Alphabetized by first author's last name

EFFECTS OF NATURALLY-OCCLUDING AROMATIC COMPOUNDS AND RESIDUAL ACIDITY FROM DELINITNING ON RHIZOSPHERE COLONIZATION OF BIOLOGICAL CONTROL AGENTS ON COTTON. E. M. Buske, R. Rodriguez-Kabana, and P. A. Backman. Department of Plant Pathology, Biological Control Institute, Auburn University, AL 36849-5409.

The effects of furalin, benzaldehyde, and citrus on cotton rhizosphere colonization of eleven bacterial biological control agents were determined in three greenhouse experiments. These compounds demonstrated ability to control pathogenic nematodes. Soil was treated with 0.5 kg/ha of each compound 10 days prior to planting with Delapine 51 seed. The surface pH on half the seed in each experiment was increased from 4.7 to 4.4 by applying 4% HCl solution. Bacteria were applied as seed treatments and rhizosphere colonization was determined 12 days after planting. Seed-surface pH did not affect rhizosphere colonization in any experiment. Treatment with furalin reduced colonization of all strains from an average of 0.7 to 4.4 log cfu/g root. Citrus affected colonization of only two strains (increasing colonization of one and reducing the other). Benzaldehyde adversely affected colonization of two strains. Results suggest that most of the biological control bacteria tested are compatible with citrus and benzaldehyde.

EFFECT OF APPLICATION TIMING WITH A SHORT AND A LONGER RESIDUAL FUNGICIDE ON CONTROL OF PEANUT STEM ROT. T. R. Bronson, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793-0748.

One application of a short (carboxin, 1.26 kg/ha) or longer (chlorothalonil, 0.56 kg/ha) residual fungicide was applied to Florunner peanut at 10-day intervals from 30-110 days after planting (DAP) in 1992 and 1993. Carboxin treatments had no effect on stem rot (Sclerotium rolfsii) or yield. Thifluzamide applied from 30-100 DAP in 1992 and 30-70 DAP in 1993 significantly reduced stem rot and increased yield. Crop value was increased by applications from 30-100 DAP in 1992 and 30-50 DAP in 1993. The best disease control (74%) was from the 50 DAP application. The greatest increase in crop value ($945/ha) and yield (115 kg/ha) was from the spray at 40 DAP. Higher grades and reduced kernel damage resulted from some thifluzamide treatments.


Tomatillo, an important vegetable crop in Mexico and Central America, is being evaluated as a food crop in Louisiana. A 4-yr study indicated that virus diseases (physalis mottle, cucumber mosaic, and tomato spotted wilt viruses) were the major factor limiting production. Fungal diseases (gray mold (Botrytis sp.) and fruit rot (Rhizoctonia solani) were occasionally a problem on transplants or fruits in the field. The most important insect pests included fruit worm, aphids, flea beetle and thrips. Insecticides presently labeled for use on tomato were used and found to be effective for insect control. Greenhouse and field studies indicated that tomatillo has good tolerance to the herbicides Treflan, Derrisol, Posto, and Pendate. Maximum yields were obtained when plastic mulches were used.


Tomatillo experimental plots were planted during the spring and fall of 1993 at the Burden Research Station in Baton Rouge. Tests were conducted to evaluate the effect of plastic mulches and insecticide application on virus vectors and yield of tomatillo. Virus diseases evaluated included: cucumber mosaic virus, physalis mottle virus, and tomato spotted wilt virus. The following treatments with and without insecticide were tested: no-mulch, black plastic, and aluminum-painted plastic. Aluminum-painted plastic mulch increased tomatillo yields up to 70% when compared with non-mulched plots. Moreover, yields increased further if insecticide was applied. Virus vector populations and virus disease incidence were significantly lower in insecticide-treated aluminum-painted mulched plots than in all other treatments.

FURTHER EVALUATION OF STEROL-INHIBITING FUNGICIDES FOR POLIAR DISEASE CONTROL IN WHEAT. A. Y. Chambers, Dept. of Entomology and Plant Pathology, Univ. of Tennessee, Jackson, TN 38301-3200.

New sterol-inhibiting fungicides - flusilazole, tebuconazole, and fenbuconazole - were evaluated for control of leaf rust (Puccinia recondita f. sp. tritici), glume blotch (Drechslera nodorum), and leaf blotch (Tilletia tritici) during 1990-93. The fungicides were compared to standard, registered fungicides propiconazole (a sterol inhibitor) and mancozeb plus triadimefon in field plots of 'Saluda' wheat at the West Tennessee Experiment Station, Jackson, TN. In 1990-93, treatments of all fungicides significantly reduced severity of the diseases and significantly increased yields over no treatment. Flusilazole was comparable to the standard treatments in disease control and yields in 1990 while treatments of tebuconazole and fenbuconazole significantly improved disease control and yields over the standards. Treatments of flusilazole and fenbuconazole were similar to those of propiconazole and mancozeb-triazole in 1990; only treatment with tebuconazole significantly improved disease control and yields compared to the standard materials. There were no significant differences in disease control and yields among the five fungicides in 1992. Propiconazole provided less disease control but comparable yields to the other fungicides in 1993.
THE EFFECT OF pH OF HOUSEHOLD BLEACH SOLUTIONS USED AS A SURFACE STERILANT FOR RICE SEED. S. C. Chun and R. W. Schneider. Dept. of Plant Pathology and Crop Physiology, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge 70803.

