

The American Phytopathological Society

SOUTHERN DIVISION

Annual Meeting

February 6-9, 1983

ABSTRACTS

EFFECT OF TEMPERATURE AND MICROWAVE IRRADIATION ON THE VIABILITY AND MOISTURE CONTENT OF SCLEROTIA OF *SCLEROTIUM ROLFSSII*. M. A. Acra, S. F. Jenkins and E. Echandi. Dept. of Plant Pathology, North Carolina State University, Raleigh 27650.

Sclerotia of one isolate of *S. rolfssii* produced on oat grains in non-sterilized field soil were dried in incubators at various temperatures (20-50C) for either 2 or 4 days. Germination was determined on non-sterile soil using a 1% methanol assay. Both percent germination and fresh weight were decreased with an increase in temperature and time of incubation. Treatment of sclerotia with microwaves (2450 MHz) reduced the percent germination; this reduction was enhanced as the microwave power settings (10-100% of maximum power) or irradiation time (10-160 sec) were increased. When scarified sclerotia (shaken with sand for 45 min) were irradiated, they were contaminated with microorganisms to a greater extent than non-scarified sclerotia, and their germination on field soil was inhibited. There were no differences in fresh weight among the various microwave treatments, indicating that the irradiation did not affect viability of sclerotia by altering moisture content.

INFECTION OF GRAIN SORGHUM BY MAIZE DWARF MOSAIC VIRUS STRAIN B. J. D. Alexander and R. W. Toler, Department of Plant Sciences Texas A&M University, College Station, TX 77843.

Twenty-seven cultivars of grain sorghum were tested for susceptibility to infection by maize dwarf mosaic virus strain B (MDMV-B) by mechanical inoculation in the field and greenhouse. Eleven cultivars were determined by symptomology and serological testing to be susceptible to MDMV-B infection. These cultivars were also susceptible to infection by MDMV-A. RTx430, SA394 and (ATx623 x RTx430) developed severe redleaf symptoms and many of the infected plants were killed by MDMV-B infection. Symptoms of MDMV-B infection in the Rio cultivar were less severe than the redleaf symptoms caused by MDMV-A infection. MDMV-B symptoms in SC0175-14E, BTx623, Hegari (8165426), RTAM 428, SA 707B, RTx09 and RTx412 were approximately equal to or slightly worse than symptoms caused by MDMV-A infection. MDMV-B infected fewer accessions but in general was more severe on the plants it infected than MDMV-A.

LIQUID MEDIA FOR OOSPORE PRODUCTION BY *PYTHIUM ULTIMUM*. Teresa Arroyo and L.F. Johnson. Instituto Tecnológico de Costa Rica, San Carlos, Costa Rica, C.A., and Dept. of Entomology and Plant Pathology, Univ. of Tennessee, Knoxville, TN 37901 U.S.A., resp.

Oospore production was determined in 5 liquid media in petri dish culture. A 6-mm agar disk of *P. ultimum* from a PDA culture was placed in each dish containing 15-20 ml of media. Dishes were incubated in the dark at 17 C. At intervals of 7, 15, 22, and 30 days, most of the liquid in sample dishes was removed by pipetting and decanting, and numbers of oospores were determined microscopically. Oospores were produced in largest numbers in a minerals-lecithin-oil (MLO) medium (813 oospores/mm²) after 30 days. In comparison, oospores produced in corn meal (10 g/L), oat meal (35 g/L), V-8 cholesterol (Phytopath. 65:1094), and Kentucky bluegrass (Phytopath. 72:232) were 525, 404, 256, and 90/mm², resp. MLO medium contained (per L) 2 g NaNO₃, 1 g K₂HPO₄, 0.5 g MgSO₄·7H₂O, 0.5 g KCl, 10 mg FeSO₄ and 2.5 ml lecithin in soybean oil (U.S. Biochemical Corp., Cleveland, OH). Refined lecithin powder or soybean oil was not as effective for oospore production as was the unextracted lecithin in soybean oil.

K⁺ AND H⁺ TRANSPORT DURING THE HYPERSENSITIVE REACTION. M. M. Atkinson and J. S. Huang, Dept. of Plant Pathology, North Carolina State University, Raleigh, N. C. 27650.

K⁺ (86 Rb) and H⁺ transport was studied in suspension cultured

tobacco cells undergoing the hypersensitive reaction to *Pseudomonas pisi*. Within 90 min after inoculation, tobacco cells exhibited an increased efflux of K⁺ and a net uptake of H⁺. At pH 6.0 maximum fluxes of approximately 10 μmole K⁺ and 3.8 μmole H⁺/g (fresh weight) tobacco cells/h occurred between 2.5 and 3 h after inoculation. K⁺ uptake rates declined concurrently from about 1.0 to 0.1 μmole/g/h. K⁺ efflux from tobacco cells was highly dependent upon H⁺ uptake capacity: high external pH or the proton ionophore FCCP reduced efflux rates substantially while low external pH increased efflux rates. K⁺ efflux rates were only slightly reduced by high external K⁺ concentrations indicating that K⁺ efflux was not entirely passive. These results suggest the hypersensitive reaction proceeds through the activation of a K⁺/H⁺ exchange mechanism across the plasmalemma.

