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Abstracts

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Alphabetized by first author's last name

THE EFFECTS OF CHEMICAL TREATMENTS, HARVEST DATE AND SPECIFIC ISOLATION MEDIA ON THE PEANUT SHELL MYCOBIOTA OF TWO PEANUT CULTIVARS. R.E. Baird[1], T.B. Brenneman[2], D.K. Bell[2], A.K. Culbreath[2], and J.D. Moore[2], Bot.& Pl. Path. Dept.[1], Purdue Univ. ,Vincennes, IN 47591, Dept. of Pl. Path.[2], Univ. of GA, Coastal Plain Expt. St., Tifton, GA 31793.

Peanut *Arachis hypogaea* L. cultivars Florunner and Southern Runner grown at two locations near Tifton, GA were either treated with the fungicide flutolanil (Moncut®) or nontreated. Peanut shell mycobiota were characterized for both treatments at two harvest dates. A total of 12,744 fungal isolates were cultured from 4,200 shells assayed. Over two-thirds of the isolates were Deuteromycotina. Common form-genera isolated were *Alternaria, Curvularia, Fusarium, Lasiodiplodia, Nigrospora, Rhizoctonia,* and *Rhizopus*. Isolation frequencies of some genera were significantly different between treatments within a cultivar, and between the two cultivars. However, these differences were of small magnitude and inconsistent across farms, harvest dates, or cultivars. Isolation frequencies of the fungi on three media were significantly different. Isolations of *Rhizoctonia* spp. from shells occurred at the same frequency with tannic acid-benomyl agar and malt extract agar media. *Fusarium* spp. were isolated more frequently on malt-salt agar (MSA) than MEA and TABA.

CHARACTERIZATION AND APPLICATION OF DNA PROBES SPECIFIC TO MELOIDOGYNE ARENARIA. T. J. Baum, R. A. Dean, and S. A. Lewis. Department of Plant Pathology and Physiology, Clemson University, Clemson, S.C. 29634-0377.

Differential screening of a genomic library of M. arenaria produced three clones that showed specific hybridization to one or two Meloidogyne species. When tested against 31 populations of M. arenaria, M. incognita, M. javanica, and M. hapla, two clones hybridized selectively to DNA from M. arenaria and M. javanica, and one (clone 17) was specific to M. arenaria. The specificity of clone 17, a 5 kb EcoRI fragment, was localized within an internal 900 bp ScaI fragment. Based on sequence analysis, specificity was contained within a repeat region, consisting of a 28 bp unit repeated 19 times. Species-specific DNA probes were used to determine species proportions in mixed Meloidogyne populations.

MANAGEMENT OF SCLEROTIUM ROLFSII IN SOUTHERN RUNNER PEANUT UNDER TWO LEAFSPOT SPRAY REGIMES. T. B. Brenneman and A. K. Culbreath, Dept. of Plant Pathology, Coastal Plain Experiment Station, Tifton, GA 31793.

Peanut cultivar Southern Runner (SR) has known resistance to late leafspot (Cercosporidium personatum) and white mold (Sclerotium rolfsii). Four labeled fungicides/insecticides with activity against S. rolfsii were evaluated on SR with either a 2-wk or 3-wk spray schedule of chlorothalonil (1.26 kg/ha) in 1991 and 1992. Leafspot incidence was high both years causing 41% and 72% defoliation in plots sprayed on a 2-wk and a 3-wk schedule, respectively. Treatments applied for S. rolfsii did not affect leafspot severity either year. The effects of chlorothalonil regimes and fungicides/insecticides on white mold incidence were variable. All fungicides/insecticides increased yields in 1991 only and the combination of chlorpyrifos and PCNB provided the best white mold suppression. There were no interactive effects between treatments for foliar and soilborne diseases.

HISTORICAL PERSPECTIVE OF YELLOW VINE IN THE CUCURBITS. B. D. Bruton*, B. Cartwright, and S. D. Pair*. *U.S. Dept. Agric., ARS, Lane, OK 74555 and Dept. Entomology, Okla. State Univ., Lane, OK.

In 1991, the yellow vine syndrome was observed in watermelons and muskmelons in central Texas and Oklahoma, with losses in the millions of dollars. Although not as severe in 1992, damage to squash, pumpkin, watermelon, and muskmelon was costly. A distinct yellowing of the leaves normally developed prior to harvest. Leaves on terminal runners remained upright and did not expand with inward curling of the leaf perimeter. The leaves gradually died leaving a yellow to lime green vine that persisted for some time. Flowers and fruit on symptomatic plants appeared normal. Phloem necrosis in the crown and root area was typically associated with symptomatic plants. SEM revealed extensive plugging of the phloem in each of the 3 cucurbits. Soil fumigation with methyl bromide was ineffective, whereas, weekly insecticide applications provided some degree of control.

FACTORS ASSOCIATED WITH YELLOW VINE IN SQUASH. B. Cartwright and B. D. Bruton. Dept. of Entomology, Okla. State Univ., Lane, OK 74555 and U. S. Dept. of Agric., ARS, Lane, OK.

In 1988, an unusual yellow vine syndrome was first observed in squash in Oklahoma. Symptoms include severe stunting, distinct yellowing and gradual decline, and occasionally a sudden wilt. Disease incidence was greater when squash were grown using black and reflective mulches as opposed to bare ground. Preliminary observations suggested there may be a relationship between insects and the occurrence of disease symptoms. In two separate studies which compared squash grown under insecticide-sprayed and unsprayed regimes, the occurrence of yellow vine symptoms was significantly reduced when a weekly insecticide program was followed. Cucumber beetles, squash bugs,

melon aphids, and thrips were the most common insect pests observed in these studies. In a limited cucurbit host range study, squash and pumpkin were the only cucurbits to develop symptoms. Watermelon, muskmelon, and cucumber did not appear to be affected.

CONTROL OF STEM ROT OF RAPESEED WITH FOLIAR FUNGICIDES. A. Y. Chambers. Department of Entomology and Plant Pathology, University of Tennessee, Jackson, TN 38301-3200.