The effect of pH of 50% household bleach solutions (2.6% NaOCl/Clioxin, Oakland, CA), used as a surface sterilant on rice seeds (Oryza sativa L.), was tested from pH 2 to 9. Seeds were soaked for 2 hrs in the freshly prepared solutions that had been buffered at different pHs. After treated rice seeds were rinsed with sterile distilled water, they were plated on nutrient agar for detection of bacterial contamination and acidified potato dextrose agar for detection of fungal contamination then incubated at 32°C for 2 days. The results indicated that 2% of the rice seeds contaminated and germinated was determined. Seed contamination rates were significantly reduced by bleach treatments below pH 7 (Bonferroni t-test, P < 0.05). However, germination rates were significantly reduced between pH 3 and 5 (Bonferroni t-test, P < 0.05). Considering both the efficacy of surface sterilization and the viability of seeds, bleach solutions should be buffered at pH 6 to 7. Unbuffered bleach has a pH of about 11.6. This effect is probably related to the influence of pH on the chemical state of chlorine compounds, particularly hypochlorous acid (HOC).


Thalli of three isolates of Discula destructiva Redlin and one isolate of an undescribed Discula species were grown in 125 ml flasks containing citrate-phosphate buffered liquid growth medium adjusted to pH 4, 5, 6, and 7. Each treatment was replicated five times and the experiment repeated. After two weeks of growth conditions, the number of thalli and dry weight were obtained. Growth of one isolate of D. destructiva and the undescribed Discula species isolate was reduced as the pH of the media increased from 4 to 7. When growth at pH 4 and 7 are compared for these two isolates, increasing pH to 7 reduced growth 35% for D. destructiva and 49% for the isolate of the undescribed Discula species. Growth of the two other D. destructiva isolates was not affected consistently by pH treatments. When comparing growth at pH 4 and 7, raising pH to 7 reduced growth 15% for one isolate and increased growth 15% for the other isolate.

RESULTS OF FOURTEEN YEARS OF TESTING PROPICONAZOLE FOR CONTROL OF PEANUT DISEASES. J. C. Jacob and P. A. Backman. Department of Plant Pathology, Auburn University, AL 36849-5409.

The fungicide propiconazole was evaluated in field trials from 1979-1993 for control of four important peanut diseases. During 1979-1987, propiconazole (0.126 g a.i./ha) was compared to chlorothalonil (1.26 g a.i./ha), and an untreated control. Leaf spot incidence averaged 48.6, 37.1, and 81.0% for the propiconazole, chlorothalonil and untreated control treatments, respectively. Peanut rust was moderately severe in two trials, with rust severity significantly greater for peanut rust compared to black root rot. No significant differences were observed between propiconazole and chlorothalonil in southern stem rot incidence or yield. Recent trials (1986-1993) have evaluated the use of block spray programs of propiconazole and chlorothalonil. Here, leaf spot incidence averaged 43.4, 35.9, and 83.0% for the block-spray (propiconazole and chlorothalonil), chlorothalonil, and untreated fields, respectively. Lasiodiplodia theobromae and Gaeumannomyces graminis were not significantly different between the two fungicide treatments. In 1993, tank-mixes of propiconazole and chlorothalonil provided equivalent leaf spot control as compared to chlorothalonil alone.

IMMUNIZATION OF CABBAGE FOR LONG-TERM RESISTANCE TO BLACK ROT. K. Jelinas, P. A. Backman, and S. Tuzun. Department of Plant Pathology, Alabama Agricultural Experiment Station, Auburn University, AL 36849-5409.

Cabbage (Brassica oleracea) transplants were immunized with 0.2% v/v Silwet surfactant containing 10^6 cfu of either a weak pathogen, Xanthomonas campestris pv. campestris (Xcc. isolate B-119), or an incompatible pathogen, X. campestris pv. malvacearum. Three weeks later, cabbages were challenged in the field with 10^6 cfu of a pathogenic strain of Xcc, also in Silwet. Immunized plants significantly suppressed development on watermelon rust and populations of Xcc. in planta (ps0.05) for at least five weeks after induction. Significant data were obtained for both greenhouse and field experiments. Immunized plants also resulted in an earlier induction of a hydrolytic chitinase/diastase enzyme, β-1,3 glucanase and osmotic as well as other protease. The results show that immunized plants produce defense proteins which suppress black root disease progression in cabbage and suggest that immunization technologies for transplants can achieve durable resistance in field environments.

