variation in P. omnivorum. Variablity based on RFLP in mitochondrial DNA, along with variablity based on pathogenicity factors among 21 isolates of P. omnivorum is known. Genomic DNA from 40 isolates from nine different hosts and from different geographic locations along with 35 isolates from a single location was digested separately with five restriction enzymes and was probed with the Saccharomyces cerevisae ribosomal probe pBD4. A moderate level of variation was observed among the 40 isolates. Within these isolates, DNA digested with the enzymes Dra I and BamH I exhibited four and two distinct patterns, respectively. A lower degree of variation was observed among the isolates from a single location.

POPULATION DENSITIES OF *PHYTOPHTHORA CAPSICI* IN FIELD SOILS RELATED TO DRIP IRRIGATION, RAINFALL, AND DISEASE. Ristaino, J. B., Hord, M. J., and [1]Gumpertz, M. L. Depts. of Plant Pathology and [1]Statistics, N. C. State University, Raleigh, NC.

Populations of *Phytophthora capsici* were monitored in plots in three fields that were either drip irrigated on a more frequent or less frequent schedule, and infested with one of three levels of inoculum or left uninfested. In fields with low or moderate rainfall, populations were highest early in epidemic development in plots that were irrigated more frequently. Populations were positively correlated with disease incidence and soil water content, and were higher on the sides of the plot where the drip irrigation line was located in these fields. In a high rainfall field, populations were not significantly affected by irrigation frequency or the location of the drip irrigation line, but were highest after a heavy rainfall event that occurred early in the season. The pathogen spread into initially uninfested plots and was detected after symptoms of disease had occurred. Population dynamics over time were affected by the level of inoculum added to plots, rainfall, drip irrigation, and disease incidence.

DETECTION OF FUMONISINS IN CORN BY IMMUNOASSAY. R. A. Shelby and V. C. Kelley. Departments of Plant Pathology and Botany and Microbiology, Auburn University, Alabama Agricultural Experiment Station, Auburn University, AL 36849.

Two monoclonal antibodies (Mabs) with different reactivity spectra were developed against a fumonisin B1(FB1)-BSA conjugate. Mab 4H12 is specific for FB1 while Mab 8H3 reacts with FB1 and FB2. Using both Mabs, ELISA's were done on twelve corn samples taken from variety trials at Brewton, AL, and compared with FB1 and FB2 analysis by high performance liquid chromatography (HPLC). Quantitative analysis of FB1 and FB2 was calculated by regression on a standard curve generated by serial dilutions of FB1 and FB2 in buffer. ELISA data using Mab 4H12 were correlated with PPM FB1 by HPLC (r^2=.84) and data from Mab 8H3 were highly correlated with PPM FB1+FB2 by HPLC (r^2=.96). ELISA tended to underestimate the level of fumonisins in more heavily contaminated samples (>10 PPM), but agreed well at lower levels. These Mabs make possible the rapid testing of corn samples for FB1 and FB2.

USE OF SOIL SOLARIZATION TO REDUCE THE SEVERITY OF EARLY BLIGHT, SOUTHERN BLIGHT AND ROOT-KNOT IN TOMATOES. C. Stevens[1], V. A. Khan[1], D. Collins[2], R. Rodriguez-Kabana[2], L. D. Ploper[2], O. Adeyeye[1], J. Brown[2] and P. Backman[2]. [1]GWC Agri. Expt. Station Tuskegee University, Tuskegee Inst. AL. 36088. [2]Alabama Agri. Expt. Station, Auburn University AL. 36849.

Soil solarization (SS) significantly reduced early blight (EB) foliage disease (Alternaria solani) as indicated by a 72 and 50% reduction of blighted leaves and lesions per leaf at the 3rd leaf cluster respectively, compared to 'Floradade' tomato plants grown in bare soil (BS). SS also reduced the inoculum levels and the incidence of Southern blight (SB) (Sclerotium rolfsii) in the soil. Root-knot (RK) (Meloidogyne incognita) was also significantly reduced. Combining a transplant application of Terraclor (TC) and biocontrol agent Gliocladium virens in alginate prill with solarized soil (SOL-S) and BS, improved the efficiency of SS in controlling EB and SB of plants grown in SOL-S plots. However, application of TC increased the severity of RK in plants grown in SOL-S plots. Except for TC plus SOL-S treatment, yield from SOL-S plots was increased 3 times by SS compared to BS alone.

Ribsomal DNA as a Molecular Marker to Examine Diversity Among Species of Colletotrichum. C. L. Trout and D. O. TeBeest, Department of Plant Pathology, University of Arkansas, Fayetteville, Arkansas 72701.

Several species of Colletotrichum are currently either being used or considered for use as bioherbicides. Traditionally, species within this genus are characterized on the basis of morphology while various formae speciales are recognized based on host specificity. In an attempt to find molecular markers which are useful for examining diversity in Colletotrichum a ribosomal DNA probe was used. Ten isolates representing six species (C. glocosporioides, C. graminicola, C. dematium, C. malvarum, C. orbiculare, and C.

coccodes) and four formae speciales of C. gloeosporioides were examined for rDNA gene repeat (rDNA) restriction fragment length polymorphisms (RFLPs). Preliminary results indicate that rDNA RFLP analysis may be a useful tool for distinguishing species of Colletotrichum. In addition, the four formae speciales of C. gloeosporioides examined were also differentiated by rDNA RFLP analysis.

