The American Phytopathological Society

SOUTHERN DIVISION

Annual Meeting

February 5-6, 1990

ABSTRACTS

Alphabetized by first author's last name.

PLANT DENSITY EFFECT ON PROPORTION OF MAIZE DWARF MOSAIC VIRUS INFECTION IN SORGHUM. J. D. Alexander, R. W. Toler and F. R. Miller, Dept. of Plant Pathology & Microbiology, Texas A&M University, College Station, Texas 77843.

An experiment was designed to compare the patterns and proportions of infection by maize dwarf mosaic virus-strain A (MDMV-A) in host populations of 100:0 and 15:85, susceptible:immune sorghum. Each plot consisted of 6 rows of plants and was bordered on all sides with plots of immune plants. Half of the six replications of each host population type were replanted 10 days after the first planting due to poor emergence in all plots. Plant densities ranged from 200 to 1200 plants per plot. MDMV-A infections were recorded at 3 and 6 weeks after first-planting emergence. Regression analysis indicated that plant density was a highly significant factor in the proportion of susceptible plants infected in both host population types. Greater proportions of susceptible plants were infected in the less dense plots, presumably from increased exposure to wind-borne alate aphid vectors.

GINKGO BILOBA SUSCEPTIBLE TO CALONECTRIA CROTALARIAE. L. W. Baxter, Jr., G. C. Kingsland and S. B. Segars.

Calonectria crotalariae (anamorph = Cylindrocladium crotalariae) was isolated from diseased greenhouse-grown seedlings of G. biloba. Stems of 15-year-old ginkgo trees died when wound-inoculated with C. crotalariae. Stems of current mature growth (CMG), 1-year growth (OYG) and 2-year growth (TYG) were equally susceptible to C. crotalariae. Time necessary for permanent wilting on CMG, OYG, and TYG was approximately 4, 7, and 10 days, respectively. Isolates from blueberry, camellia and kiwi were pathogenic on wound-inoculated stems (WIS) of CSG, OYG, AND TYG of ginkgo. The kiwi isolate killed ginkgo more slowly than the other isolates late in the season. Several hundred inoculations were made from July to October, 1988 and 1989. The bluebery isolate (only one used) killed WIS of Cleyera japonica, Picea abies, Sequoia sempervirens, and Cornus florida. All wounded non-inoculated stems healed. Abundant conidia and perithecia formed on 5-day-old cultures, 2 days and 7 to 10 days after scraping, respectively.

THE EARLY EPIDEMIC STAGES OF CERCOSPORA LEAFSPOT OF ALFALFA, A DISEASE WITH EXTENSIVE LESION EXPANSION. R. D. Berger and D. A. Roberts, Dept. Pl. Pathol., U. of Florida, Gainesville, 32601.

At the initiation of leafspot (caused by Cercospora medicaginis) on leaf cohorts of alfalfa (Medicago sativa), primary epidemic waves were minimal and secondary waves were substantial. Thus, the progress of this disease was in direct contrast to the pattern of waves observed previously for rust (Uromyces striatus) and to the hypothetical response generated with Vanderplank's basic infection rate equation, i.e., a large primary wave and the damping of subsequent waves. Because the lesions of Cercospora leafspot continued to expand, the secondary waves of logit(severity) were much greater than the waves observed for log(lesion numbers). The radial rate of lesion expansion (ca. 0.1 mm day^{-1}) was relatively slow, but the areas of lesions doubled within 4 days and the lesions were five times their initial size by 12 days. At the time of defoliation of individual leaflets, the amount of disease was variable ($y=0.17 \pm 0.11$), but lesion expansion constituted 85-95% of the total diseased area.

EFFECT OF POWDERY MILDEW AND LEAF RUST INFECTION ON YIELD OF WINTER WHEAT IN NORTH CAROLINA. K. L. Bowen[2], K. L. Everts[1], and S. Leath[1], [1]USDA-ARS, Department of Plant Pathology, North Carolina State University, Raleigh 27695-7616, and [2] Department of Plant Pathology, Auburn University, AL 36849.

Winter wheat cvs. Saluda and Coker 983 were established in two locations in North Carolina in the falls of 1987 and 1988 to examine yield reduction caused by Erysiphe graminis f. sp. tritici and Puccinia recondita f. sp. tritici (Prt). Disease onset and extent were established by applications of triadimefon at four growth stages, and in 1987-88 by two inoculations with Prt. Yields in fungicide treated plots were reduced in comparison to untreated plots in all environments except one location in 1988-89. Mildew was observed during tillering in three of four environments; but only in 1987-88 at one location, were tillers/m row subsequently reduced. Leaf rust developed in three of four environments; 500-kernel weights were reduced in all environments. Empirical relationships between disease and yield components are being developed.

Pyrenophora tritici-repentis growth and Ptr-toxin production over time. D.A. Brown and R.M. Hunger, Plant Pathology, OSU, Stillwater, OK 74078.

Ptr-toxin, a chlorosis-inducing, host-specific toxin produced by P. tritici-repentis, is an acidic, low molecular weight (800 < Ptr-toxin < 1800) compound. Growth and toxin production by 5 isolates were monitored for a 21-day period. From day 3 to day 21, growth increased as much as 422% and as little as 31%. During this time, significant accumulation of Ptr-toxin was observed for 3 P. tritici-repentis isolates. Specific activity of Ptr-toxin produced by isolate OKD1 was greatest at days 3 and 6 and by isolate OKD3 at day 3; no significant increase in the specific activities of Ptr-toxin produced by other isolates was observed. Screening isolates for Ptr-toxin production can be performed after culture for 3 days. Cultures may be incubated for longer periods to obtain greater quantities of Ptr-toxin.

Regulation of Pyrenophora tritici-repentis growth and Ptr-toxin production in vitro by cultural parameters. D.A. Brown and R.M. Hunger, Plant Pathology, OSU, Stillwater, OK 74078.

Previous work has demonstrated the production of a chlorosis-inducing, host-specific toxin (Ptr-toxin) by P. tritici-repentis. In this study, conditions for optimum growth and toxin production in defined media were identified. Growth of P. tritici-repentis isolates in a defined liquid medium increased

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significantly over a range of 0.05 to 5.0% glucose. Greatest accumulation of Ptr-toxin was observed at 1 and 2% glucose; significant differences in the specific activity of toxin in culture filtrate(s) were also found. Influence of light on growth and toxin production appeared to be insignificant. Signficant increases in fungal dry weights were observed at 23 and 30C; however, the effect of temperature on toxin production remains questionable.

POPULATION DYNAMICS OF SCLEROTIUM ROLFSII UNDER GREENHOUSE CONDITIONS. Graciela H. Canullo and R. Rodriguez-Kabana, Department of Plant Pathology, Alabama Agricultural Experiment Station, Auburn University, Alabama 36849-5409.

Lentil (Lens culinaris) was planted in field soil previously infested with increasing inoculum densities (ID) of Sclerotium rolfsii (SR). In an initial 10-day observation period, the number of lentil seedlings emerged (LSE) decreased linearly with increasing ID, while the percentage of seedlings (PS) remaining alive decreased quadratically with respect to ID. In a second 10-day observation period, after mixing soil and replanting with the same host, PS decreased linearly with increasing numbers of colonies (C) and sclerotia (S) on the soil surface. C and S were exponentially correlated with ID during both observation periods. Total numbers of sclerotia in the soil (methanol-soil tray method) were correlated with ID, and C and S values recorded during the first observation period. The techniques developed in this study were used to evaluate the effectiveness of nitrogenous amendments for control of SR under greenhouse conditions.