OPTIMIZING FUNGICIDE APPLICATIONS TO CONTROL GUMMY STEM BLIGHT OF WATERMELON. A. P. Reinhart, Dept. Plant Pathology & Physiology, Clemson University, Coastal REC, Charleston, SC 29414-5341.

Gummy stem blight is a widespread, destructive disease of watermelon caused by Bidsmella breyniae (anamorph Poma cucurbitacearum). In fall 1991 and spring 1993, six and nine fungicide treatments, respectively, were applied weekly at labeled rates to watermelons cv. Charleston Gray in field plots. Areas under disease progress curves (AUDPC) were lowest for a systemic, tank-mixed fungicide, and both fungicide treatments reduced by 36.5% compared to non sprayed plots (P=0.01). Effects of three application intervals of chlorothalonil plus bionyx or quanum on gummy stem blight were evaluated in field trials at 10 locations from 1990 to 1996. No differences were observed among fungicide treatments. Regular fungicide applications are required to adequately control quanum stem blight in fall-grown watermelon in coastal Southern Carolina.

VALIDATION OF A FOUR ENVIRONMENTAL VARIABLE MODEL TO PREDICT LEAF RUST ON WINTER WHEAT IN MISSISSIPPI. M. Aden Khan and L. E. Trevathan. Department of Entomology and Plant Pathology, Mississippi State University, Mississippi State, MS 35782.

Environmental data from three locations in Mississippi during 1986-90 were used to develop disease predictive models; data from Starkville during 1992-93 were used for validation. Leaf rust severity was calculated as a product of weekly, weekly and daily maximum, minimum and average air temperature and soil temperatures, rainfall, relative humidity, solar radiation, wind speed and fishhook represented independent variables. The model explained 84%, 82% and 89% of the variation in disease development at Holly Springs, 1987, 1988 and 1989 at Starkville, respectively. Observed and predicted values were close for cultivars at both locations, but differed by year.

In Florida, seedling blight caused by R. solani has become problematic in recent years even with 100% usage of fungical seed treatments. In field tests in 1991 and 1992, a single application of chlorpyrifos 4E (CH) or ipriodone 4F (IF) was applied as a 20-25 cm band over-the-row onto the soil prior to planting. Significant reduction in blighted plants was noted. The treated plants had a white necrotic area of tap roots with lesions reduced with CH (4.7 L ha⁻¹) and IF (14.3 L ha⁻¹) by 42 and 38%, respectively (P=0.05) compared to the untreated control. The number of wilted and dead seedlings was reduced with CH (4.7 L ha⁻¹) and IF (14.3 L ha⁻¹) by 52 and 71%, respectively (P=0.05). Young plant vigor ratings were concomitantly improved (P=0.05) in both tests. In 1993, a post-emergence application of CH (4.7 L ha⁻¹) or IF (38.5 L ha⁻¹) to 28-day old peanuts reduced the number of dead plants by 75% (P=0.001) and the amount of bare space along the row (>15.2 cm) to 48-day old plants by 67% (P=0.001). Because CH can be phytotoxic when applied to emerged plants, it was not tested.

DETECTION OF MONOSPORAES CANNONALLUS IN ROOT TISSUE AND SOIL BY PCR-MEDIATED AMPLIFICATION OF THE ITS REGIONS OF rDNA. B. R. Lovke, R. D. Martin, and M. E. Miller. Department of Plant Pathology and Microbiology, Texas A&M University, College Station 77843, and Westaco 78596.

M. cannonallus is a soilborne ascomycetous that causes a root rot/line decline disease of watermelon and muskmelon. This organism is difficult to detect in roots and soil because the ascospores do not germinate, a conidial stage is unknown, and its morphotype in culture is extremely variable. A detection method has been developed with unique sequences within the ribosomal internal transcribed spacer regions (ITS) that have been determined to be orthologous in M. cannonallus and from ascospores extracted from infected soil. Identity of the amplified products was confirmed by hybridizing Southern transfers of the amplification products separated by gel electrophoresis, with a digoxigenin-labeled portion of the M. cannonallus ITS. Ascospores of M. cannonallus were physically extracted from soil samples by sucrose flotation techniques, crushed to release the DNA and subjected to PCR amplification. An equivalent of 1600 spores per sample yielded a sufficient amount of PCR-amplified product to be detected by electrophoresis in ethidium-bromide stained gels. The detection limits of the described methods suggest their potential in diagnostics.

ASSOCIATION OF dRNA WITH REDUCED AGGRESSIVENESS AND PHENOTYPIC VARIABILITY IN MONOSPORAES CANNONALLUS. B. R. Lovke, V. A. Valdez, D. M. Martin, and M. E. Miller. Department of Plant Pathology and Microbiology, Texas A&M University, College Station 77843, and Wadaco 78596.