PHASEOLLIDIN HYDRATASE ACTIVITY PRODUCED BY *FUSARIUM SOLANI* F. SP. *PHASEOLI*. C. S. M. Turbek, D. A. Smith, and C. L. Schardl. Department of Plant Pathology, University of Kentucky, Lexington, KY 40546-0091

Phaseollidin, an isoflavonoid phytoalexin produced by *Phaseolus vulgaris* (French bean), is modified by the action of a phaseollidin hydratase (PdHase) activity secreted by the bean pathogen, *Fusarium solani* f. sp. *phaseoli* (*Fsp*). The well-characterized enzyme kievitone hydratase (KHase) is also secreted by this fungus, and catalyzes a similar hydration of another bean phytoalexin, kievitone. To investigate whether the two activities were catalyzed by the same or different enzymes, KHase was purified from culture filtrate and PdHase activity was assayed at each step. The activities copurified by hydroxyapatite chromatography. However, in the final step — non-denaturing polyacrylamide gel electrophoresis — peak PdHase activity overlapped, but did not precisely correspond, with peak KHase activity. This result indicated the existence of distinct hydratase enzymes. Partially-purified PdHase had an approximate K_M = 6.8 μM phaseollidin.

INTERNAL TISSUE DAMAGE IN ROOTS OF HEALTHY LOBLOLLY PINES. C. Walkinshaw. USDA Forest Service, Southern Forest Experiment Station, Forest Management Research, 2500 Shreveport Highway, Pineville, LA 71360.

Large variation in cell and tissue morphology occurred in roots of healthy loblolly pines (Pinus taeda L.). Irregular pockets of dead cells were common in putative healthy roots that were collected 1 meter from the stem and at three depths from 0 to 20 cm. These abnormalities were in roots sampled twice from ten trees. The Papanicolaou staining schedule with 5 to 8 micron paraffin sections was the most effective for identifying damaged tissues. Roots were considered living when nuclei stained normal with hematoxylin:eosin and starch grains stained purple with the periodic acid-schiff reaction. Roots with abnormalities generally qualified as living as opposed to dead roots that lacked cell organization. These views of internal root anatomy appear valuable to define root health.

RE-EXAMINATION OF RACES OF THE CUCURBIT ANTHRACNOSE PATHOGEN, COLLETOTRICHUM ORBICULARE. L. Wasilwa, J. C. Correll, and T. E. Morelock. Depts. of Plant Pathology and Horticulture, Univ. of Arkansas, Fayetteville, AR 72701.

Seven races of the anthracnose pathogen (Colletotrichum orbiculare) have previously been described based on disease reactions on 12 differential cucurbit hosts. However, the validity of some of these races is questionable. Over 70 anthracnose isolates from cucumber, watermelon, cantaloupe, cucuzza gourd, and honeydew from throughout the U.S., including representative cultures of each of the seven previously described races, were examined for virulence and vegetative compatibility. Ten vegetative compatibility groups (VCGs) were identified among all isolates, but only isolates from four VCGs (VCGs 1,2,3 and 4) were virulent on cucurbits. All of the recently (1989-1991) collected isolates belonged to two distinct VCGs; all cucumber and cantaloupe isolates belonged to VCG1 whereas all watermelon and some cucuzza gourd isolates belonged to VCG2. These two VCGs were quite different in their disease reactions on 13 cucurbit differentials. All isolates in VCG1 gave disease reactions similar to isolates previously described as race 1; all those in VCG2 gave disease reactions similar to isolates previously described as race 2. In particular, two watermelon cultivars best differentiated the two races; race 1 (VCG1) isolates were virulent on Black Diamond but weakly virulent on Charleston Grey whereas race 2 (VCG2) isolates were virulent on both. The seven previously described races could not be differentiated (P = .05) from race 1 or race 2 type disease reactions on the 13 cucurbit differentials.

REACTION OF SIX CULTIVARS OF PERENNIAL RYEGRASS INOCULATED WITH STEM RUST. Welty, R. E. and R. E. Barker. NFSPRC, USDA/ARS, Corvallis, OR 97331-7102.

Six cultivars of perennial ryegrass (Lolium perenne L.) were inoculated with Puccinia graminis subsp. graminicola to evaluate resistance. Young plants grown and inoculated in growth chambers (20 C, 16 hr light; 15 C, 8 hr dark) were rated for rust infection type (0-4 scale); the same plants grown as adults in the field were assessed for incidence of infection (%) and disease severity (% leaf area rusted, Modified Cobb Scale). Area under the disease progress curve was used to compare cultivars. As young plans and as adults, Birdie II and Linn were significantly more resistant than Ovation, Delray, Yorktown II, and Palmer. A sequential-screen procedure was used to eliminate disease escapes in 14-wk-old plants and retain slow-rusting characteristics of adult plants. The procedure could be used in plant breeding programs and in the study of genetics of resistance.