EVALUATION OF MUSKMELON CULTIVARS FOR RESISTANCE TO FUSARIUM WILT AND FUSARIUM CROWN AND FOOT ROT. E. R. Champaco, R. D. Martyn, and M. E. Miller, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

Twenty-two muskmelon (*Cucumis melo* L.) lines were evaluated for resistance to races 0, 1, 2, and 1,2w of *Fusarium oxysporum* f. sp. *melonis* (FOM) and *F. solani* f. sp. *cucurbitae* (FSC) race 1. Currently, there is no identified resistance to FOM race 1,2w or FSC race 1 and the only resistance to FOM race 1 is in the host differential CM 17-187 and the breeding line MR-1. Greenhouse tests were performed over 2 yrs using the root-dip inoculation method. For some cultivars inoculated with FSC, surviving plants were rated using a disease severity index based on a scale of 0-3. Numerous cultivars were resistant to either race 0 or race 2 of FOM. Several cultivars (Easy Rider, Hiline, Laguna, PSX 1983, and PSX 2083) were resistant to both race 0 and race 2, but none were resistant to race 1,2w of FOM or FSC race 1. MR-1 was resistant to FOM races 0, 1, and 2, but was susceptible to FOM race 1,2w and FSC race 1. This confirms earlier reports by Zink and Thomas that MR-1 is resistant to races 0, 1, and 2. We propose that the breeding line MR-1 be included as a host differential for identifying races of FOM.

Characterization and pathogenicity of Rhizoctonia-like organisms from Florida ornamental plants. A.R. Chase, University of Florida, IFAS, Central Florida Research and Education Center - Apopka, FL 32703.

Rhizoctonia-like organisms were collected from Florida ornamental plants and characterized according to nuclear condition and anastomosis grouping. The type of isolate obtained from a specific organ of a specific ornamental species was often the same. Of 269 isolates obtained, 113 (42%) were from roots, 61 (23%) were from stems and 95 (35%) were from leaves. Of 110 multinucleate isolates obtained, 32 (35%) were R. solani and 5 (2%) were R. zeae from roots, 28 (45%) were R. solani from stems and 46 (48%) were R. solani from leaves. The remaining 159 isolates were binucleate organisms. Of the above 105 R. solani isolates, about 60% were AG4 type, 20% were AG1 type and 20% were not typed. Multinucleate isolates usually were demonstrated as pathogenic on their host of origin whereas binucleate isolates usually could not be demonstrated as pathogenic on their host of origin. R. solani AG4 were pathogenic on a wide range of herbaceous ornamental plants.

ENHANCED GROWTH OF BROCCOLI TRANSPLANTS BY THE BIOCONTROL FUNGI, TRICHODERMA HARZIANUM AND LAETISARIA ARVALIS. K. E. Conway and B. A. Kahn, Dept. of Plant Pathology and Dept. of Hort. & L.A., Okla. State Univ., Stillwater, OK 74078-9947.

Seeds of broccoli cultivars Green Comet or Premium Crop were sown into mix in 100 A seedling trays amended with either dried sclerotia of L. arvalis (20/g mix) or chlamydospores of T. harzianum (10^6/g mix) or into the non-amended soilless mix (Redi-earth). After 5 wk of growth in the greenhouse, 10 plants from each cultivar X treatment combination were selected at random and weights of stems and roots were recorded. Population densities of both fungi were assayed. Rootballs amended with L. arvalis contained 1000 propagules/g mix, and those amended with T. harzianum contained $3X10^6$ cfu/g mix. Both fungi increased the dry weight of stems and roots of both cultivars compared to the control (P=0.05). However, when broccoli was transplanted to the field, there were no differences in number of heads harvested, weight of heads or earliness of harvest.

EPIDEMIOLOGY OF TOMATO SPOTTED WILT VIRUS IN FLUE-CURED TOBACCO. A. K. Culbreath, P. F. Bertrand, A. S. Csinos, Department of Plant Pathology, University of Georgia, Tifton, GA 31793, and J. W. Demski, Department of Plant Pathology, University of Georgia, Experiment, GA 30212.

Disease progress of tomato spotted wilt virus (TSWV) was monitored in one tobacco fields in three counties in Georgia in 1989. Incidence was determined as percent symptomatic plants of the total number of plants in each plot. Number and position of symptomatic plants in each row were determined weekly at the Tift Co. field and bi-weekly in the Brooks and Ware Co. fields. Ordinary runs analysis was used to check for clustered patterns of symptomatic plants. TSWV infected plants appeared 2 to 3 weeks after transplanting and incidence increased through initiation of harvest. Disease progress slowed as plants neared maturity. Final incidence was 3.6, 10.3 and 22.5 percent in Tift, Brooks and Ware Co. fields respectively. Initial incidence and subsequent increase in all three fields occurred in a random pattern.

POPULATION DYNAMICS OF THREE POTENTIAL BIOCONTROL PSEUDOMONAS STRAINS ON SEEDS AND ROOTS OF COTTON. Martin Delgado and K. E. Conway, Agronomy Faculty, Universidad National de Piura, Piura, Peru and Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078-9947.

Seeds of cotton cv Del Cerro were submerged for 1 hr in suspensions (10^8, 10^6, and 10^4 cfu/ml) of two strains of P. aeruginosa, isolated from soil near Piura, and one strain of P. cepacia from Oklahoma. Strains were inhibitory to Macrophomina phaseolina. Densities of bacteria on seeds prior to planting were 10^{6-7}, 10^{4-5}, and 10^{2-3} cfu/seed from the various suspensions. Seeds were sown in autoclaved Redi-earth contained in 50 ml centrifuge tubes and placed in a growth chamber adjusted to 30C day/ 26C night, 12/12h cycle. Densities were determined on seeds and roots after 2, 7, 14, 21, and 28 da. At 2 da, densities on roots increased to 10^{7-11} cfu/cm or /gm fresh weight root, regardless of original density, demonstrating rhizosphere competences. High initial densities on the seed (10^{6-7}) reduced germination.

CYTOCHEMICAL RESPONSE OF PECAN TO INFECTION BY CLADOSPORIUM CARYIGENUM. S. V. Diehl, C. H. Graves, and P. A. Hedin. Dept. of Plant Pathology & Weed Sci., Mississippi State Univ. and Crop Sci. Res. Lab, USDA, Mississippi State, MS 39762.

C. caryigenum infected and non-infected tissues from leaves of seven pecan and two hickory cultivars, and from nuts of three pecan cultivars were sectioned and selected phenolics were quantitated using specific indicators and a microspectrophotometer. Concentrations of juglone, isoquercitrin and condensed tannins were significantly greater in infected than in non-infected tissues. Nutmeg hickory leaves contained the highest levels of these phenolics in non-infected tissue, whereas Van Deman pecan contained the least. Stuart and Odom pecan cultivars contained the highest concentrations of the three phenolics in infected tissues, whereas Pabst and Schley contained the least. Husks of Stuart pecan contained the highest concentrations of these phenolics in both infected and non-infected tissues.

PARAQUAT-ENHANCED EXUDATION OF ^{14}C FROM FUNGAL PROPAGULES INCUBATED ON LEACHED SAND. A. B. Filonow, Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

^{14}C-labeled conidia of Cochliobolus sativus, C. victoriae or Helminthosporium carbonum were incubated for 4-6 h on a sterile leached sand apparatus which maintained the conidia in a nongerminated state. After 90 min. of leaching, paraquat (Gramoxone^R 2E) was added to the leaching solution at 20-200 µg a.i./ml solution. ^{14}C-exudation from treated conidia increased beyond that of the no paraquat controls. For example, at 100 µg/ml C. victoriae or H. carbonum exuded 160%, 323% or 213% more ^{14}C respectively, than the controls.

Exudation increased as paraquat concentration increased. Fungal respiration as measured by $^{14}CO_2$ collection increased 37-126% during exposure to paraquat. Germination of conidia on PDA was not affected by paraquat treatments.