Nine foliar spray treatments involving four fungicides - benomyl, fluazinam, iprodione, and thiophanate-methyl - were evaluated in field plots in 1991-92 for control of Sclerotinia sclerotiorum on rapeseed (Brassica napus, low erucic acid type or "canola"). All treatments applied to Cascade cultivar significantly reduced severity of stem rot compared to no treatment. Treatments of thiophanate-methyl (0.79 kg/ha) applied at beginning of bloom and again at mid-bloom, iprodione (0.56 kg) applied at mid-bloom, and thiophanate-methyl (0.38 kg) applied at mid-bloom were significantly more effective than the other six treatments. Benomyl (0.56 kg) applied at mid-bloom, benomyl (0.28 kg) applied at mid- and full-bloom, and thiophanate-methyl (1.57 kg) applied at mid-bloom also gave very good disease control. Fluazinam (0.28 and 0.56 kg) and benomyl (0.28 kg) applied at mid-bloom were less effective. Yields were increased significantly over no treatment (up to two-fold) following all treatments except fluazinam at 0.56 kg.

PHYLOGENY OF CAULIFLOWER MOSAIC VIRUS ISOLATES REVEALS RECOMBINATION EVENTS. Kelly D. Chenault and Ulrich Melcher, Dept. Biochem. Mol. Biol., Oklahoma State Univ., Stillwater OK 74078.

Cauliflower mosaic virus (CaMV) nucleic acids that result from genetic recombination can be selected. Whether recombination played a role in the evolution of unselected isolates was explored by sequence comparisons. The complete nucleotide sequences of eight CaMV isolates were subjected to phylogenetic analysis by parsimony, distance, and maximum likelihood methods to generate a "species" tree. "Gene" trees, generated from these sequences and relevant partial nucleotide sequences of other isolates, for each of the CaMV open reading frames and the large intergenic region were compared with each other and the species tree. Four probable recombination events and several possible ones were found. Isolates from North America clustered separately from isolates obtained from other parts of the world.

EFFECTS OF SOIL SOLARIZATION ON SOUTHERN BLIGHT OF LUPINS. D. J. Collins[1], C. Stevens[2], and V. A. Khan[2], [1]Department of Plant Pathology, Alabama Cooperative Extension Service and Alabama Agricultural Experiment Station, Auburn University, AL 36849, and [2]George Washington Carver Agricultural Experiment Station, Tuskegee University, Tuskegee Institute, AL 36088.

Lupins (*Lupinus albus*) are being evaluated as a alternative grain/forage crop in Alabama. Southern blight, caused by *Sclerotium rolfsii*, has been identified as a potential hazard to lupin production. Currently, several methods for management of this pathogen are being evaluated. Soil solarization significantly reduced the incidence of southern blight of white lupin 'Ultra' as compared to the bare soil control. Numbers of pods/plant and numbers of plants/plot were greater in solarized plots than in bare soil. Solarized plots yielded 2,108 kg/ha grain compared to 611 kg/ha for the bare soil plots.

AGGREGATION OF SYMPTOMATIC AND ASYMPTOMATIC TSWV-INFECTED PEANUT PLANTS. A. K. Culbreath J. W. Todd, J. W. Demski and J. R. Chamberlin. University of Georgia, Coastal Plain Expt. Station, Tifton, GA 31793-0748.

Plots of 'Florunner' peanut (Arachis hypogaea) were sampled weekly or bi-weekly in 1991 and 1992 to determine apparent and total incidence of tomato spotted wilt virus (TSWV) infections. Each plot sampled had one sub-plot (20 consecutive plants) of row removed from each of the two rows. The plants were examined for symptoms of TSWV, and the tap root of each plant was assayed for TSWV by ELISA ('L strain' antiserum, Agdia Inc., Elkhart, IN). Ordinary runs analysis of total infected plants indicated fewer than expected runs in one of eight sub-plots in five of seven of the last evaluations in 1991, and in one of eight sub-plots in the last three evaluations in 1992, indicating intra-plot clustering of infected plants. Variance to mean ratios for total disease incidence in the sub-plots were 2.0 or higher for the last 15 of 18 samples in 1991, and for the last 10 of 11 samples in 1992, indicating interplot clustering.

TURNIP HYPERSTUNTING INDUCED BY CAULIFLOWER MOSAIC VIRUS CHIMERAS. Christine Daubert and Ulrich Melcher, Dept. Biochem. Mol. Biol., Oklahoma St. Univ., Stillwater OK 74078.

VR246 and VR244A are chimeras of DNAs of CM4-184 and Cabbage S (CabbS) isolates of cauliflower mosaic virus (CaMV). CabbS and VR244A cause appreciable stunting of turnip leaves, and CM4-184 causes mild stunting. Stunting caused by VR246 was more severe than caused by CabbS, indicating that CM4-184 sequences in VR246 cooperate with CabbS sequences to cause hyperstunting. To test which VR246-specific CM4-184 sequences (the large intergenic region and/or open reading frames IV and V) are important for hyperstunting, three pairs of chimeric CaMV DNAs were created by exchanging restriction fragments of plasmid-cloned CaMV DNAs. The stunting-inducing properties of the new chimeras are being tested.

ABUNDANCE AND SPATIAL AGGREGATION OF YELLOW VINE IN CROPS OF WATERMELON AND MUSKMELON. J. A. Duthie, B. D. Bruton*, and S. D. Pair*. Dept. Plant Pathol., Okla. State Univ., Lane, OK 74555 and *U. S. Dept. of Agric., ARS, Lane, OK.

Yellow vine (YV) of cucurbits is a syndrome of unknown etiology. Information on abundance of YV and on spatial aggregation of affected vines may be useful in determining the cause. In 1992, 6 fields of watermelon and muskmelon were surveyed in Oklahoma and Texas. The presence of YV was assessed on each of 4 plants in 200-400 quadrats/field. Quadrats were located on a grid consisting of 20-40 beds with 10-20 quadrats/bed. In the 6 fields, YV affected 46, 28, 27, 16, 15, and 12% of vines, respectively. In fields with more than 15% of vines affected, frequences of affected vines/quadrat were not binomially distributed. Thus, when YV was abundant, affected vines were aggregated within quadrats. These data are consistent with the hypothesis that YV may be spread from vine to vine by a biotic agent.