The soilborne pathogen of cucurbits, Monosporaes cannonallus, displays extensive variation in virulence among isolates. Less virulent isolates exhibit reduced growth on standard media, form smaller perithecia, and appear degenerated. We hypothesized that avirulence was a consequence of inappropriate laboratory maintenance (Phytopathology, 83:4674; however, we have now modified that because a change in phenotype and avirulence could be reversed by repeated transfers of a set of isolates over 3 to 4 years. Also, avirulent, degenerated isolates were isolated from field-grown plants along with virulent, wild-type isolates. Electrophoresis of undegraded genomic DNA from 30 wild-type and seven degenerated isolates revealed that all but one of the degenerated isolates harbored one or two low molecular weight nuclear acid fragments. In contrast, only one wild-type isolate displayed extra fragments. The low molecular weight fragments were digested completely by low-salt DNA restriction, while high-salt restriction enzyme, or DNAse had no effect, suggesting the fragments were dRNA. The sizes of the dRNA fragments were 2.0 kb in the isolate where a single house was observed, and varied from 2.0 to 1.1 kb for isolates that had up to four distinct fragments.

ULTRASTRUCTURE OF THE HOST-PATHOGEN RELATIONSHIP IN POWDERY MILDEW DISEASE OF CRAPSE-MYRTLE. C. W. Mumma and E. A. Richardson. Dept. of Plant Pathology and Dept. of Botany, University of Georgia, Athens, GA 30602.

This study examined the ultrastructural aspects of the host-pathogen relationship between the asexual stage of a powdery mildew fungus reported to be Cryptolepis lacerastrum and its host, crate myrtle (Phystema indica). The pathogen produced highly specialized haustoria in the epidermal cells of infected leaves. Each haustorium possessed a slender neck and expanded body that formed numerous small, highly contorted branches. An extraharvallular matrix and an extraharvallular membrane (EM) separated the haustorium from the host cytoplasm. The EM was continuous with the host cell plasma membrane, but was thicker than the plasma membrane and, in certain regions, highly convoluted. Various gold-conjugated lectins and enzymes were used to characterize the host-pathogen interface.

ISOLATION, SEQUENCING, AND DISRUPTION OF THE CAMP DEPENDENT PROTEIN KINASE CATALYTIC SUBUNIT GENE IN MAGNAPORTHE GRISEA. T. K. Mitchell, Y. H. Lee, and R. A. Dean, Department of Plant Pathology and Microbiology, University of Wisconsin, Madison, WI 53706.

Magnaporthe grisea, the causal agent of rice blast disease, produces a specialized infection structure called appressorium to facilitate entry into its host. It was found that cyclic adenosine monophosphate, cAMP, can induce the formation of appressoria on non-inductive hydrophilic surfaces. The primary target for cAMP in other organisms is a cAMP dependent protein kinase. This kinase acts as a second messenger to initiate phosphorylation / dephosphorylation cascades resulting in developmental changes. We have cloned the cAMP dependent protein kinase catalytic subunit gene from M. grisea. Sequence analysis indicates extensive amino acid identity between the cloned sequence and conserved regions in other organisms. Southern analysis indicates that this gene exists as a single copy in M. grisea. Currently the gene is being disrupted to determine the kinase's affect on appressoria formation.

SHIFT IN THE EPIDEMIOLOGY OF TOBACCO BLUE MOLD RELATED TO CHANGING TRANSPLANT PRODUCTION METHODS. W. C. Nesmith, Plant Pathology Dept., Univ. of Kentucky, Lexington, KY 40546.

One principle of plant pathology is that changing cultural practices often result in shifting disease potential. Tobacco transplant production is undergoing a major change from soil beds located on each tobacco farm to containerized production in greenhouses, including indoor commercial transplant movement. One particularly notable variation, the "float system", is centered around using a polystyrene foam tray which is subrigidized by floating on a bed of water and/or nutrient solution. Because of high potential for root diseases caused by phycocyanogenic fungi, metalaxyl is applied to the beds of water. In Kentucky, metalaxyl-insensitive Pseudoperonospora tabacina was confirmed from 29 float systems, including several involved in transplant movement of transplants. In eight cases, field outbreaks of metalaxyl-insensitive P. tabacina were connected to transplanting infected plants from float systems into the field. The potential for this new production approach to select and move inoculum of P. tabacina appears to be significant and will dictate changes in blue mold control strategies.

EFFECTS OF TEMPERATURE, LIGHT, AND MOISTURE ON PRODUCTION OF CONIDIA FROM SCAB LESIONS ON PECAN SHOOTS. K. L. Reynolds, Department of Plant Pathology, University of Georgia, Athens, GA 30602.

One-year-old shoots with scab lesions caused by Cladosporium carvigenum were collected from unsprayed pecan (Carya illinoinensis cv Desirable) trees. All new growth was removed, and the 1-year-old wood was washed in deionized water using a 0.1% Tween 20 detergent solution, and sections, and lesions counted. Each section had 10-50 lesions, each approximately 1 cm².