A SEMISELECTIVE MEDIUM FOR THE ISOLATION OF XANTHOMONAS CAMPESTRIS PV. VESICATORIA. R. D. Gitaitis[1] C.J. Chang[2], and K. Sijam [2]. Department of Plant Pathology, University of Georgia, [1]Coastal Plain Experiment Station, Tifton, GA 31793 and [2]Georgia Station, Griffin, GA 30223

A semiselective medium (CMC-E) developed for Xanthomonas campestris pv. vesicatoria (Xcv) contains the following per liter: KH_2PO_4, 1.5 g; K_2HPO_4, 6.0 g; KCl, 0.2 g; $MgSO_4 * H_2O$, 1.0 g; eosin Y, 2.0 g; methylene blue, 0.4 g; yeast extract, 1.0 g; sodium carboxymethylcellulose (CMC), 13.0 g; gelatin, 2.0 g; agar, 3.0 g; stock solution of minor elements, 5.0 ml; anti-bubble agent, 1 drop; cephalexin, 64 mg; tobramycin, 0.4 mg; cycloheximide, 50 mg; 5-fluorouracil, 12 mg; bacitracin, 100 mg; and neomycin sulfate, 10 mg. The CMC and agar are added while blending to avert clumping. Gelatin is autoclaved separately; antibiotics are filter-sterilized, and both are added to cooled medium. Xcv is cellulolytic and can be differentiated from other bacteria on this medium as flat, pink, colonies in the center of pitted crater-shaped depressions.

Gwinn, K.D., Collins-Shepard, M.H. and Reddick, B.B.
DETECTION OF ACREMONIUM COENOPHIALUM IN TISSUE PRINTS WITH WESTERN BLOT. Department of Entomology and Plant Pathology. University of Tennessee, Knoxville, TN 37901-1071.

Presence of Acremonium coenophialum in tall fescue (Festuca arundinacea) was determined by performing Western blots on tissue prints. Tissue prints were prepared by manually pressing 1 mm sections of stem bases on nitrocellulose membrane, which was then dried in an 80 C oven for 1 hour and incubated overnight (4 C) in a blocking solution. Membrane was incubated at 25 C for 2-4 hrs in antiserum (1:1000 dilution in blocking solution) specific for A. coenophialum. After washing, the membrane was incubated in Protein A-alkaline phosphatase (0.4 ug/ml) in blocking solution. The membrane was washed and developed with Naphthol AS-MX/fast red TR salt substrate. Imprints of tall fescue plants infected with A. coenophialum reacted with antiserum; positive reaction was determined by presence of red color. Imprints of noninfected plants remained colorless.

IDENTIFICATION AND DISTRIBUTION OV VIRUSES INFECTING CUCURBITS IN TEXAS. R.M. Harveson, SWFREC Immokalee, FL 33934, and R.S. Halliwell, Texas Agric. Exp. Sta., College Station, TX 77840.

In the last 7-8 years, cucurbitaceous crops have been severely affected by diseases that suggest a virus etiology. The major cucurbits grown in Texas include cucumber (Cucumis sativus L.), watermelon [Citrullus lanatus (Thunb.) Matsum, & Nakai], muskmelon (Cucumis melo L.), and squash (Cucurbita spp.). Samples of these plants were collected from the various growing regions on the basis of virus or virus-like symptomatology. Both leaf and fruit tissue were assayed by DAS-Direct ELISA against five separate viruses. A total of 568 samples from 32 counties were assayed. Papaya Ringspot Virus-watermelon strain (PRSV-W), Watermelon Mosaic Virus II (WMVII), Cucumber Mosaic Virus (CMV), Tobacco Ringspot Virus (TRSV), and Zucchini Yellow Mosaic Virus (ZYMV) were detected in 22%, 59.5%, 15.2%, 15.4%, and 18.4% of the samples, respectively. Many samples contained mixed infections of two or more of these viruses, and each virus was found in each of the growing regions.

EVALUATION OF GLIOCLADIUM VIRENS AS A BIOCONTROL AGENT OF DOLLAR SPOT ON BERMUDAGRASS. R. A. Haygood and A. R. Mazur, Clemson University, Clemson, SC 29634-0377.

Gliocladium virens strain GL21 was compared to fungicides for the control of dollar spot (caused by species of Lanzia and Moellerodiscus) on Tifway 419 II bermudagrass. Inoculum of G. virens was provided in a prill formulation by W. R. Grace and Company. Six applications were made at 2 wk intervals at the rate of 32.4g/sq m beginning 17 March, 1989. Preventive rate applications of chlorothalonil were made on the same dates. Propiconazole and iprodione were applied at preventive rates 17 May and 2 June. G. virens had provided 70%, 54% and 46% control of dollar spot when plots were rated 5 June, 16 June and 28 June, respectively. Fungicide applications had provided over 85% control on all three dates.

INFECTION OF ST. AUGUSTINEGRASS IN TEXAS BY A FLEXUOUS, ROD-SHAPED VIRUS. G. B. Heidel, R. W. Toler, and D. R. Huff, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843, and B-Four Corporation Research Center, Box 321, West Columbia, TX 77846.

Line PI 291594 of St. Augustinegrass, *Stenotaphrum secundatum* (Walt.) Kuntze, propagated at the B-Four Corporation Research Center, West Columbia, TX, was found to be infected with a flexuous, rod-shaped virus. PI 291594 was collected from Zimbabwe in 1963 and sent directly to Griffin, GA. It has been maintained in the National Plant Germplasm System by the USDA Southern Regional Plant Introduction Station since 10 June 1963, and arrived in Texas 23 March 1989. Symptoms include severe mottling. Ouchterlony tests were negative with panicum mosaic virus-St. Augustine decline strain antiserum. Virions were bound by antiserum to maize dwarf mosaic virus-strain B (MDMV-B) in an immunosorbent electron microscopy (ISEM) assay. MDMV-B is closely related, if not identical to, sugarcane mosaic virus-strain E, the only flexuous rod-shaped virus known to infect St. Augustinegrass. Particle modal lengths were 735 and 686 nm. No pinwheel inclusions were detected in thin sections of PI 291594.

FIELD INOCULATION OF VELVETLEAF WITH VERTICILLIUM DAHLIAE. D. K. Heiny and G. J. Weidemann, Department of Plant Pathology, University of Arkansas, Fayetteville, AR 72701.

Field studies were conducted to assess the efficacy of *Verticillium dahliae* as a biocontrol agent of velvetleaf (*Abutilon theophrasti*). Aqueous conidial suspensions at 5×10^9 spores m^{-2} or infested sodium alginate granules at 22 g m^{-2} were applied preemergence or postemergence alone or in combination to replicated field plots. Sodium alginate granules of kelgin and kaolin containing conidia and hyphae of *V. dahliae* were amended with sucrose and yeast extract. After 12 wk, stem height, seed weight, and plant infection based on reisolation to sodium pectate medium were determined from 20 plants in each plot. A low incidence (5-45%) of infection was confirmed in 10 of 36 plots. No *V. dahliae* infection was found in 26 plots. Preemergence applications of conidia or postemergence granular applications most frequently resulted in velvetleaf infection. Average stem height (AvStH) was correlated with average seed weight (AvSeW; $r=0.82$, $P<0.0001$), but neither AvStH nor AvSeW was related to infection incidence.