PHOMOPSIS FRUIT ROT OF PROCESSING PEACHES IN ARKANSAS. Patrick Fenn, Department of Plant Pathology, Univ. of Arkansas, Fayetteville, AR 72701

A previously undiagnosed fruit rot of peach has increased in incidence over the last several years in Arkansas. Lesions on cvs. Allgold, Babygold 5 and Babygold 7 were round to oval, 0.5-5 cm in diameter and light brown. Occasionally white mycelia and pycnidia occurred on the lesion surface. Rot extended to the pit and had well defined margins. Rotted tissue plated on PDA consistently yielded a Phomopsis sp. identified by production of pycnidia exuding typical alpha and beta conidia. Inoculations of peach fruit caused symptoms as observed on naturally infected fruit, and the fungus was recovered readily. This fungus also caused a brown core rot in inoculated Gold Delicious apples. Phomopsis fruit rot, previously reported as a minor problem in the eastern United States, has caused appreciable losses of processing peaches and may affect product quality.

OPTIMUM SAMPLE SIZE FOR DETERMINING DISEASE INCIDENCE, SEVERITY, AND DEFOLIATION CAUSED BY Alternaria mali ON APPLES. N. Filajdić, and T. B. Sutton, Department of Plant Pathology, North Carolina State University, Raleigh, NC.

Optimum leaf and terminal number to be sampled for determination of incidence and severity of Alternaria blotch on apple and associated defoliation was determined from variance components and cost for data collected between 1989 and 1992 at three locations. Mean optimum number of leaves per terminal for evaluating disease severity and incidence was 14.88 and 17.45, respectively. Optimum numbers of terminals per tree were 0.94, 0.92, and 1.96 when severity, incidence, and defoliation were assessed, respectively. The relationship between the coefficient of variation and the least significant difference and number of leaves sampled was adequately described by the power and logarithmic functions. The variation was distributed evenly over leaves and terminals, but the relatively low cost of sampling leaves indicated that increasing the number of leaves sampled would increase the sampling efficiency more than increasing the number of terminals sampled.

EVALUATION OF CITRULLUS SP. FOR WATERMELON MOSAIC VIRUS 2 RESISTANCE. A. G. Gillaspie, Jr. and J. M. Wright. USDA, ARS, Plant Introduction Station, Griffin, GA 30223-1797.

Citrullus accessions (670) were evaluated for practical resistance to watermelon mosaic virus 2 in greenhouse tests (seedlings were mechanically inoculated) and in field tests (plants in spreader rows were plants mechanically inoculated). Plants were considered virus-free by the absence

of disease symptoms and by negative results in ELISA. Plants were considered resistant if virus-free 10-14 days after final inoculation in the greenhouse, or 4-6 wk after emergence in the field, even though many were subsequently infected. Ten C. lanatus accessions (PI 189316, 189317, 189318 from Zaire; PI 244018, 244019, 255137 from South Africa; PI 164708 from India; PI 494529 and Egun, which are Egusi-types, and PI 306782 from Nigeria) and five C. colocynthis accessions (PI 386016, 386024, 386025, 386026 from Iran and PI 388770 from Morocco) possessed some resistance in both field and greenhouse tests.

BACTERIAL MICROFLORA ASSOCIATED WITH POSTHARVEST DECAY OF VIDALIA SWEET ONIONS. R. D. Gitaitis, R. Beaver, D. Sumner, D. Smittle, and B. Maw, Coastal Plain Experiment Station, Tifton, Georgia, D. Gay, Cooperative Extension Service, Tifton, B. Tollner, and Y. Hung, Georgia Experiment Station, Griffin, Georgia.

Quality was evaluated for onion bulbs grown under two fertility regimes, harvested at five different maturity levels, and stored under two temperature regimes. Bulbs were graded at harvest and every 2 wks when stored at 13-24 C and every 4 wks when stored at 1 C. Isolations were made from rotted areas on TB-T, T-5, KMB, and nutrient agar media. Representative strains were identified by fatty acid analysis with a gas chromatograph using the MIDI system. Bacteria, in contrast to fungi, were responsible for a minor proportion of decay. The most frequent phytopathogenic bacteria recovered were Pseudomonas cepacia, P. gladioli pv. alliicola, and P. marginalis. However, over 40 other species, including Salmonella, Serratia, Xenorhabdus, and Yersinia were recovered.

FIELD SPREAD OF 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 first observed in commercial fields in 1989, where losses were as high as 80%. The purpose of this study was to evaluate the rate of spread from a point-source of inoculum in a watermelon field. In the spring of 1990, three watermelon hills were inoculated out of 55 total hills in a 25 ft by 110 ft plot. In a replicated test in the spring of 1992, one infected seedling was planted in the center of 50 x 50 ft plots(50 plants) of Charleston Gray 2 weeks after planting. Foliar symptoms were used to monitor disease spread weekly. In both seasons, 80% of the plants had foliar symptoms prior to harvest. However, in 1990, 50% infection was reached 3 weeks earlier than in 1992. This probably resulted from the higher initial infection in 1990, but rainfall and temperature also may have been a factor. Fruit infection was 45% in 1992 versus only 5% in 1990. Dry weather during fruit maturation may have been responsible for the lack of fruit symptoms in 1990.

CONJUGAL TRANSFER OF MINIPLASMIDS AMONG RACES OF *XANTHOMONAS CAMPESTRIS* PV. *VESICATORIA*. S.J. Kent, V. Dittapongpitch, and D.F. Ritchie. Dept. of Plant Pathology, Box 7616, North Carolina State University, Raleigh, 27695-7616.

Based on size, there are four indigenous miniplasmids (2.50, 2.28, 1.80, and 1.70 kbp) in copper-resistant pepper race 2 and tomato strains, but not in pepper race 1 strains. We wished to determine the transfer range and frequency of the different miniplasmids within *X.c. vesicatoria* by conjugation. Copper (Cu) resistant, rifampicin (rif) sensitive race 2 and tomato donor strains were mated with Cu sensitive, rif resistant race 1 and race 3 pepper strains. Transfer frequencies of 10^{-4}-10^{-5} and a change to race 0 were observed with the 2.50 kbp and 2.28 kbp miniplasmid when transferred to race 1 recipients. Fewer transconjugants were obtained with the smaller miniplasmids than with the 2.50 kbp miniplasmid. Race 3 strains appeared not to be recipients for miniplasmids. No transfer of miniplasmids from the tomato strain to pepper races 1 and 3 was observed.