UNHARVESTED PEANUT PODS PROVIDE INOCULUM OF RHIZOCTONIA SOLANI. D. K. Bell and D. R. Sumner, Coastal Plain Experiment Station, Tifton, Georgia 31793.

Intact peanut pods were collected in February from a field harvested the previous September. Five cm deep layers of pods were placed at 0-5, 5-10 and 10-15 cm depths in 23 x 24 cm pots of heat treated (60 C, 30 min) soil and planted to Funks G-4507 corn and Bragg soybean. Plants were harvested after 4 weeks, and rated for root-hypocotyl disease index (RHDI, min 1-max 5). Isolations were made from lesions and anastomosis group (AG) of *Rhizoctonia solani* was identified. The RHDI averaged 2.0, 2.3 and 2.3 for corn from treatments with pods at the three respective depths, and for soybean the RHDI averaged 1.9, 3.4 and 2.6. The RHDI values for corn and soybean with pods at the 0-5 cm depth were not significantly (P=0.05) greater than the controls (1.3 and 1.5). The two remaining RHDI values for corn and soybean were greater than the controls. Sixty-seven and 47 isolates of *R. solani* AG-4 were isolated, respectively, from corn roots and soybean roots plus hypocotyls. No other AG were isolated.

SOYBEAN RESISTANCE TO ROOT-KNOT NEMATODE, *MELOIDOGYNE INCOGNITA* WARTELLEI GOLDEN AND BIRCHFIELD. W. Birchfield & B. G. Harville, Dept. Plant Path. & Crop Physiol., La. State Univ. Agric. Expt. Sta., USDA, ARS, and Dept. Agron., La. State Univ. Agric. Expt. Sta., Baton Rouge, LA 70803.

Wartell's root-knot nematode is a destructive soybean parasite, but knowledge on its differential effects on soybean varieties is limited. Twenty-eight soybean varieties/accessions, were field tested for resistance. Resistance was measured by nematode population build-up, and top and root host symptoms. Low-est nematode populations occurred on LA 78-17717, Braxton and LA 74-4656. Less chlorosis and necrosis of foliage and stems were observed on LA 75-1794, LA 75-1799, LA 77-10797, LA 77-10799, Braxton, Centennial, and Bragg. Lowest root galling occurred on LA 75-1794, LA 75-1799, LA 78-17738, Centennial, Bragg, LA 74-3854, and LA 77-10799. The most resistant varieties for grower trials are Bragg, Braxton, Centennial, and Forest. Davis and Mack soybean varieties were high susceptible to the nematode.

AMINOPEPTIDASE PROFILES OF *XANTHOMONAS CAMPESTRIS* PV. PRUNI. J. A. Bohac, A. J. Latham, and R. M. Cody. Ala. Agri. Exp. Stn., Auburn University, AL 36849.

The profiles of aminopeptidase activity were determined for 14 isolates of *Xanthomonas campestris* pv. *pruni*. These profiles represent the quantitative hydrolysis of 15 aminoacyl-β-naphthylamide substrates by the aminopeptidase enzyme. Activity was assayed by fluorescence released upon hydrolysis of substrate

and measured with a Model 111 Turner Fluorometer. No significant differences were observed in hydrolysis of amino acid substrates by specific isolates. Qualitative and quantitative differences were shown among isolates for amino acid substrates. Most isolates hydrolyzed alanine, arginine, glutamine, glycine, leucine and lysine, but did not hydrolyze cystine, isoleucine, serine and valine. Isolates differed in hydrolysis of methionine, phenylalanine and tyrosine. Virulent isolates hydrolyzed proline, avirulent did not. These differing patterns of hydrolysis can be used to construct aminopeptidase profiles that distinguish among *X. campestris* pv. *pruni* isolates.

INDIGENOUS WEEDS AS RESERVOIRS OF TOMATO SPOTTED WILT VIRUS IN LOUISIANA. W. P. Bond, H. K. Whitam, and L. L. Black. Dept. Bio. Sciences, Southeastern La. Univ., Hammond, 70402; La. Coop. Exten. Serv., La. State Univ.; and Dept. Plant Path. & Crop Physiol., La. State Univ. Agric. Expt. Sta., Baton Rouge, 70803, respectively.