DIFFERENCES IN CULTIVAR RESISTANCE TO BACTERIAL FRUIT BLOTCH OF WATERMELON. D. L. Hopkins, Central Florida Research and Education Center, University of Florida, Leesburg, FL 34748

Bacterial fruit blotch of watermelon was observed in commercial watermelon fields in the USA for the first time during 1989. The bacterium causing this disease has been identified as Pseudomonas pseudoalcaligenes subsp. citrulli. Two strains of the fruit blotch bacterium obtained from commercial fields in Florida were used to inoculate 21 watermelon cultivars in a field test. Bacterial suspensions ($5X10^5$ cfu/ml) were sprayed directly on the leaves or fruit for inoculations. Differences in leaf symptoms were not significant among cultivars. When fruit were inoculated within seven days of fruit set, all cultivars reacted similarly with most inoculated fruit aborting. With fruit inoculated 14-21 days after fruit set, differences in cultivar resistance to the bacterium were observed. Most resistant were Crimson Sweet, Sangria, and Sugar Baby.

PRELIMINARY INVESTIGATION OF GEOGRAPHIC ISOLATES AND RACES OF *FUSARIUM OXYSPORUM* F. SP. *NIVEUM* USING MITOCHONDRIAL DNA RESTRICTION FRAGMENT LENGTH POLYMORPHISMS. D. H. Kim, R. D. Martyn, and C. W. Magill, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

Mitochondrial DNA (mtDNA) from 13 isolates of *Fusarium oxysporum* f. sp. *niveum* (FON) collected from widely separated geographic regions was examined for restriction fragment length polymorphisms (RFLP). No cosedimenting plasmid was detected from any of the mtDNA. Estimated size of mtDNA from FON (FL-60-3A race 0) was 42.1 ± 4.5 kb. Restriction enzymes *Bam*HI, *Eco*RI, *Hpa*I, and *Hin*dIII resolved 2, 4, 9, and 14 fragments, respectively, but no polymorphism was observed among the 13 isolates. However, *Pst*I digestion patterns hybridized with a mtDNA multi-probe revealed three distinct polymorphisms among the isolates. The first was unique to one isolate (IS-59 race 2) and its pattern lacked 1.5 and 2.0 kb fragments and, instead, had 0.6, 0.9, and 2.9 kb fragments. The second polymorphism pattern occurred in three isolates (FL-7IV-2 race 0, GA-591 race 1, and FL-7III-1 race 2) and was characterized by a lack of the 1.5 kb fragment, but had 0.6 and 0.9 kb fragments. The most common polymorphism pattern was seen in the remaining nine isolates (three of race 0, four of race 1, and two of race 2) and all contained the 1.5 kb fragment. RFLP analysis did not correlate with physiological races or geographical distribution.

DRECHSLERA TERES FORMA MACULATA ON BARLEY IN SOUTH CAROLINA. Graydon Kingsland, Department of Plant Pathology and Physiology, Clemson University, Clemson, SC 29634-0377.

Drechslera teres (Sacc.) Shoem. forma maculata Smedegaard-Petersen (pathogen of the local lesion type of net-blotch) was isolated from leaf lesions on barley (Hordeum vulgare var. Keowee) during 1987 in western S.C. The lesions were fusiform, 8 to 15 mm long, with ash-gray to tan centers and brown to black borders. In 1989 it was identified on an average of 30% and 37% of lesions collected at random in fields on 29 March and 18 May, respectively. Conidia from leaves or culture were straight with rounded basal and apical cells. They measured 40 to 100 µm (61.9) x 10 to 20 µm (17.7) with an average of five septa. Black, setose pseudoperithecia-like structures, 250-420 µm in diameter, were formed on lesions and in culture. Necrotic leaf lesions developed on Keowee barley seedlings within 6 days of inoculation with the S. C. isolate of D. teres f. maculata. The pathogen was isolated from these lesions. D. teres forma teres has not been identified in S.C.

CONTROL OF SOUTHERN STEM ROT OF PEANUT WITH CHLORPYRIFOS (LORSBAN 15g). T.A. Kucharek and G.R. Edmondson. Plant Pathology Dept., Univ. of Florida, Gainesville, FL 32611.

Chlorpyrifos (CP) reduced Sclerotium rolfsii–induced stem rot of peanuts in eight of nine replicated field tests from 1983 to 1989. Yields were increased with CP in seven of eight tests. The average reduction of stem rot by CP, as compared to the untreated control, was 26% and the average increase in yield was 392 kg/ha. CP was always applied as a single application in a 36–cm band along the center of the row with a 'Gandy Linetender' granular applicator between 42 and 50 days after planting. CP reduced the number of infection foci and the spread within foci along a row. These two parameters were assessed by counting the number of foci, with one focal point limited to 0.91 m of row, and by measuring the amount of wilted vines along the row in 0.15–m increments, respectively. Although both methods significantly correlated with each other for seven data sets from tests in 1988 and 1989 (P=0.01), the second method measured 30% more disease suppression by CP than did the first method.

RAPID POLYMERASE CHAIN REACTION BASED SEQUENCING OF PLANT PATHOGENIC VIRAL DNA. Robert T. Larley and Ulrich Melcher. Department of Biochemistry, Oklahoma State University, Stillwater, OK 74078.

A polymerase chain reaction (PCR) based procedure is being developed for rapid isolation and sequencing of genes of cauliflower mosaic virus (CaMV) and tobacco mosaic virus (TMV). Crude virons were obtained by differential centrifugation of leaf homogenates. Phenol extraction of proteinase K-SDS treated preparations was used to prepare CaMV DNA, while phenol extraction in the presence of bentonite was used for TMV RNA preparation. A complementary DNA was synthesized from the TMV RNA. The open reading frames of genes of interest were amplified from extracts of DNA at 10 ng/ml by PCR. Excess dNTP and primers were removed from the PCR products by ultra filtration through Ultrafree-MC 30,000 NMWL polysulfone membrane filters (Millipore, Bedford, MA). The purified products were precipitated with ethanol and sequenced directly by the dideoxy enzymatic method. Our method eliminated the need to clone the viral genome into a plasmid and subsequent transformation for amplification. It also eliminated the need for extensive DNA purification before sequencing. The sequencing steps also were simplified by the elimination of NaOH denaturation. The procedure could ensure rapid study and characterization of viral genes and the molecular evolution of plant viruses.

INFLUENCE OF TILLAGE SYSTEMS ON NEMATODE POPULATION DEVELOPMENT AND SOYBEAN YIELD RESPONSES. G. W. Lawrence*, B. B. Johnson**, and K. S. McLean*, *Dept. of Plant Pathology and Weed Science, Miss. State University, Miss. State, MS 39762, **Coastal Plains Experiment Station, Newton, MS 39345.

Five tillage systems were evaluated for effects on plant parasitic nematode population development and soybean yield. Treatments were 1) disk, hip, chisel, do-all; 2) disk, hip, do-all; 3) disk, chisel, do-all; 4) disk, do-all; and 5) no-till. The test was conducted on a Prentiss fine sandy loam soil naturally infested with Heterodera glycines race 3, Helicotylenchus sp and Quinisulcius acutus. H. glycines populations ranged from 170 to 1763 cysts and juveniles per 250 cm^3 soil in the no-till and maximum tillage systems, respectively. Helicotylenchus and Q. acutus population densities were lowest in the no-till plots. Highest soybean yields (47.4 bu/a) were in the no-till plots. Increased input into a tillage system was correlated with increasing H. glycines population densities and decreasing soybean yields.

HOST SUITABILITY OF KENAF TO THREE PLANT PARASITIC NEMATODES, G. W. Lawrence and K. S. McLean, Dept. of Plant Pathology and Weed Science, Miss. State University, Miss. State, MS 39762.