EFFECT OF TILLAGE AND SEED TREATMENT ON LOCAL LESION NET BLOTCH AND YIELD OF BARLEY IN SOUTH CAROLINA. Graydon Kingsland. Department of Plant Pathology and Physiology, Clemson University, Clemson, SC 29634-0377.

Incidence of local lesion net blotch of seedlings of barley (*Hordeum vulgare* var Keowee), caused by *Drechslera teres* forma *maculata*, was not reduced by rototilling soil with infested barley debris to a depth of 22 cm two or three times (36 and 0 or 66, 36 and 0 days) before seeding. About 20% of leaves from these plots were diseased, compared with 15% incidence on leaves of seedlings from non-tilled plots 28 days postseeding. Plot ratings for severity on mature plants (15 May) averaged 40% for all tillage practices. Yield from thrice-tilled plots (3400 kg/ha) was significantly higher than yield from twice-tilled plots (3000 kg/ha) and non-tilled plots (2950 kg/ha). Disease incidence on seedlings from seeds treated with three fungicides averaged 16% and was not significantly different from the incidence of 18% on the controls. However, yield of 3500 kg/ha from Vitavax 200 plots was significantly greater than yield from the check, Vitavax 75, or Thiram plots.

TRANSMISSION OF THE WATERMELON FRUIT BLOTCH BACTERIUM FROM INFESTED SEED TO SEEDLINGS. T. Kucharek, Y. Pérez, and C. Hodge. Plant Pathology Dept., Univ. of Florida, Gainesville, FL 32611.

Watermelon fruit blotch (WFB) occurred in fruit and foliage in Florida from 1989-1992 in fields established from seed or transplants. In the greenhouse, using seed from infected fruit that were planted as one seed/container, the incidence of WFB in 10 d-old seedlings 4 and 27 mo after harvest was 89 and 5.4%, respectively. When infested and noninfested seed were planted together in the same pots in two tests, WFB occurred in seedlings from noninfested seed in 7 and 10 days. By 16 days, the incidence in noninfested seed-produced seedlings was 77 and 30% for the two tests. With three temporally randomized plantings for each of five seed lots using 120 seed/flat in 9-12 flats/planting, WFB occurred in one seedling of one planting of one seed lot at 9 d and 160 contiguous plants at 15 d. Identification of WFB bacteria isolated from seedlings was by fatty acid analysis of cultures that produced hypersensitive reactions in tobacco leaves. These results demonstrate that seedling growouts can be useful for detection of the WFB bacterium associated with seed at a qualitative but not a quantitative level.

ELECTRON MICROSCOPIC AND MOLECULAR CHARACTERIZATION OF TURNIP VEIN-CLEARING VIRUS. Robert T. Lartey[1], Leslie C. Lane[2] & Ulrich Melcher[1] Depts. of [1]Biochem. Mol. Biol., Oklahoma St. Univ., Stillwater OK 74078 & [2]Plant Pathology, Univ. Nebraska, Lincoln NE 68583.

Turnip vein-clearing tobamovirus (TVCV) causes vein clearing in turnips, mosaic in *Nicotiana tabacum* cv. Samsun, and severe mosaic in *N. clevelandii*. Observation of uranyl acetate-stained epidermal peels of infected turnip leaves by transmission electron microscopy revealed rod-shaped viral particles, typical of tobamoviruses. cDNAs were synthesized from TVCV RNA and cloned in a Bluescript plasmid. Sequences of cDNA clones revealed that TVCV RNA was related to, but distinct from, known tobamoviral RNA sequences. TVCV coat protein, like that of ribgrass mosaic (RMV) had two tryptophans. Profiles of CNBr fragments of TVCV and RMV coat proteins were indistinguishable Thus, symptoms caused by TVCV differ from those reported for RMV, but their coat proteins appear identical.

INHIBITORY EFFECTS OF VOLATILE COMPOUNDS FROM RAPESEED MEAL TO SCLEROTINIA MINOR AND SCLEROTIUM ROLFSII. Xin Li, H. A. Melouk, J. P. Damicone and K. E. Jackson. Department of Plant Pathology and USDA-ARS, Oklahoma State University, Stillwater, OK 74078-9947.

Decomposition of rapeseed meal (RSM) in moist soil produces volatile compounds with biocidal properties. RSM (containing 36 μM/g glucosinolate) was added to soil at rates ranging from 0 to 55g/kg of soil containing sclerotia of Sclerotinia minor and Sclerotium rolfsii. Sclerotia were retrieved after various incubation periods and their viability was determined by plating on potato-dextrose-agar (PDA). After 10 days of incubation, viability of sclerotia of both fungi was reduced by >80% in soils amended with RSM at 20g/Kg soil. Also, mycelial growth of S. minor and S. rolfsii and the formation of sclerotia on PDA were reduced by >80% by volatile compounds released from soils amended with RSM at 55g/Kg soil. Therefore, RSM has a potential as a soil amendment for reducing the viability of sclerotia of S. minor and S. rolfsii in soil.

PATHOGENICITY OF *MONOSPORASCUS CANNONBALLUS* AS RELATED TO COLONY CHARACTERISTICS AND GEOGRAPHIC ORIGIN. B. R. Lovic, R. D. Martyn, M. E. Miller. Department of Plant Pathology and Microbiology, Texas A&M University, College Station 77843, and Weslaco 78596.

Monosporascus cannonballus, an unusual soil-borne ascomycete, causes a root rot/vine decline disease of muskmelon (*Cucumis melo*) and watermelon (*Citrullus lanatus*) in several areas of the world. The main purpose of our study was to evaluate differences in pathogenicity of isolates from different geographic areas. Fifteen isolates of *M. cannonballus* from Texas, Arizona, California, Japan, and Spain were tested for their pathogenicity to muskmelon (cultivar "Magnum 45") under greenhouse conditions in infested soil. The repeated greenhouse experiment demonstrated the existence of pathogenic and non-pathogenic isolates from all

areas from which the disease has been reported. Pathogenicity was assessed as a significant reduction in fresh and dry weight of the roots and vines, and formation of perithecia in the root tissue. Non-pathogenic isolates exhibited reduced growth rate on standard laboratory media, formed less perithecia, and appeared deteriorated. Deterioration may have been caused by maintenance on potato dextrose agar while cultures appeared more stable on V8 agar. Deterioration in storage was reduced by storing the dried soil inoculum at -20 C.