Washed sections were placed in petri dishes with moist filter paper or were air-dried and placed in petri dishes without filter paper. In one experiment, moist sections were incubated at 10, 15, 20, 25, and 30°C in continuous fluorescent light. In another experiment, moist and dry sections were exposed to continuous fluorescent light or continuous darkness at 26°C. After 3 to 7 days each section was washed in 2 ml deionized water with 0.1% Tween 20 and the conidia in the wash water counted with a hemacytometer. Sporulation per lesion was greatest at 15°C and least at 30°C. Sporulation was significantly higher on moist shoot sections than on dry sections and was highest on sections that were kept moist and exposed to continuous light and lowest under dark, dry conditions. Light alone had no significant impact on sporulation.

THE EFFECTS OF CHICKEN LITTER AND ASSOCIATED MICROORGANISMS ON MELODIOGYNE INCognita. C. Riegel and J. P. Noe, Dept. Plant Pathology, University of Georgia, Athens, GA 30602.

The effects of chicken litter and associated microorganisms on Meloidogyne incognita in cotton cv. DPL 50 were determined in microplots. Microplots with methyl bromide fumigated field soil were amended with four types of litter and infected with M. incognita. Fungal, bacterial and nematode population densities were assayed at monthly intervals. Population densities of M. incognita second stage juveniles (J2) were negatively correlated with increasing rates of litter. Regression analysis indicated that midseason M. incognita numbers decreased from 57 to 1 J2/100 cm² soil in a log-linear relationship with fungal colony counts. Final J2 incognita counts decreased as bacteria and freeliving nematodes increased. Fungi isolated from the litter included species of Aspergillus, Fusarium, Mucon, Pencillium, and Trichoderma.
PREPARING ALGINATE FILMS FOR DELIVERY AND EVALUATION OF ROOT KNOT NEMATODE INOCULUM. R. Rodriguez-Kabana, N. Kokalis-Burelle, and R. A. Sikora. Department of Plant Pathology, Auburn University, AL, and Institute for Plant Pathology of the University, Nussallee 9, D-5300 Bonn 1, Germany.

A method was developed for utilizing alginates films to deliver inoculum into soil and evaluate effects of soil conditions on the inoculated nematodes. Eggs of *Meloidogyne incognita* were harvested from galled tomato roots (*Lycopersicon esculentum*). Surface sterilization, suspended in 2% (w/v) aqueous sodium alginate, and agarified with 1% (w/v) agar. They were incubated in sterile petri dishes at 25°C in the dark. The alginates solution was gelled by dipping in 0.25 M CaCl₂. Grids containing eggs were observed in vitro and egg development was evaluated. The number of immature eggs and eggs with first stage juveniles declined linearly over time while the number of empty egg shells, and hatched juveniles increased over time, indicating that the alginates gel did not interfere with development and motility of *M. incognita* juveniles. In a greenhouse experiment using cucumber (*Cucumis sativus*), the number of gall/egg was correlated with the number of eggs in alginates grids placed in each pot at planting.

USE OF ALGINATE FILMS FOR DELIVERY OF *MELOIDOGYNE INCOGNITA* INOCULUM AND EVALUATION OF MICROBIAL INTERACTIONS. R. Rodriguez-Kabana, N. Kokalis-Burelle, and R. A. Sikora. Department of Plant Pathology, Auburn University, AL, and Institut für Pflanzenkrankheiten der Universität, Nussallee 9, D-5300 Bonn 1, Germany.

Greenshouse experiments were performed to evaluate the use of alginates films for observation of interactions between soil microorganisms and *Meloidogyne incognita* eggs. Standard alginate (2% w/v) grids (2.5 cm x 5.0 cm x 0.5 mm) containing *M. incognita* eggs were buried in field soil containing organic amendment (ammonium nitrate) and removed from soil, rinsed with water, and observed and photographed using differential interference contrast microscopy. The number of immature eggs in grids from soil amended with chitin or flesh seed meal was lower than in untreated soil; percent parasitized eggs was also greater in grids from amended soil than from untreated soil. When pine bark powder was added to soil, the number of viable eggs was negatively correlated with pine bark rate while the opposite was true for the number of parasitized eggs. The number of parasitized eggs was significantly greater in soils planted with several aromatic plants than in soil planted to cotton (*Gossypium hirsutum*).

FIELD PERFORMANCE OF RICE LINES WITH NOVEL SHEATH BLIGHT RESISTANCE DERIVED THROUGH SOMACLONAL VARIATION. M.C. Rush*, S.D. Linkome*, K.P. Selhan*, D.E. Groth*, and Q.J. Xie*. Departments of Plant Pathology and Crop Physiology and Agriculture, and Rice Research Station, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge, 70803.