Pathogenicity tests were conducted in the greenhouse to determine the ability of Meloidogyne incognita race 4, M. javanica and Hoplolaimus galeatus to reproduce on and reduce growth of kenaf (Hibiscus cannabinus L. Tanniug 1). Seedlings were grown in 500 cm^3 of soil infested with either 1600 eggs of M. incognita, 1300 eggs of M. javanica, or 113 H. galeatus. Plants were harvested and nematode population quantified after 60 days. M. incognita, M. javanica, and H. galeatus populations densities increased 8931%, 4648%, and 972%, respectively, with corresponding reproductive factors of 90.3, 47.4 and 10.7. M. incognita significantly reduced plant height, and shoot fresh and dry weights. All nematode treatments compared with the untreated control significantly reduced root fresh and dry weights. Increasing nematode population densities combined with reductions in plant growth indicate kenaf (Tanniug 1) is a susceptible host to these nematodes.

A POTYVIRUS OF VOANDZEIA SUBTERRANEA DETECTED IN SEED FROM AFRICA. R.H. Li, F.W. Zettler, M.A. Petersen, and M.S. Elliott. Plant Pathology Department, University of Florida, Gainesville 32611.

A virus of V. subterranea (VSV) that is biologically and serologically similar to one described by Bock et al. in Tanzania (1978. Ann. Appl. Biol. 89:423–428) was detected in 9 of 92 seedlings grown in Florida. VSV induced systemic mosaics in 8 cultivars of Pisum sativum and necrotic local lesions in 9 cultivars of Phaseolus vulgaris. VSV did not infect manually inoculated plants of Arachis hypogaea, nor did V. subterranea seedlings inoculated with peanut mottle virus (PMoV) become infected. VSV was transmitted to 8 of 12 P. sativum plants, each exposed to 6–8 aphids (Myzus persicae) allowed 10–30 sec acquisition probes on V. subterranea. In immunodiffusion tests, homologous precipitin lines of PMoV spurred over those of VSV. Coat protein subunits (31–32K) were detected in purified preparations of VSV after SDS–PAGE and by PMoV antiserum in Western blots. Ninety of 99 flexuous rod–shaped particles were 735–904 nm long. Type III cylindrical inclusions were found in thin sections of V. subterranea.

DEVELOPMENT OF A LUCIFERASE MARKER FOR MONITORING COLONIZATION OF RHIZOBACTERIA IN THE RHIZOSPHERE. Walter F. Mahaffee, and P.A. Backman, Dept. of Plant Pathology, and J.J. Shaw, Dept. of Botany and Microbiology, Auburn University, Alabama Agricultural Experiment Station, Auburn, AL 36849.

An operon from Vibrio fischeri encoding for bacterial luciferase (lux) was transformed into a root colonizing fluorescent pseudomonad using Tn 4431. Colonies were screened for tetracycline resistance and fluorescent pigment production on Pseudomonas agar F with 15 ppm of tetracycline. Cotton seeds were inoculated with a transformed strain and allowed to germinate. Computer images of the colonized seedlings showed light emission on the cotyledon and upper hypocotyl. Preliminary colonization studies indicated light could be detected where there were greater than log 7 cfu/g root. Scintillation counting of root washings may provide a rapid method of enumeration. Work is continuing on selection of higher light emitters and development of methods to use scintillation counting and computer imagery for evaluating interactions between root inhabiting organisms and pathogens in the rhizosphere.

VARIETAL DISEASE RESPONSE OF SORGHUM LINES INOCULATED WITH MAIZE DWARF MOSAIC VIRUS STRAIN A. G. S. Mahuku and R. W. Toler, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843-2132.

Reaction of sorghum inbreds and F2 hybrids to maize dwarf mosaic virus strain A (MDMV-A) was tested. Four inbreds and 39 F2 hybrids were evaluated for disease severity and incidence. Twenty-one were resistant, 16 moderately resistant, and six susceptible. Resistant lines based on yield were derived from the cross B599-6 X QL-3 India. Susceptible lines developed varying levels of necrosis or 'red leaf' symptoms in response to infection by MDMV-A. The presence of the virus in symptomatic plants was confirmed by the Ouchterlony test. The double antibody sandwich method of ELISA was used to quantify the virus in each accession. A strong correlation (r = 0.78609) between the proportion of plants infected and virus concentration (accumulation) was obtained. Based on this relationship, ELISA values can be used to screen sorghum accessions for their reaction to MDMV-A and hence determine susceptibility of accessions. The association between resistance to MDMV-A with restricted virus accumulation in infected plants was evident among the accessions.

EFFECTS OF CHALLENGE INOCULUM CONCENTRATION ON INDUCED RESISTANCE TO FUSARIUM WILT OF WATERMELON UNDER SIMULATED FIELD CONDITIONS. R. D. Martyn, E. A. Dillard, and C. L. Biles, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

Resistance to some plant pathogens can be induced by prior inoculation of a plant with an avirulent isolate or race. Race 2 of *Fusarium*

oxysporum f. sp. *niveum* (FON-2) overcomes all currently available resistance in commercial watermelons; however, resistance can be induced in these cultivars in the greenhouse by prior inoculation with race 0 or race 1, or with the cucumber wilt Fusarium *F. o.* f. sp. *cucumerinum* (FOC). Field studies utilizing microplots (0.7m x 1.2m) were conducted to evaluate induced resistance to FON-2 in Calhoun Gray watermelons. Because wilt resistance is known to be affected by inoculum density, the field experiments were conducted using two different population levels of FON-2: 1,000 and 4,000 cfu/g soil. At 1,000 cfu, both FON-1 and FOC delayed the onset of disease; however, FON-1 provided significantly more protection throughout the season. At 4,000 cfu, induction by FON-1 again delayed disease onset by as much as 3 wks, but by mid- to late-season, there was no difference in disease severity or percent dead plants between induced and non-induced plants. Induced resistance is apparently similar to natural resistance in that it can be overcome by increasing inoculum concentrations.

EFFECT OF WATER CONTENT ON GROWTH OF HYPOXYLON ATROPUNCTATUM IN DETACHED OAK STEMS. J. Mason and P. Fenn. Dept. of Plant Pathology, University of Arkansas, Fayetteville, AR 72701.

Stem segments from 16-month-old, greenhouse-grown shumard oaks were wound inoculated with H. atropunctatum and held at ca. 100% or ca. 50% RH at 25 C. Daily isolations and measurements of relative water content (RWC) revealed that RWC of ca. 60% or below correlated with initiation of fungal growth. Growth averaged 7.5 cm from the inoculation site at 50% RH but only 1.8 cm at 100% RH after 5 days. There were no external symptoms. Growth also correlated with increased electro-conductivity of tissue diffusates. Staining with 2,3,5-triphenyltetrazolium Cl, neutral red and trypan blue indicated that host tissues were alive as fungal growth occurred. Manipulation of stem water content may reveal how water stress influences fungal growth and pathogenesis.

DISEASE-FREE PLANTS FOR MANAGEMENT OF STRAWBERRY ANTHRACNOSE CROWN ROT. T. B. McInnes and L. L. Black, Dept. of Plant Path. and Crop Physiol., Louisiana State Univ., Baton Rouge, LA 70803.

Anthracnose crown rot (ACR) limited strawberry plant and fruit production in summer nursery beds and production fields on farms using locally grown plants in Louisiana from 1986-1989. Pathogen-free plants derived from tissue culture and increased in northeast Louisiana were provided to growers in the strawberry growing region of southeast Louisiana to establish summer nursery beds. The pathogen-free strawberry plants remained free of ACR in summer nursery beds where separated from nursery beds of locally grown transplants. Spread of ACR was rapid within summer nursery beds (June to October), but not in production fields (November to May). In production fields, ACR killed only those plant infected prior to transplanting.

REDUCED VIABILITY OF SCLEROTIA OF SCLEROTINIA MINOR AFTER INGESTION BY MALLARD DUCKS. H. A. Melouk, L. L. Singleton, and D. G. Glasgow. USDA-ARS, Dept. of Plant Pathology, Oklahoma State Univ., Stillwater, OK 74078-9947.