SUSCEPTIBILITY OF THE CUCURBITACEAE TO *MONOSPORASCUS CANNONBALLUS* UNDER SIMULATED FIELD CONDITIONS. R. D. Martyn, J. C. Mertely, B. R. Lovic, and M. E. Miller. Department of Plant Pathology and Microbiology, Texas A&M University, College Station 77843 and Weslaco 78596.

Monosporascus cannonballus (*Mc*) is a soilborne ascomycete that causes a vine decline disease of muskmelon (*Cucumis melo*) in Texas and Arizona in the USA and in Japan and Spain. We have documented previously that *Mc* is a pathogen of numerous cucurbits under greenhouse conditions; however, expression of the 'vine decline' symptom typically occurs near harvest, and, is difficult to reproduce in the greenhouse. Therefore, ten cucurbits encompassing six species in three genera were evaluated under simulated field conditions utilizing infested microplots. Each test crop was grown to maturity and rated for vine decline symptoms (VDS), the formation of perithecia, and reisolation of *Mc*. Perithecia formed in and *Mc* was reisolated from the roots of all cucurbits tested. Typical VDS occurred on muskmelon and watermelon (*Citrullus lanatus*) 9 wk after planting; however, severe virus infection in the *Cucurbita* spp. prevented ratings in those crops. There were differences in VDS among three muskmelon cultivars, but both watermelon cultivars were highly susceptible. Based on all criteria, watermelon, muskmelon, cucumber (*Cucumis sativus*), and a gourd (*Cucurbita texana*) were most susceptible, while zucchini and pumpkin (*C. pepo*) and butternut (*C. moschata*) were more tolerant.

A LEAF SPOT OF *ILEX* SPP. CAUSED BY A PATHOVAR OF *PSEUDOMONAS SYRINGAE*. S. M. McCarter and E. H. Moody, Department of Plant Pathology, University of Georgia, Athens 30602.

A bacterial leaf spot was observed during late winter of 1992 on container plantings of 'Rotunda' and 'Savannah' hollies. Pure cultures of a fluorescent pseudomonad were consistently isolated from the tissue, and Koch's postulates were fulfilled. The bacterium tested negative for oxidase, arginine dihydrolase, and pectate degradation but positive for tobacco hypersensitivity. It utilized erythritol and sucrose but not DL-lactate or D(-)-tartrate. It caused weak ice nucleation, did not produce syringomycin, and was sensitive to both streptomycin and copper. The bacterium is in the *P. syringae* group but attempts to use conventional and Biolog tests to assign a pathovar have been inconclusive. The disease appears to be associated with wind-blown sand in nurseries, and protection from this injury seems to be the best means of control.

THE EFFECTS OF PREEMERGENCE HERBICIDES ON RHIZOCTONIA BLIGHT OF CENTIPEDEGRASS (Eremochloa ophiuroides [Munro] Hack.). Steve Millett and Bruce Martin, Clemson University, Department of Plant Pathology and Plant Physiology, 120 Long Hall, Clemson, SC 29634-0377.

The effects of preemergence herbicides used on centipedegrass were examined as factors that may influence the incidence or severity of Rhizoctonia blight, caused by Rhizoctonia solani Kuhn, AG 2 type 2. In greenhouse experiments, disease severity was significantly higher on centipedegrass treated with atrazine and simazine applied at label rates of 1.1 and 2.2 kg a.i./ha in comparison to the controls, pendimethalin (applied at label rates of 1.68 and 3.36 kg a.i./ha) and dithiopyr (applied at label rates of 0.27 and 0.54 kg a.i./ha). Disease incidence in field plots treated with atrazine and simazine was significantly higher than in control plots or plots treated with pendimethalin or dithiopyr. Laboratory experiments were conducted to determine the effects of the herbicides on growth of R. solani AG-2 type 2 in liquid culture. All herbicides at concentrations of 0.1, 1 and 10 ppm significantly reduced mycelial dry weight as compared to the control.

EVALUATION OF INDUCED RESISTANCE FOR CONTROL OF BACTERIAL WILT IN CUCUMBERS UNDER FIELD CONDITIONS. **W. C. Nesmith and J. Kuc, Plant Pathology Department, and W. C. Dunwell, Horticulture Department, University of Kentucky, Lexington, KY.**

Greenhouse-grown transplants of cucumber (Cucumis sativus L. cultivar' Wisconsin SMR-58'), which had previously been induced (Plant Disease 66:683-686) by inoculation with the anthracnose pathogen, Colletotrichum lagenarium (Pass.) Ell. & Haltst., were evaluated under field conditions for control of bacterial wilt caused by Erwinia tracheiphilia E. F. Smith. Plants treated similarly with water served as controls. All plants were transplanted into raised beds mulched with black plastic on June 1, 1992 and fertilized and managed according to the current Kentucky Cooperative Extension Service recommendations for commercial cucumber production except that pesticides were not regularly used and fruit were not removed. The plots consisted of 10 plants per treatment, arranged in a randomized complete block design with four replications. Inoculum was natural. The season was wetter and cooler than normal for the region. Although bacterial wilt developed significantly slower in induced plants through mid-July, the level of control was insufficient to prevent all plants from eventually succumbing to disease by July 30. In addition, an epidemic of anthracnose developed in the plots with no difference detected between the levels in induced and control plots.

GROWTH CHARACTERISTICS OF *DISCULA DESTRUCTIVA* REDLIN, *SP. NOV.* ON DIFFERENT MEDIA AND CARBOHYDRATE SOURCES. R. O. Pacumbaba, Jr., and C. A. Beyl. Department of Plant and Soil Science, Alabama A&M University, Normal, Al 35762

The growth of *Discula destructiva* Redlin, *sp. nov.*, the causal agent of dogwood anthracnose, was studied during three weeks using five different media with two different carbohydrate sources to optimize growth and observe morphological differences. The five media used were malt sucrose agar (MSA), potato sucrose agar (PSA), lima bean sucrose agar (LBSA), V-8 juice sucrose agar (V-8SA) and potato dextrose agar (PDA); The last medium as control for the experiment. Diameters of the mycelial mat were determined every two days. Each colony was photographed on its respective medium after three weeks. Fungal mycelial growth and conidiamata on each medium were compared with respect to pigment, size and morphology. Results indicated that malt sucrose agar stimulated most rapid fungal growth.