A sheath blight resistant somaclone (LBLE-163) was generated from the susceptible cultivar Labelle. Lines generated by crossing an elite line selection (LSBR-5) from the same somaclone with a resistant cultivar Lemont and yield tested in the field during the period 1988-1993. Two advance lines have been in yield tests conducted by the breeding program for 3 years. These lines are significantly more sheath blight resistant than Labelle and Lemont and yield at the level of the newest commercial long-grain cultivars. In field plots tests they yielded 7500-8000 lb/ha in the first crop and 3500-4500 lb/ha in the ratoon crop. Additional crosses were made among sources of the resistance gene in LSBR-5 and recently released commercial long-grain cultivars in 1993. Crosses for a modified recurrent selection scheme to generate lines will be LSBR-5 resistance combined with other sources of partial resistance were also made in 1993.

EFFECTS OF ADJUVANT AND APPLICATION METHOD ON FLUOTANIL PERFORMANCE AGAINST SOILBORNE DISEASES OF PEANUT. K.W. Seabold and P.A. Backman. Department of Plant Pathology, Alabama Agricultural Experiment Station, Auburn University, AL 36849-5409.

Fluotanil was applied at a rate of 1.12 kg a.i./ha to peanut either alone or tank-mixed with the sticker-adjuvant dyes Soy-Dex or Bondex, or the penetrating adjuvant Kinetic using a broadcast or in-canopy delivery system. Effects on fungicide retention and efficiency against southern stem rot (*Sclerotium rossii*) and Rhizoctonia root rot (*Rhizoctonia solani*) were evaluated. Fungicide retention and persistence were measured using a bioassay in which treated peanut stems were challenged with *Rhizoctonia solani*. Fungicide efficiency against southern stem rot was evaluated after digging and inverting the two middle rows in each plot. Additionally, leaf spots were taken from each plot and the number of *Rhizoctonia*-induced lesions per leaf counted. Bioassay data indicated that sticker-adjuvant slightly improved the retention of flutolanil as compared to flutolanil alone. Application method did not affect flutolanil retention during the first three evaluation dates; however, slightly better flutolanil retention was observed with the in-canopy method for the last evaluation date. All flutolanil treatments significantly reduced the incidence of both southern stem rot and root rot as compared to an untreated check plot, but no differences were observed among application methods or adjuvant types.

EVALUATION OF NIGHT APPLICATIONS OF FUNGICIDES FOR CONTROL OF SOUTHERN STEM ROT ON PEANUT. E.D. Smith, T.B. Breeneman, and B.D. Mullins, Univ. of Georgia, Coastal Plain Exp. Station, Tifton, GA 31793.

Seed of Florunner peanut was planted at 112 kg/ha in a field with a history of southern stem rot (*Sclerotium rossii*). Fungicide applications were made on 12 July and 13 Aug. 1990 using three D, 2,-nozzles per row that delivered 140 L/ha at 315 kPa. Day applications were made between 3 and 4 pm and night applications between 9 and 10 pm. Disease ratings of below-ground symptoms on 27 Sep indicated that all treatments, except propiconazole (0.25 kg/ha), provided significant control. Fluazinam (0.75 kg/ha), tebuconazole (0.21 kg/ha) plus Induce at 0.25%, fluometuron (0.5 kg/ha), cyproconazole (0.23 kg/ha), and tebuconazole plus Induce provided 64, 59, 57, 54, and 48% control, respectively. Only fluazinam applications resulted in a significant increase in yield to 4,131 kg/ha, 29% more than untreated peanuts. Peanuts treated at night averaged 12% less disease and 6% higher yields than peanuts treated during the day, and these results were significant at P = 0.05 and P < 0.10, respectively. Spraying at night when peanut leaves are folded may improve fungicide penetration through the canopy.

RECURRENT SELECTION FOR RUST RESISTANCE IN TWO PEARL MILLET GERMPLASMS H.T. Tappeh, J.P. Wilcox, and W.W. Haseman. Georgia and USDA-ARS Forage and Turf Unit, UGA Coastal Plain Experiment Station, Tifton, GA 31793.

Recurrent selection for rust resistance was performed in two pearl millet germplasms, Tift #2 and Tift #5. Four cycles of selection with intercrossing were made in the greenhouse after inoculation with bulkuredospores of *Puccinia sativus* var. indica. The proportion of resistant plants in each cycle increased significantly from the previous one in the two germplasms. The original population and the four cycles of each germplasm were evaluated in the field. Mean final rust severities were reduced from 16.0% and 22.6% in the original Tift #2 and Tift #5, respectively, to 0.6% and 9.4% in the fourth cycle. Depending on this improvement for the selected character, the field results show that for agronomic characters, such as plant height, number of culmnodes, flowering date, and head length, great variability was successfully maintained. For most of these characters a stabilization around the mean in the original population was observed in the fourth cycle of selection. These results shows that recurrent selection may be used in managing pearl millet germplasm through selection for resistance to rust while maintaining considerable agronomic diversity for other traits.