Two mallard drakes (Anas platyrhynchos) were each fed daily 25 g of split peanut seeds of cv. Florunner. On each half of the split seeds, a single sclerotium of S. minor was attached by a non-toxic glue. Feces were collected forty times over a 17-week period, and processed by wet sieving through metal screens (0.83 and 0.30-mm pores). Materials retained on screens were suspended in water, and sclerotia-like remnants (SLR) were picked with the aid of a magnifying lens, surface disinfected in 0.5% aqueous solution of NaClO for two minutes, and plated on potato-dextrose-agar containing 100 mg/L of streptomycin sulfate. Two percent of the SLR recovered from the feces generated cultures of S. minor that were pathogenic to peanut.

EFFECTS OF FUMIGANTS ON GROWTH AND YIELD OF MUSKMELONS IN FIELDS INFESTED WITH ROOT ROT PATHOGENS. M. E. Miller, J. M. Amador, R. D. Martyn, and C. Lander, Texas A&M University, Weslaco 78596 and College Station 77843.

Several Fusarium spp. are associated with a severe root rot of muskmelon (Cucumis melo L.) in south Texas. Busan 1020, Telone II, Telone C17, and Busan 1020-Telone C17 combinations were each applied at three rates in commercial fields with a history of root rot. Vines at 48 days post-plant were significantly larger (p=0.05) in fumigated plots than in non-fumigated control plots except for those treated with Busan 1020 at 70.1 l/ha and Telone II at 65.4 l/ha. Fruit yields were highest in plots treated with Telone C17 at 168.2 and 252.3 l/ha, Telone II at 196.2 l/ha, and Busan 1020-Telone C17 combinations at 140.2 and 130.8 l/ha. One month after fumigation, CFU'S/g soil of Fusarium spp. were significantly lower in fumigated plots compared to non-fumigated control plots, except for those treated with Telone II.

USE OF MYCORRHIZAL FUNGI FOR ENHANCEMENT OF VEGETATION OF DREDGED MATERIAL SITES. James K. Mitchell, Department of Plant Pathology, University of Arkansas, Fayetteville, AR 72701.

Vegetation establishment on dredged material sites is difficult because of low fertility and low moisture retention. Commercial fertilizer and mulch amendments are currently utilized following dredging, but further additions are costly and difficult to supply. Mycorrhizal fungi (VAM) can be used to increase mineral nutrition, water absorption, and root development for establishment. Studies were conducted to determine the influence of clay amendments on VAM efficacy and plant growth in dredged sites. Sediment amended with VAM and non-calcined montmorillonite or bentonite clays (16/30 mesh) at rates of 85,000 Kg/Ha enhanced plant growth over unamended controls under conditions of nutrient and drought stress. These studies suggest VAM and clay amendments used together can lead to successful revegetation.

HISTOPATHOLOGY OF WHEAT SEEDLING ROOTS INFECTED WITH PYTHIUM ARRHENOMANES. H. Mojdehi, L. L. Singleton, Dept. of Plant Pathology, and P. E. Richardson, Dept. of Bot. and Micro., Oklahoma State University, Stillwater, OK 74078.

Two-day-old wheat seedlings were placed on the edge of a P. arrhenomanes culture for 3 hr, and transferred into test tubes (9mm dia.) containing glass beads and 1 ml of sterile water. Roots were sampled every 6 or 12 hr (for 80 hr), and observed with the scanning electron microscope, or serial sectioned for light microscopy. Roots were colonized extensively in the region of root hair formation within 30 hr after infection. Extensive penetration occurred 100 u to 2 mm behind the root tip, with hyphae extending into the stele. Above this area, hyphae remained limited to the cortical cells, or did not penetrate at all. Hyphae penetrated intracellularly in most cases, and became sporangia-like, or formed structures resembling appressoria. Penetration into the root was directly through the epidermis, or natural openings on the root surface.

MICROASSAY FOR EVALUATING CHEMICAL AND BIOLOGICAL CONTROLS OF TOBACCO BLACK SHANK. W. C. Nesmith, University of Kentucky, Lexington, KY 40546 and Jo Handelsman, University of Wisconsin, Madison, WI 53706.

Efficacy of fungicides and biological control agents against zoospores of Phytophthora parasitica var. nicotianae and black shank of tobacco seedlings was evaluated in 96-well microtiter plates (Falcon 3072). Assay wells each contained a one week-old tobacco seedling (surface sterilized Kentucky 14 seeds germinated on moist filter paper inside sterile petri plates under light at room temperature) in 50 ul each of sterile water or appropriate buffers, 10^3 zoospores suspension, and the test agent. Following incubation at room temperature in the light, each well was examined at intervals with the aid of an inverted microscope for zoospore lysis (30 min), cyst germination (2 hrs), colonization (12-24 hrs), and sporangia production (after 48 hrs). The assay was rapid and highly reproducible and required minimal space and facilities, and should be adaptable to a wide range of tests involving zoospores and small seedlings.

EXPRESSION OF COWPEA MOSAIC VIRUS (CPMV) COAT PROTEIN CODING REGION IN TRANSGENIC TOBACCO. D.L. Nida and S.A. Ghabrial, Dept. of Plant Pathology, University of Kentucky, Lexington, Kentucky 40546-0091

ELISA showed that tobacco supports CPMV replication and cell-to-cell movement. Therefore tobacco may serve as a model to study coat protein-mediated protection with cowpea mosaic virus. It is known that CPMV coat proteins VP37 and VP23 are derived from a 60k polyprotein precursor by proteolytic processing. Thus, it was of interest to determine whether constitutive expression of the CPMV 60k polypeptide in transgenic plants would interfere with virus infection. Plant expression vectors were constructed by inserting cDNA representing the CPMV 60k coding region into the binary Ti vector pMON530. Transgenic tobacco plants were produced by Agrobacterium-mediated plant transformation and regenerated on kanamycin-containing medium. Gene integration was confirmed

by Southern analysis. Gene expression was demonstrated by ELISA, and a 60k protein was detected by western blots.

EFFECT OF CULTURAL SYSTEMS ON INITIATION, PROGRESSION, AND SEVERITY OF TOMATO EARLY BLIGHT EPIDEMICS. C. L. Patterson, Plant Pathology Dept., Oklahoma State Univ., Wes Watkins Ag. Res. Center, P.O. Box 128, Lane, OK 74555.

Stake and weave trellis systems delayed initiation of tomato early blight (Alternaria solani) epidemics 7 days, decreased the epidemic rate, and resulted in a significant decrease in disease severity during the growing period. Sixty seven percent of the leaves were infected by A. solani with an average of 7 lesions/leaf in the trellis plots. Cage tomato systems resulted in 97% of the leaves infected with an average of 24 lesions/leaf. In the ground systems 100% of the leaves were infected with an average of 47 lesions/leaf. Plants in the latter two systems were 50-75% defoliated with significant fruit loss due to sunburn and blossom end rot. Disease incidence and severity was correlated with duration of leaf wetness; r^2=0.72 and 0.93, respectively. Thus, in the trellis system duration of leaf wetness was decreased resulting in a subsequent decrease in disease incidence and severity.

INHERITANCE OF LETHAL WILT REACTION TO BYMV IN ARROWLEAF CLOVER. I. J. Pemberton and G. R. Smith, Texas Agricultural Experiment Station, Drawer E, Overton, TX 75684.