FIELD EVALUATION OF ARROWLEAF CLOVER SELECTED FOR TOLERANCE TO PEA MOSAIC VIRUS. Indre Pemberton and G. R. Smith, Texas Agricultural Experiment Station, Box E, Overton, TX 75684.

Five cycles of recurrent phenotypic selection have resulted in a population (Cycle 5) of arrowleaf clover (*Trifolium vesiculosum* Savi) with superior tolerance to pea mosaic virus (PMV) isolate 204-1. A field study was conducted to evaluate and compare Cycle 5 germplasm to the standard arrowleaf varieties Yuchi, Meechee, and Amclo. Seven-week-old greenhouse-grown seedlings were transplanted to the field in Nov 1991. Plants assigned to the FALL treatment were inoculated with PMV the previous week. SPRING inoculations were made the following March. CONTROL plants were left uninoculated. Survival and time of flowering were recorded and all plants were harvested. In general, the earlier the plants were inoculated, the lower the yields and fewer plants flowered (FALL<SPRING< CONTROL). Despite PMV infection, Cycle 5 exhibited only 5 to 10% delay in flowering and 97% plant survival. Cycle 5 had significantly greater yields than the varieties. Losses among inoculated plants were as high as 70 to 75% for Yuchi and Meechee, respectively, in the SPRING treatment. Amclo exhibited more tolerance to PMV than Yuchi or Meechee, but significantly less than Cycle 5.

SOYBEAN SDS IN THE MIDWEST AND SOUTH: DISEASE INCIDENCE AND ASSOCIATION OF FUSARIUM SOLANI WITH ROOTS AND WITH CYSTS OF HETERODERA GLYCINES. K. W. Roy, Mississippi State, MS, 39762· T. S. Abney, Purdue University, West Lafayette, IN, 47907; and M. V. Patel, Mississippi State, MS, 39762.

In 1988, 1989 and 1992, roots of soybean plants from seven, 19 and 26 fields, respectively, that were affected by SDS in AL, AR, KY, IL, IN, MS, and TN, were assayed for Fusarium solani form A (FSA) and other fungi. Also, 29 other fields were inspected and, for fields where soybean cyst nematode (SCN) occurred, soil populations and the internal mycoflora of cysts were determined.

The most severe SDS was found in southeastern IL, southwestern IN, and northwestern KY and often occurred in low-lying areas of fields and near irrigation ditches. In Gallatin county, Illinois in 1992, SDS was present in more than 80% of 29 inspected fields, many of which had no SDS in 1988 or 1989. FSA was isolated from roots of symptomatic plants from all 52 locations where SDS occurred (range 4-100%). In the field, blue FSA spore masses sometimes occurred on stems at the soil line. F. solani form B (FSB) was the prevalent fungus in roots, and its incidence and that of FSA were positively correlated (r = .63). Cyst populations were not correlated with disease incidence. However, FSA was isolated from cysts from 71% of the fields where SCN occurred and from an average of 9% of the cysts (range 0 - 25%). FSB and species of Gliocladium and Stagnospora also were frequently isolated from cysts.

Evaluation of potential biological control agents of sudden death syndrome of soybean. J.C. Rupe, C.M. Becton, and P. Yount, University of Arkansas, Fayetteville.

Numerous fungi were isolated from the rhizosphere of relatively healthy soybeans growing in areas of fields in Arkansas with plants having severe symptoms of sudden death syndrome (SDS). Effectiveness of these fungi in controlling SDS was tested in the greenhouse by growing the fungi in potato dextrose broth at room temperature for 2 wks, homogenizing the culture in a blender, and dipping the roots of a susceptible 2-wk-old cultivar (Lee 74) in the resulting suspension. After incubating in vermiculite for 4 days, the plants were challenged by dipping the roots in a 1 X 10^7 conidia/ml suspension of the SDS pathogen, *Fusarium solani*, grown on potato dextrose agar for 2 wks at room temperature. Challenged plants were replanted in fumigated soil and observed for 3 wks. Of the 186 fungal isolates tested, 50 consistently significantly reduced or prevented disease compared to the control in at least three tests.

MOLECULAR CHARACTERIZATION AND DNA SEQUENCE ANALYSIS OF SPIROPLASMA VIRUS SVTS2. Y. H. Sha[1], J. Fletcher[1], U. Melcher[2], and R. E. Davis[3]. Dept. Plant Pathol.[1], Biochem. and Molec. Biol.[2], Oklahoma State University, Stillwater, OK 74078 and USDA/ARS, Beltsville, MD 20705[3]

Virus SVTS2, isolated from honeybee spiroplasma Spiroplasma melliferum TS2, can infect the phytopathogen S. citri. In the present work, SVTS2 infected S. melliferum, S. floricola, and all tested S. citri strains. In Western blots developed using anti-SVTS2 polyclonal antiserum, SVTS2 had one major protein (181 kd) and four minor proteins (60, 107, 140 and 153 kd). A restriction map of SVTS2 RF included one EcoRI, one HpaII, two BstYl/Sau3AI, four HinfI, and four TaqI sites. This map differs from that of viruses SVBR3, SpV1- R8A2, and SpV1-aa, all isolated from S. citri. When SVTS2 RF DNA was ligated with Bluescript KS+ and transformed into E. coli DH5α, clones of the complete RF DNA (6.5 kb) and a fragment (3.3 kb) were obtained. In partial DNA sequencing, the sequence of the 3.3 kb fragment was identical to that of a segment of the 6.5 kb DNA. SVTS2 had 56% identity to SpV1 R8A2 and 47.9% identity to SpV4 (a spherical virus from S. melliferum) in a 921 bp segment of SVTS2 DNA. Thus, SVTS2 is different from, but closely related to, SpV1-R8A2.

TESTS OF THE ETIOLOGY OF CUCURBIT YELLOW VINE. M. E. Shaw, J. Fletcher, B. D. Bruton*, and S. D. Pair*. Dept. of Plant Pathol., Okla. State Univ., Stillwater, OK 74078 and *U.S. Dept. of Agric., ARS, Lane, OK 74555.