A field microplot trial was established to evaluate nematode populations in a rotation program utilizing nematode-suppressive and non-suppressive legumes, and nematode-host and non-host grass species. The treatment rotations consisted of velvetbean (*Mucuna deeringiana*) or cowpea (*Vigna unguiculata*) during the first phase, followed in phase two by oat (*Avena sativa*), wheat (*Triticum aestivum*), rye (*Secale cereale*) with a preferred grass (*Cynodon dactylon* or *Dactylis glomerata*) and a non-preferred grass (*Echinochloa crus-galli* or *Lupinus sp.* or *pawlowa*). Phase three consisted of soybean (*Glycine max*). Soil and root samples were collected sequentially at approximately three month intervals, and soil populations of root-knot (*Meloidogyne sp.*), cyst (*Heterodera sp.*), spiral root (*Helicotylenchus sp.*), stunt (*Tylenchulus semipenetrans*) and nematode were assessed. Root-knot and stunt nematode populations in the second and third samples were significantly lower in microplots previously planted with velvetbean than in plots with cowpea. Rotations with rye, oat and wheat decreased the population of root-knot nematodes. High populations of spiral nematodes associated with microplots planted with velvetbean.

TOLERANCE VERSUS RESISTANCE IN FUSIFORM RUST OF LOBLOLLY PINE. C. H. Walkinghaw. USDA Forest Service, Box 500, Pineville, LA 71361-5500.

Loblolly pines have the ability to tolerate stem infections of *Cronartium quercuum* (Berk.) Miyabe ex Shirah f. sp. *fusiform* Burdsall and Snow. Infected trees have diameter growth similar to asymptomatic trees on the same site. Sporulation of the fungus occurs in these trees, some more than 100 years old. Rust-tolerance mechanisms were evident in rust-infected tissues. Compartimentalization of infections was seen in young seedlings, saplings and adult trees. Root elongation and linear growth of galls was common in greenhouse and field infections. Pumal hyphae were partially encased in dead tissue. Pine familiar differed in their ability to restrict the pathogen and in their diameter growth. Unlike resistance that prevents gall formation, tolerance does not exert selection pressure on the rust pathogen since sporulation continues over many years.
PREMATURE DEPOLITION OF BLACK LOCUST IN GEORGIA.
E.C. Whiting and R.W. Roncadori, Department of Plant Pathology, Miller Plant Sciences, University of Georgia, Athens, Georgia 30602.

Black locust (Robinia pseudoacacia L.), a fast-growing leguminous tree species, is being evaluated as a source of biomass. Chlorotic leaves and premature defoliation were observed on 95-100% of trees by the end of July in 1991 and 1992 in a progeny plantation near Greensboro, GA. Numerous dark brown spots (1-3 mm in diameter) and gray necrotic lesions along leaflet margins were present on the abscised leaflets. Colletotrichum gloeosporioides Penz. was associated with symptomatic leaflets. Inoculation tests confirmed pathogenicity. In 1993, an abnormally hot and dry year, similar symptoms to those in 1991 and 1992 were observed beginning in mid-June and by August 28 all trees were 25-50% defoliated. C. gloeosporioides was only present at low levels, suggesting that environmental factors alone may also limit the production of black locust in the Piedmont of Georgia.

REDUCTION OF PEARL MILLET GRAIN YIELD DUE TO RUST INFECTION.
J.P. Wilson and W.W. Hamma, USDA-ARS Forage and Turf Unit, University of Georgia, Coastal Plain Experiment Station, Tifton, GA, 31793.

The effects of rust, caused by Puccinia sativae var. indig. on, grain yield of the pearl millet hybrid 23DAE6077 was evaluated in the field in 1992 and 1993. Treatments in 1992 consisted of inoculation, control, or fungicide protection (Braun 720 @ 3.6 ml/l). Treatments in 1993 consisted of a control and 1 or 3 fungicide applications. Environmental conditions were unfavorable for rust development in 1992 but mean final severities ranged from 0 to 35%. No differences among treatments for yield or 500 grain weight were observed. Conditions in 1993 were more conducive for rust in 1993, and mean yield ranged from 36 to 96%. Grain yield and 500 grain weight of the control were reduced by 72% and 39%, respectively, of those yield components measured from plots with 3 fungicide applications. Indirect yield losses from lodging occurred in 1993. Lodging was greater in plots with severe rust infection, averaging 9% of stands, and increased markedly when rust severity exceeded 20% severity. Fusarium moniliforme and Sclerotium rolfsii were the predominant pathogens isolated from lodged culm samples.

EVALUATION OF CONSAN, SM-9 AND PHYTON 27 FOR THE CONTROL OF BROWN PATCH ON TALL FESCUE.
Alan S. Windham, University of Tennessee, PO Box 110019, Nashville, TN 37222.