Approximately 20% of the plants in 'Yuchi' arrowleaf clover (*Trifolium vesiculosum* Savi) exhibit a lethal wilt (LW) response when inoculated with strain Ky-204-1 of bean yellow mosaic virus (BYMV). The objective of this study was to determine the inheritance of the LW trait in arrowleaf clover. Rooted cuttings from twenty Yuchi plants were inoculated with BYMV-Ky-204-1, and two plants expressing the LW trait were identified. Crosses were made between the two healthy LW mother plants and two plants not expressing the LW trait (NL). Plants of the ten resulting F1 families were inoculated to determine the presence of the LW trait. Progeny of LW x LW crosses segregated to fit a chi-square ratio of 3:1 (P=0.99) for presence of LW. Progeny of the LW x NL crosses fit a 1:1 ratio (P=0.99). Two NL parents yielded no LW progeny. We conclude that BYMV lethal wilt is simply inherited and conditioned by a single dominant gene in arrowleaf clover.

Effect of small grains on the inoculum potential of Gaeumannomyces graminis var. tritici. C.S. Rothrock, Department of Plant Pathology, University of Arkansas, Fayetteville, Arkansas 72701.

The influence of different small grains on the inoculum potential of Gaeumannomyces graminis var. tritici (Ggt) was examined in field experiments. Plots were artificially infested with Ggt and planted with oats, rye, triticale, barley, or wheat. All small grains, except oats, were previously shown to be susceptible to take-all. However, yield of rye cultivars was not reduced (Plant Dis. 72:883-886). After two growing seasons, wheat (cv. Stacy) was planted in all plots to assess inoculum potential. Wheat had no or little take-all in plots previously planted to oats, but severe take-all followed all other small grains. Wheat following wheat at one site had lower disease severity than following rye, triticale, or barley. Take-all severity was reflected in wheat yield and growth parameters.

DIFFERENTIATION OF TOMATO AND PEPPER STRAINS OF XANTHOMONAS CAMPESTRIS PV. VESICATORIA IN AN AGAR MEDIUM. K. Sijam[1], C. J. Chang[1], and R. D. Gitaitis[2]. Department of Plant Pathology, University of Georgia, [1]Georgia Station, GA 30223 and [2]Coastal Plain Station, Tifton, GA 31793.

A semiselective medium (CKTM) containing pourite, soy peptone, Bacto tryptone, dextrose, L-glutamine, L-histidine, $(NH_4)_2HPO_4$, KH_2PO_4, $MgSO_4 \cdot 7H_2O$, $CaCl_2$, agar, Tween 80, cycloheximide, bacitracin, neomycin, cephalexin, 5-fluorouracil, and tobramycin was able to differentiate tomato and pepper strains of Xanthomonas campestris pv. vesicatoria. A clear ring developed around 2-3 day old colonies of both strains, followed by the formation of minute crystals. Two to four days later, strains isolated from pepper remained as described, whereas tomato strains developed dense white halos giving a "fried egg" appearance. Results obtained from 74 isolates of Xanthomonas campestris pathovars indicated that 88% were correctly identified to host origin by these characteristics.

RATE - A SIMPLE AND INEXPENSIVE SYSTEM FOR REMOTE ENTRY OF PLANT DISEASE DATA INTO PC FILES. T. Spradlin, J. Youmans, D. V. Phillips, and B. M. Cunfer. Department of Plant Pathology, University of Georgia, Georgia Station, Griffin, GA 30223.

Files are transferred from a PC to a hand-held computer (PSION Organizer II-XP) via an RS 232 interface (COMMS-LINK) and stored in memory (32K) or in two removable memory packs (Read/Write Eproms, 100K/sec, up to 128K each). An OPL program called RATE was developed to facilitate data entry. Plot or treatment identification as well as cultivar or treatment description, if desired, are displayed along with space for data entry. Entered data (quantitative or qualitative) are immediately displayed and stored in memory or on the removable packs. Files and entries can be accessed and edited in any order and as often as desired. A program called PRINT was developed to print a hard copy at remote locations on a battery-powered printer (Radio Shack TRP 100). Files, with entered data, are transferred back to the PC via COMMS-LINK for storage and analysis.

EFFICACY OF FUNGICIDES FOR THE CONTROL OF BERRY ROT DISEASES OF MUSCADINE GRAPE (VITIS ROTUNDIFOLIA MICHX.). Barbara J. Smith and Boyett Graves, USDA-ARS Small Fruit Research and MAFES South Miss. Branch, P.O. Box 287, Poplarville, MS 39470

The fungicides, benomyl, myclobutanil, mancozeb, triadimefon, and maneb, were tested for the control of berry rot diseases of muscadine grape. Ten treatments were applied to 'Doreen' vines beginning 17 May 1989. Four treatments included late season sprays of benomyl plus maneb (B&M) applied beginning 3 August 1989. Foliar symptoms of black rot (BR) were rated on a scale (DS) of 0=no symptoms to 5=50% of leaves necrotic. Berry rots were determined as the percentage of diseased berries in a random sample collected at harvest. All treatments, except for maneb and mancozeb plus B&M, resulted in less foliar BR than the control (DS=1.4). All treatments, except for mancozeb, resulted in less total berry rots, bitter rot, and BR as compared to the control (34%, 23%, 9%). Vines receiving myclobutanil had low levels of foliar BR (DS=0.5), total berry rots (8%), bitter rot (5%), and BR (2%).

ASSOCIATION OF PHANEROCHAETE WITH PEANUT IN TEXAS. Taber R. A., D. H. Smith, H. H. Burdsall, Jr., M. C. Black, C. R. Crumley. Dept. Plant Path. & Micro., Tx. Agri. Exp. Sta., Texas A&M University, College Station, Tx 77843 and Yoakum, Tx; USDA, Madison Wi; Tx. Agri. Exp. Sta. Uvalde and Pearsall, Tx.

An orange resupinate hydnaceous basidiomycete was observed fruiting on lower stems and prostrate branches of peanut (cv. 'Florunner') in South Texas during the 1989 growing season. Although a small basidiocarp was observed on one occasion several years earlier, weather conditions in 1989 were apparently favorable for extensive development of the fungus. The fungus fruited commonly on plants diagnosed to be infected by *Phymatotrichum omnivorum* (Shear) Duggar. Single and mass basidiospore isolates were obtained from peanuts in five irrigated fields involving two counties. The fungus was tentatively identified as *Phanerochaete omnivorum* (Shear) Burds. et Nakas. Although the orange teeth and rhizomorphs of the South Texas isolates resemble those of *Phanerochaete chrysorhizon*, the micromorphology (including the larger basidiospore size and ability to grow at 36 C) is characteristic of *Phanerochaete omnivorum*. Taxonomic and pathogenicity studies are continuing.

PATHOGENIC INTERACTION BETWEEN SORGHUM YELLOW BANDING VIRUS AND MAIZE DWARF MOSAIC VIRUS-A IN MAIZE. M.P.K.J. Theu and R. W. Toler, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX 77843.

The sweet corn variety 'Silver Queen', a propagation host for sorghum yellow banding virus (SYBV), exhibited symptoms of SYBV infection earlier than usual when also infected with maize dwarf mosaic virus-A (MDMV-A). The mean expected period for symptoms for SYBV infection alone is 9 days. When plants inoculated three days prior with MDMV-A at the 3-leaf stage, SYBV symptoms appeared after 5 days. There was no hypersensitive reaction from MDMV-A or SYBV alone or in combination. Height of plants infected only with MDMV was not significantly different from the non-inoculated controls. Plants infected with SYBV alone were less severely affected than plants doubly infected. Doubly infected plants were shorter in height than those singularly infected with either virus alone. All plants with a complex infection were dead 17 days after inoculation. Complex infection of MDMV-A and SYBV are synergistically lethal in Silver Queen.

SCANNING ELECTRON MICROSCOPY OF AGROBACTERIUM ISOLATES IN MUSCADINE LEAVES. K. L. Thies and C. H. Graves, Dept. Plant Pathology and Weed Science, Mississippi State University, MS State, MS 39762.