No fungal, viral, or prokaryotic pathogens were consistently associated with symptoms of cucurbit yellow vine, and inoculations with isolated microorganisms failed to reproduce the syndrome. ELISA tests for beet curly top virus, lettuce infectious yellows virus, whitefly transmitted geminiviruses, and Spiroplasma citri were inconclusive, however DNA hybridizations or Western blots were negative. No dsRNAs were detected. Affected phloem was positive with Dienes' stain but samples did not hybridize with cloned MLO probes. TEM often showed pleiomorphic bodies, vesicles, or bacteria-like bodies in the phloem of affected plants. Transmission tests using Macrosteles quadrilineatus, Circulifer tenellus, or field-collected insects were negative.

DEVELOPMENTAL STAGE AND TEMPERATURE AFFECT STRAWBERRY FLOWER AND FRUIT SUSCEPTIBILITY TO ANTHRACNOSE. B. J. Smith, USDA-ARS, Poplarville, MS 39470

Both Colletotrichum acutatum and C. fragariae may cause anthracnose flower blight and fruit rot of strawberry. The influence of temperature and developmental stage of flowers and fruit on anthracnose susceptibility was determined using two strawberry clones. Plants with one to three inflorescences were inoculated with a conidial suspension (10^6 conidia/ml), incubated for 48 hr at 100% RH at 10, 15, 20 or 25 C, and then held in the greenhouse (20 C). The percentage of infected flowers and fruit inoculated at various developmental stages were determined 7, 14, and 21 days after inoculation (DAI). Open flowers, pink and red fruit were very susceptible to infection (53% infected 7 DAI), while green fruit and closed buds were more resistant (8% infected 7 DAI). The optimum incubation temperature for infection was 20 C. Little disease occurred following incubation at 10 C. More flowers and fruit were symptomatic at 7 DAI when inoculated with C. fragariae than when inoculated with C. acutatum; however, at 14 and 21 DAI there were no differences in disease due to fungal species.

VARIABILITY AMONG RABBITEYE BLUEBERRY CULTIVARS TO POST-HARVEST FRUIT ROTS. B. J. Smith, J. B. Magee, and C. L. Gupton, USDA-ARS, Small Fruit Res. Sta., Poplarville, MS 39470

Berries of 13 rabbiteye blueberry (Vaccinium ashei Reade) cultivars were harvested at 1 wk intervals for 4 wk and compared for development of fruit rots. At each harvest one group of 10 ripe, unblemished berries from each of 4 bushes of each cultivar was inoculated in the stem scar with a conidial suspension of the ripe rot fungus, Colletotrichum acutatum. Berries in a second group were not inoculated. Berries were incubated in a moist chamber at room temperature (25 C) for 5 days. Disease incidence for each berry was scored from 0=no symptoms to 3=severe symptoms. Following inoculation, the cultivars Premier (PR), Tifblue, Menditoo (MN) and Delite (DL) scored highest for ripe rot while Woodard, Centurion, Beckyblue (BK) and Bluebell scored lowest. While most uninoculated berries developed no symptoms, the most common diseases were ripe rot and Botrytis fruit rot (B. cinerea). Disease scores were highest for PR, BK, MN and DL. Botrytis fruit rot was most severe on BK, PR, Climax and DL, and ripe rot was most severe on MN, PR and Homebell.

EFFECTS OF THYMOL, A NATURALLY OCCURRING NEMATICIDE, ON SOIL MICROFLORA. A. Soler, R. Rodríguez-Kábana, G. Morgan-Jones, and J. A. McInroy, Department of Plant Pathology, Auburn University, Auburn, AL 36849-5409.

Previous experiments have shown the nematicidal properties of thymol, a phenolic compound produced by several plant families. The effects of this compound on soil microflora were studied under greenhouse conditions. Pots containing 6 kg of a sandy-loam soil from a cotton field were treated with thymol at rates of 0, 150, and 250 mg/kg soil. Soil samples were taken 2, 4, 6, 10, 20, and 40 days after treatment. Populations of bacteria, fungi, actinomycetes, and nematodes, as well as total biomass, were estimated at each sampling time. Populations of fungi and nematodes and total biomass were significantly lower in treated soils at each sampling time. In samples taken at 20 and 40 days after treatment, bacterial populations were significantly higher in treated soils. Qualitative changes in populations of fungi and bacteria were evident. Our results suggest that naturally occurring allelopathic compounds can be used to manage soil microbial populations, which may result in suppression of soil-borne phytopathogens.

USE OF SOIL SOLARIZATION AS A CROP MANAGEMENT TOOL TO REDUCE FOLIAGE DISEASES OF WATERMELON. C. Stevens[1], V. A. Khan[1], J. E. Brown[2], L. D. Ploper[2], P. Backman[2], D. J. Collins[2], and R. Rodriguez-Kabana[2]. [1]GWC Agric. Exp. Station, Tuskegee University, Tuskegee Inst. AL. 36088. [2]Alabama Agric. Exp. Station, Auburn University, Auburn AL. 36849.

Crimson Sweet watermelon seedlings were transplanted in 1991 to plots in Tuskegee that were solarized in 1988. Plants grown in solarized soil showed a reduction of Alternaria leaf spot (Alternaria cucumerina) and anthracnose (Colletotrichum lagenarium) 3 years after solarization. Percent leaves with Alternaria leaf spot, blighted leaves, number of lesions/leaf, and lesion size were significantly reduced by 64, 84, 87, and 57 percent, respectively. Percent foliage infected, number of stem lesions, percent fruits with anthracnose, and percent vines killed were reduced by 54, 69, 77 and 61 percent, respectively. Reduced foliage disease was associated with a shift in the bacterial microflora in the soil rhizosphere as the population of Bacillus and fluorescent pseudomonads tripled. This study indicated that solarization could be used as a new crop management option in an IPM program to reduce numbers of foliar fungicide applications.