Consan (Del Tek Inc.), SM-9 (S.M.I. Corp) and Phyton 27 (Source Technology Biologicals, Inc.) were evaluated in greenhouse and field trials for the control of brown patch caused by Rhizoctonia solani Kuh. On tall fescue (Festuca arundinacea Schreb.), in greenhouse tests conducted in 1992, Consan, SM-9 and Phyton 27 were not effective in controlling brown patch on K-31 tall fescue when applied preventively (24 hr prior to inoculation with R. solani) or curatively (24 hr after inoculation) when compared to standard fungicides Chipco 26019 FLO (propined) and Eagle 40W (myclobutanil) (P<0.01). In a field trial initiated on June 6, 1993, disease severity in turf plots sprayed with Consan (1.0 fl oz/1000 sq ft) or SM-9 (1.1 fl oz/1000 sq ft) at 14 day intervals was not significantly different from the untreated control. Chipco 26019 FLO, Dacoum 2787 Flowable (chlorothalonil), fumazin 500F, and Eagle 40W applied at 14 day intervals and Fore Flowable (mancozeb) at 7 day intervals gave good to excellent control of brown patch (P<0.01).

APLATOXIN ACCUMULATION IN MAIZE INFECTED WITH ASPERGILLUS FLAVUS AND MELOIDOGYN INCognita.
J. G. Windham, N. Zunno, and W. P. Williams. USDA-ARS, Mississippi State, MS 35762.

The effect of Meloidogyne incognita on aflatoxin production by Aspergillus flavus on maize was measured in field microplots. Hybrids resistant (Mo18 X Mp313E) and susceptible (M686516 X SC212M) to kernel infection by A. flavus were used in the study. Treatments included plants inoculated with A. flavus, or M. incognita, or both pathogens. An un inoculated control was also included in the study. Microplots were inoculated with both M. incognita and A. flavus. Inoculated ears were inoculated with A. flavus at 6 days after midilk using a side-needle inoculation technique to inject 9.0 x 10^8 A. flavus conidia per kernel. Ears were harvested sixty days after midilk and aflatoxin concentration was determined. Aflatoxin production in the A. flavus susceptible hybrid grown in M. incognita infested plots did not differ from plants grown in plots without the nematode. However, A. flavus resistant plants grown in nematode infested plots had aflatoxin production equal to the susceptible hybrids. This research indicates a need to develop a maize genotype with resistance to both pathogens.

FREQUENCY OF DISCULA DESTRUCTIVA REDLIN AND AN UNDESCRIBED DISCULA SPECIES FROM DOGWOOD TISSUE.
M.T. Windham, E.K. Erbhaus, M.E. Montgomery-Die, and R.J. Trigiano. The University of Tennessee Agricultural Experiment Station, Knoxville, TN 37901.

Cultures of Discula destructiva Redlin and an undescribed Discula species were collected from leaf or twig tissue that was symptomatic of dogwood anthracnose. Cultures were obtained from one location in MD (20 isolates), NC (22 isolates) and PA (5 isolates) and five locations in TN (131 isolates). Gallic acid agar plates were used to separate isolates as D. destrutiva (agar-grown response) or Discula species (no response). Isolate population consisted of 8% Discula species and 92% D. destructiva. When origin of isolates was considered (leaf or twig tissue), 14% were D. destructiva isolates and 13.4% of Discula sp. isolates were obtained from symptomatic twigs. No undescribed Discula sp. isolates were obtained from MD, PA, or two locations in TN. In NC, 23% of isolates were the undescribed Discula sp. and in locations in TN where the Discula sp. was found, frequency of isolation ranged from 10-25%.

TRANSFORMATION OF RICE WITH THE BAR GENE FOR PHOSPHONITHRICIN ACETYL TRANSFERASE.
Q.L. Xie, J. Oard, and M.C. Rush. Department of Plant Pathology and Crop Physiology and Agronomy, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge, 70803.

A system was developed to transform rice with the bar gene which encodes for phosphonithricin acetyl transferase (PAT). This enzyme inactivates the herbicide phosphonithricin (PTT - BASTA™ or GLINT™). The bar gene was originally from Streptomyces hygroscopicus. Three plasmids, pDH502, pAHCC5 and pBSL21 were used in these experiments. The gene is to be used as a marker for a novel recenive gene for sheath blight resistance generated through somaclonal variation in the susceptible rice cultivar Labelle (LSBR-5). The cultivar Lemont has been transformed for resistance to PTT. The cultivars Cypress, Katy, and Nipponbare and the sheath blight resistant lines LSRB-5 and UKN-149 are putatively transformed. Phosphonithricin has also been reported to have fungicidal activity, including activity against Rhizoctonia solani the cause of rice sheath blight. The compound could not be used as a fungicide on rice unless the cultivar has been transformed for PAT activity.