Using Amplified Fragment Length Polymorphisms (AFLP's) to Distinguish Isolates of *Peronospora tabacina* Adam. M. D. Wiglesworth, W. C. Nesmith, C.L. Schardl, and M.R. Siegel. University of Kentucky, Lexington, Kentucky 40546-0091.

Many etiological aspects of tobacco blue mold remain unknown because traditional techniques for differentiation of *Peronospora tabacina* Adam have been inadequate. We previously determined that the internal transcribed spacer regions of the rRNA genes were not sufficiently variable to differentiate among isolates of *P. tabacina*, but could distinguish species and genera of several Peronosporales. Therefore, another PCR-based method (Welsh and McClelland, *Nucl. Acids Res.* 18:7213-7218) was used to identify isolate-specific polymorphisms. This technique uses genomic fungal DNA, 10 nt oligonucleotide primers, and modified PCR parameters to generate randomly amplified fragments of DNA that are size-fractionated by agarose gel electrophoresis. Amplified fragment length polymorphisms (AFLP's) distinguished between isolates of *P. tabacina* collected from Germany in 1963, Kentucky in 1979, and Mexico in 1987; this was not possible using the previous PCR-based assay. To our knowledge, this is the first report of a molecular technique that is successful in detecting differences in isolates of the tobacco blue mold fungus. Fragments exhibiting polymorphisms have been cloned in *E.coli* and are being sequenced to serve as molecular markers for a study with various populations of *P. tabacina*.

EFFECT OF AN ALLELE FOR EARLINESS ON SUSCEPTIBILITY OF PEARL MILLET TO LEAF BLIGHT. J. P. Wilson and W. W. Hanna. USDA-ARS, Coastal Plain Experiment Station, Tifton, GA 31793

Differences in leaf blight infection of derivatives of pearl millet Tift 23 with cytoplasmic substitutions and alleles conferring morphologic traits were evaluated. There was no effect of the B, A_1, or A_4 cytoplasms, or the tr and d_2 alleles on leaf blight progress in the field or infection by Pyricularia grisea in the greenhouse. An apparent increased AUDPC in the field was associated with the e_1 allele for earliness. Correction of disease progress curves for heading date indicated that the e_1 allele was associated with reduced severities at heading. Inoculation of greenhouse grown seedlings with P. grisea resulted in reduced lesion dimensions on several of the cultivars with the e_1 allele. Differences between reactions of the cultivars in the field and greenhouse could be due in part to differences in susceptibility to other pathogens constituting a minor role in the leaf blight complex.

HYBRID RESISTANCE TO AND EFFECTS ON SILAGE QUALITY BY SOUTHERN RUST INFECTION OF CORN. J. P. Wilson, J. C. Johnson Jr., and R. N. Gates. USDA-ARS and UGA, Coastal Plain Experiment Station, Tifton, GA 31793.

Severity of southern rust, caused by Puccinia polysora, differed among hybrids in an epidemic in Georgia in 1991. Hybrids evaluated and severities at maturity for silage were Pioneer 3154 (42%), Coker 77B (50%), Pioneer 3085 (67%), Pioneer 3142 (80%), and DeKalb 689 (88%) ($LSD_{0.05}$ = 7.3). Effects of rust on silage yield and quality of DeKalb 689 were examined. Plots were untreated, protected with one or two applications of chlorothalonil, or one of Tilt. Rust severities were <1% at plot establishment. After 22 days, severity means for treatments ranged from 34 to 84%. Six plants from each plot were evaluated for silage quality of non-grain portions. Severity was correlated positively with dry matter concentration, and negatively with dry matter yield, dry matter digestibility, and digestible dry matter yield. Linear regression indicated that within the range of severities, digestible dry matter yield decreased 4% with each 10% increase in rust severity.

GREEN TREEFROGS AS VECTORS FOR DISPERSAL OF *COLLETOTRICHUM GLOEOSPORIOIDES* ON NORTHERN JOINTVETCH IN RICE FIELDS. X.B. Yang and D.O. TeBeest. Dept. of Plant pathology, University of Arkansas, Fayetteville, Arkansas 72701.

Green treefrogs (*Hyla cinerea*) commonly seen in Arkansas rice fields have been found as efficient dispersal vectors for *C. gloeosporioides f. sp. aeschynomene*, causal agent of anthracnose on northern jointvetch (NJV). In 4 experiments, the frogs were caught from rice fields and kept in containers in contact with healthy NJV. More than 90% of tested plants were infected with up to 10 lesions per plant. In greenhouse, the frogs sealed in simulated rice-weed patches moved the pathogen from the source plant to healthy plants resulting in 95% infection. In rice fields, the density of tree frogs in 16 surveyed weed patches varied from 0.32 to 3 frogs per NJV plant, and tree frogs preferred taller NJV as shelters. Shelter selection experiments showed that in rice-weed patches the frog preference indices of rice to NJV was 1:133. The fact that NJV is taller than rice and the frogs prefer sitting on taller plants may contribute to the dispersal efficacy.

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