BACTERICIDE RESISTANCE DETERMINANTS IN DIVERSE PHYLLOPLANE AND SOIL BACTERIA FROM ORNAMENTAL PEAR NURSERIES AND TOMATO FIELDS. G.W. Sundin, D. E. Monks, and C.L. Bender, Dept. of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

Bacteria were isolated from the phylloplane and soil of two ornamental pear nurseries and one tomato field on media containing copper or streptomycin. Copper bactericides were applied regularly and streptomycin only sporadically at the locations sampled. Results of dot blot (total DNA) and Southern (plasmid DNA) hybridizations indicated that a copper resistance (Cu^r) determinant previously cloned from Pseudomonas syringae pv. tomato was present in 25.2% of 115 Cu^r, gram-negative phylloplane isolates surveyed. However, this determinant was not detected in 120 Cu^r bacteria isolated from soil. The streptomycin-resistance (Sm^r) determinant from the broad-host-range plasmid RSF1010 was detected in 10.6% of 47 and 9.2% of 109 Sm^r, gram-negative phylloplane and soil isolates, respectively.

VARIATION IN THE RESPONSE OF CAMBIAL TISSUES TO INVASION BY CRONARTIUM QUERCUUM F. SP. FUSIFORME. C. H. Walkinshaw. USDA Forest Service, Box 5500, Pineville, LA 71360.

Pinus elliottii Englm. var. elliottii seedlings were inoculated with spore composites of 30-field isolates, or with single isolates. Stem specimens were fixed in FAA at 2, 6, 9 and 12 months after inoculation. Tissues were dehydrated, embedded in paraffin and sectioned at 10-15 microns. A variety of stains were used to distinguish hyphae and tissue damage. Severe damage occurred with loss of the cambium and death of initials. Cambial tissues in pine families that formed few galls generally displayed extensive necrosis and death of hyphae. A mild reaction occurred in susceptible pine families that only had a slight shifting of fusiform initials to accommodate fungal hyphae. A large variation in cambial reaction was also observed among pines that were inoculated with single field isolates. These variations in the cambium were similar to those reported previously for lesions in the outer cortex of slash pines.

TESTS OF DIFFERENTIAL TRANSMISSION OF THREE SPIROPLASMA CITRI LINES BY THE LEAFHOPPER, CIRCULIFER TENELLUS. A. C. Wayadande,

M. E. Shaw, and J. Fletcher. Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74078.

Three lines of Spiroplasma citri which differed in maintenance history were evaluated for their ability to be transmitted to turnips by the leafhopper, Circulifer tenellus. Log phase cultures were injected into C. tenellus late instar nymphs or young adults. ELISA results indicated that leafhoppers injected with BR3-T (maintained by leafhopper transmission in turnip) transmitted S. citri to 19 of 77 turnip test plants. None of the 72 or 84 plants exposed to leafhoppers injected with BR3-P (cells passed in culture over 130 times) or BR3-G (maintained in periwinkle by graft transmission > 8 years) were ELISA positive. All lines multiplied in leafhopper tissues, since insects were ELISA positive 14 d after injection but not immediately after injection. Results may be due to failure of BR3-P and BR3-G to overcome physical barriers in the leafhopper, or to loss of pathogenicity.

A Unique Genomic Sequence Allows the Specific Detection of the Tobacco Blue Mold Pathogen. M. D. Wiglesworth, W. C. Nesmith, C. L. Schardl, and M. R. Siegel. Department of Plant Pathology, University of Kentucky, Lexington, Kentucky 40546-0091.

A highly unique repetitive DNA sequence was isolated and cloned from random amplified polymorphic DNA (RAPD) of *Peronospora tabacina* Adam, the blue mold pathogen of tobacco. Characterization of this fragment revealed homology to *P. tabacina* but to no other downy mildew or Oomyceteous fungus that was tested. Additionally, this fragment was determined to be part of a highly repetitive DNA sequence that was ubiquitous in tested isolates of *P. tabacina*. Sequencing of this fragment indicated the length to be 232 bp. PCR oligonucleotides were designed and amplification of this sequence was achieved with amounts of DNA (1-10 fg) less than are contained in a single sporangiospore. Use of this technique enabled the detection of *P. tabacina* DNA in local lesions, systemic vascular infections, and other parts of plants even in the presence of other contaminating DNA. The use of this highly specific and reliable approach will prove valuable for national regulatory agencies, and for epidemiological and etiological studies of this and other fungal parasites.

Analysis of a naturally occurring epidemic of Alternaria blight of spurred anoda in a soybean field. X.B. Yang and D.O. TeBeest. Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville 72701.

Alternaria blight of spurred anoda caused by *Alternaria macrospora* occurred in a 31-hectare soybean field (350 x 850 m) in Arkansas in 1992. In two weeks, the disease spread throughout the field from foci first observed in early August. Field maps of soybean growth, weed density, and disease level were made. The weed infested the field with densities varying from 5 plants/m^2 to 27 plants/m^2 in sampled quadrants. Defoliation levels varied from 30% to 100% depending on distance and the direction from three disease foci. Dispersal gradients were determined by examining infection levels on leaves or on stems at 3-m intervals from a focus to 180 m away. Infection gradient for leaves was much flatter than that for stems. High incidence of rust on spurred anoda was also observed in the field. All weeds were killed by the end of August (soybean growth stage R4). The control of the weed by natural inoculum of an endemic disease in such a large area was associated with cool and rainy weather.

PCR AMPLIFICATION OF ARABIDOPSIS DNA USING CAMV-SPECIFIC PRIMERS. Yue-Lin Zhang and Ulrich Melcher, Dept. of Biochem. Mol. Biol., Oklahoma St. Univ., Stillwater OK 74078.

For replication cycles of pararetroviruses, such as cauliflower mosaic virus (CaMV), integration of proviral DNA in host chromosomes is not obligatory, but integration is required in retroviral replication. To test for CaMV DNA integration, total DNA was prepared from leaves of plants grown from seeds of CaMV-infected *Arabidopsis thaliana*. CaMV is not transmitted through *A. thaliana* seeds. Amplification was attempted with three pairs of CaMV PCR-primers. At low annealing temperatures, two primer pairs amplified DNA fragments from the test DNA and DNA of control plants. The fragments differed in size from those expected from CaMV DNA. Whether the products were due to non-specific amplification or to CaMV-like sequences in the genome of *A. thaliana* is under study. The experiments provide no evidence for integration of CaMV DNA into host chromosomes, but do not rule out such a possibility.