Scanning electron microscopy was used in conjunction with a detached leaf pathogenicity assay system to study presence and morphology of agrobacteria in situ and to demonstrate their distribution in vascular tissues of muscadine (Vitis

rotundifolia). Meristem tip tissue culture methods were used to develop agrobacteria-free plants from which detached leaves were obtained for inoculation. These leaves were inoculated with Agrobacterium isolates of muscadine from galls, roots and vascular fluids representative of biovars 1 and 3. Galls developed following inoculation with each biovar from muscadine. Examination of cross sections of petioles and resultant galls indicated a systemic presence of bacteria and plugged tracheary vessels. Bacteria were observed primarily on the outer surface of galls and petioles and in the xylem. No detectable morphological differences were noted among Agrobacterium biovars.

INHERITANCE OF RESISTANCE TO ALTERNARIA LEAF BLIGHT IN MUSKMELON. C. E. Thomas[1], J. D. McCreight[2], and E. L. Jourdain[1], USDA, ARS, [1]U. S. Vegetable Laboratory, Charleston, SC 29414 and [2]U. S. Agricultural Research Station, Salinas, CA 93905.

The resistant (R) reaction of muskmelon line MR-1 to Alternaria leaf blight (ALB) is characterized by the production of small necrotic lesions in response to infection by *Alternaria cucumerina* (AC). These lesions remain restricted and do not expand as with susceptible (S) cultivars. The F_1, F_2, and BC_1 from crosses of the R line MR-1 and the S cultivars Perlita and PMR 6 were used to determine inheritance of resistance to ALB. All plants in the F_1 populations were R. F_2 phenotypic ratios were 3 R:1 S. The BC_1 to the R parent populations were all R and the BC_1 to the S parent segregated 1 R:1 S. The reactions of parental lines and progenies to inoculation with AC support the hypothesis that resistance is conferred by a single dominant gene designated *Ac*.

GENETIC MULTIPLE VIRUS RESISTANT YELLOW WAX PICKLING PEPPERS, B. Villalon, Texas Agricultural Experiment Station, 2415 E. Hwy 83, Weslaco, TX 78596.

Yellow wax pepper, one of about 20 cultivated Capsicum annuum L. types, has for many years been associated with the pickling industry. Increased demand for pungent and mildly pungent yellow wax peppers both long and short has stimulated production in Texas and other areas throughout the world. Most known commercial yellow wax pickling-type peppers are susceptible to virus diseases. The Texas Agricultural Experiment Station at Weslaco has developed several hundred pungent and nonpungent breeding lines of yellow wax pickling peppers with resistance to cucumber mosaic virus, tobacco etch virus, potato virus Y, pepper mottle virus, tobacco mosaic virus, and tobacco ringspot virus. Improved cultivars of different fruit shapes and sizes are being proposed for release.

FACTORS AFFECTING SPORANGIAL PRODUCTION BY PHYTOPHTHORA CINNAMOMI AT FIELD SITES. S. L. von Broembsen, Department of Plant Pathology, Oklahoma State Univ., Stillwater, OK 74078

Sporangial production by mycelial mats of P. cinnamomi buried in soil was measured at several sites where the fungus occurred naturally. Sporulation in a field of cultivated pincushions was compared with that in adjacent native vegetation for one year. Greater and more frequent sporulation occurred at the cultivated site and was correlated with greater incidence of soil moisture and temperature favorable for sporulation. Unseasonal summer rainfall resulted in increased soil moisture and peaks of sporulation at the cultivated site only. The effect of plant cover on sporangial production was also measured during early summer at sites cleared or uncleared of native vegetation. Incident solar radiation at the soil surface, soil temperature and soil moisture were higher and sporulation was greater in cleared plots than in vegetated plots.

COMBINING ABILITY FOR PATHOGENICITY AND VIRULENCE IN MOESZIOMYCES PENICILLARIAE. J.P. Wilson and K. Bondari, USDA-ARS and Dept. of Statistical and Computer Services, Univ. Georgia, Coastal Plain Expt. Stn., Tifton, GA, 31793-0748.

The quantitative inheritance of pathogenicity and virulence of Moesziomyces penicillariae, the smut pathogen of pearl millet, was examined. Twenty two single-sporidial isolates were used alone and in all combinations to inoculate 3 inflorescences each of Tift 23DA in the greenhouse and Tift 85DB in the field. The individual isolates expressed various levels of solopathogenic ability; mean infection ranged from 0.1 to 36.3%. In the diallel inoculations specific combining ability (SCA) effects were significant, indicating the presence of non-additive genes conferring mating types. General combining ability (GCA) effects were also significant, suggesting that the isolates differed in additive genes conferring virulence. The relative contribution of SCA to GCA variances was approximately 3:1. Five mating or compatibility types were identified among the isolates.

PLANT-PARASITIC NEMATODES ASSOCIATED WITH MAIZE IN MISSISSIPPI. G. L. Windham and W. P. Williams, USDA, ARS, Crop Science Research Laboratory, P. O. Box 5367, Mississippi State, MS 39762.

The incidence of plant-parasitic nematodes was determined in thirty-five maize fields in twenty counties in the corn-producing areas of Mississippi. Nematodes were extracted from 250 cm^3 of soil by a sieving-centrifugation method. Root material collected from soil samples was incubated on Baermann funnels for 5 days. The most frequently detected genera were Pratylenchus and Helicotylenchus which were found in 91% and 80% of the fields, respectively. Other nematodes with a high incidence were: Criconemella sp. (45%), Meloidogyne spp. (25%), Xiphinema sp. (25%), Hoplolaimus sp. (25%), Tylenchorhynchus sp. (20%), and Paratrichodorus sp. (20%).

PURIFICATION OF A MISSISSIPPI ISOLATE OF SUBTERRANEAN CLOVER RED LEAF (SOYBEAN DWARF)-LIKE LUTEOVIRUS. A. Zipf and M. R. McLaughlin, USDA, ARS, Crop Science Research Laboratory, Forage Research Unit, P. O. Box 5367, Mississippi State, MS 39762-5367.

A luteovirus isolated from Trifolium subterraneum and resembling subterranean clover red leaf strains of soybean dwarf virus (SDV) (Phytopathology 78:1584) was purified using a published scheme for SDV (J. Gen. Virol. 65:109-117). Changes to the scheme included the use of Acyrthosiphon pisum for inoculations, and equilibrium density gradient ultracentrifugation in cesium sulfate. Yields of purified virus ranged from 300-450 micrograms per kilogram fresh tissue (Pisum sativum cv. Puget or Dwarf Gray Sugar). The ratio of ultraviolet absorption values of A260nm/A280nm ranged from 1.62-1.70 indicating a nucleic acid content of approximately 23%.

INFECTION OF KERNELS AND COBS BY ASPERGILLUS FLAVUS AND FUSARIUM MONILIFORME IN FIELD INOCULATED MAIZE EARS. N. Zummo and G.E. Scott, USDA-ARS and Miss. Agric. and For. Exp. Stn., P.O. Drawer PG, Mississippi State, MS 39762

Transversely cut maize kernels showed significantly more Fusarium moniliforme infection in the pedicel ends of kernels than in the apical ends. Aspergillus flavus infection was greater in the apical sections of transversely serially cut kernels than in pedicel sections. There was also more infection of the pericarp by A. flavus near the middle of kernels than at the pedicel end. The relative percent infection in apical and pedicel portions of kernels by A. flavus and F. moniliforme was not affected by inoculation with A. flavus. The recovery of A. flavus from widely separated segments of the kernel strongly suggests that A. flavus infection in maize kernels is mainly through the pericarp. There was a relatively high percentage of cob infection by A. flavus with significantly greater infection of placental and sclerenchymatous tissue than in pith tissue.

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