Tomato spotted wilt virus (TSWV) was first identified as a serious problem of solanaceous crops in Louisiana in 1972. Since that time, TSWV has become increasingly important resulting in severe losses in these crops. In 1982, weeds found growing in the vicinity of tomato, tobacco, and pepper crops were assayed for TSWV to evaluate them as possible TSWV reservoirs. Plants representing nine genera indigenous to Louisiana were found to be naturally infected with TSWV based on the reaction of selected indicator species, electron microscopy of thin sections, serologically specific electron microscopy, and serology in agar gel diffusion tests. Weed hosts identified include *Amaranthus spinosus*, *Lactuca* sp., *Plantago rugelii*, *Ranunculus* sp., *Rudbeckia amplexicaulis*, *Solanum carolinense*, *Sonchus* sp., *Taraxicum* sp., and *Verbena brasiliensis*.

YIELD REDUCTION OF WHITE CLOVER BY VIRUS INFECTION. C. Lee Campbell and J. W. Moyer, Department of Plant Pathology, North Carolina State University, Raleigh 27650.

The effect of virus infection on yield of 'Tillman' white clover was assessed by planting 20 rooted cuttings of each of 6 randomly selected clover clones in Cecil clay soil near Raleigh, NC in April 1981. Assays on *Chenopodium quinoa* on 23 April, 26 May and 26 August 1981 and 26 April and 17 September 1982 indicated that 0, 20, 34, 63, and 103 plants, respectively, of the original 120 plants were infected. The presence of alfalfa mosaic virus, clover yellow vein virus, and peanut stunt virus was confirmed by enzyme-linked immunosorbent assay. Yield was taken 3 times in 1982 on each plant. Average yields of virus-infected plants (based on the 26 April 1982 *C. quinoa* assay) at the third harvest (8 July) were 29.7 - 57.3 percent less than for healthy plants. These results further signify the importance of viruses in reducing yields of white clover under field conditions.

RH-5781F: A VERSATILE NEW AGRICULTURAL FUNGICIDE. H. E. Carley. Rohm and Haas Company, Independence Mall West, Philadelphia, PA 19105.

RH-5781F is a new broad-spectrum systemic agricultural fungicide having both curative and residual protectant properties. The fungicide is particularly active against the ascomycetes, basidiomycetes, and non-sclerotial forming deuteromycetes. RH-5781F may be applied as a seed, soil, water, foliar, or post-harvest treatment. Particular utility has been identified for the control of smuts (*Ustilago* spp.), bunts (*Tilletia* spp.), powdery mildews (*Erysiphe* spp.), rust (*Puccinia* spp.), and seedling, foliar, and head diseases incited by *Fusarium*, *Helminthosporium*, and *Septoria* spp. in small grains. Foliar peanut diseases, namely; early leafspot (*Cercospora arachidicola*), late leafspot (*Cercosporidium personatum*), and rust (*Puccinia arachidis*) have been adequately controlled in limited field trials. RH-5781F has also provided control of apple diseases such as scab (*Venturia* sp.), powdery mildew (*Podosphaera* sp.) and rust (*Gymnosporangium* spp.).

A TECHNIQUE FOR SCREENING CANTALOUPE SEEDLINGS FOR ALTERNARIA CUCUMERINA RESISTANCE. B.E. CARMODY¹, M.E. MILLER² and M.P. GRISHAM¹. ¹Dept. of Plant Sciences, Texas A&M Univ., College Station, TX. 77843, ²Texas Agricultural Experiment Station, Weslaco, TX. 78596.

Five cantaloupe cultivars were evaluated for resistance to *Alternaria cucumerina*. In the field, number and size of foliar lesions were recorded weekly 8-15 wk after planting. In the laboratory, seedlings were inoculated with *A. cucumerina* in either the cotyledon or first leaf stage, and placed in humidity chambers for 18 hr. Optimum spore concentrations and temperatures for infection were 5.5 x 10³ spores/ml and 21C and 3.0 x 10³ spores/ml and 27C for cotyledon and first leaf stages, respectively. Lesion numbers and size were recorded 5 days after inoculation. A comparison of laboratory and field data shows that the most susceptible cultivars in the laboratory (those with the greatest number and size of lesions) were also the most susceptible in the field. Results indicate that a seedling screening technique can be used to screen cantaloupe for resistance to *A. cucumerina*.

A MIXED PLANT VIRUS INFECTION LEADS TO LOSS OF VIRUS HOST-TISSUE SPECIFICITY. R. J. Carr and K.S. Kim. Department of Plant Pathology, PS-217, University of Arkansas, Fayetteville, AR. 72701.

The ultrastructural responses in systemic mixed infections by an RNA virus, the legume strain of tobacco mosaic virus (CP-TMV), and a DNA virus, bean golden mosaic virus (BGMV), in bean leaf tissue were investigated by means of thin section electron microscopy. The mixed infection resulted in the appearance of particles of both viruses and cytopathological changes characteristic of each virus in the same cell, indicating that individual host cells are capable of accommodating both viruses by synthesizing their respective progeny nucleoproteins, RNP and DNP. In addition, the mixed infection caused a loss of BGMV host-tissue specificity; the particles and characteristic cytopathology of BGMV, which were restricted to phloem associated cells in single infection, were found regardless of the cell type in mixed infection. This phenomenon thus resulted in an increased number of BGMV-infected cells and could, therefore, be used as a means of increasing virus titer within this host.

TEMPERATURE, NUTRITION, AND MYROTHECIUM LEAF SPOT OF DIEFFENBACHIA. A. R. Chase and R. T. Poole. University of Florida, Agricultural Research Center-Apopka, 32703.

The influence of air temperature and host nutrition was tested on a leaf spot of *Dieffenbachia maculata* 'Perfection' caused by *Myrothecium roridum*. Plants were treated with slow release Osmocote (19-6-12) for 6 mo at the following rates: 1120, 2240, 3360, 4480, 5600, 6720, 7840, and 8960 kg N/ha/yr. Plant grades (height, foliage and root quality) and tissue samples were taken prior to inoculation of artificially wounded leaves with 1 x 10⁶ conidia/ml of *M. roridum*. Optimum plant quality was achieved at 2240 and 3360 (recommended rate) kg N/ha/yr. Disease severity (no. lesions) was also highest at these levels. There was a correlation between bench position and lesion number, so temperature effects were studied. Plants were grown in a growth chamber (3360 kg N/ha/yr) at 32, 29, 27, 24, 21, and 18 C for 2 wk prior to inoculation as above. Disease severity was lowest at 32 C and reached a maximum at 21-24 C and decreased somewhat at 18 C. Other tests confirmed the importance of temperature and nutrition in development of *Myrothecium* leaf spot.

NIROSPORA STOLON ROT OF ST. AUGUSTINEGRASS RELATED TO SUMMER DROUGHT CONDITIONS. P. F. Colbaugh, Texas Agricultural Experiment Station, Texas A&M University Research and Extension Center at Dallas, Dallas, TX 75252.

Texas landscapes were severely affected by an extended period of drought during the hot summer months of 1980. Large areas of poorly developed and dying St. Augustinegrass on residential landscapes were observed from June to September. Field studies of Dallas area homelawns indicated a common occurrence of a stolon die-back condition associated with dark brown-black lesions on stolon internodes. Laboratory observations and isolations from infected stolon internodes associated severe disease activity with a *Nigrospora* sp. tentatively identified as *N. sphaerica* (Sacc.) Mason. Inoculation studies demonstrated pathogenicity of the fungus on stolon internodes with greatest lesion activity at 27 C. Disease activity by the fungus was most severe on closely clipped or thinned turf where stolon internodes were exposed to desiccation and high temperature injury during the summer.

ROSE PETAL BLIGHT CAUSED BY ALTERNARIA ALTERNATA (FRIES) KEISSLER. P. F. Colbaugh, Texas Agricultural Experiment Station, Texas A&M University Research and Extension Center at Dallas, Dallas, TX 75252.

Conidial infection on rose petals and blossom blighting of flowers are commonly attributed to disease activity caused by *Botrytis cinerea*. Field and laboratory observations during the past two years indicate *Alternaria alternata* can also cause a severe blossom blight of field-grown roses. Petal infections and blossom blighting activity were observed from June through September on popular varieties of field-grown floribunda and hybrid tea roses in North Central Texas. Severe disease activity was most commonly observed following periods of rainfall during the summer. Inoculation studies with conidial suspensions of *A. alternata* isolated from blighted flower petals confirmed pathogenicity of the fungus on flowers of field-grown roses. Blighted flower petals and rose hips were shown to be primary sources of conidial inoculum for initiation of disease activity by the fungus.

PRESENCE AND PREVALENCE OF SOME VIRUSES IN COMMERCIAL GROWN COWPEAS IN SOUTH CAROLINA. M. H. Collins, J. F. Murphy, W. Witcher, and O. W. Barnett, Jr., Department of Plant Pathology and Physiology, Clemson University, Clemson SC 29632

A survey was conducted in South Carolina to determine the presence and prevalence of six viruses in cowpea. ELISA and Ouchterlony gel double-diffusion were used in identification. Blackeye cowpea mosaic virus (BICMV), cowpea chlorotic mottle virus (CCMV) and cucumber mosaic virus (CMV) were detected in 1981. These three viruses along with cowpea severe mosaic virus (CSMV) and southern bean mosaic virus-cowpea strain (SBMV-C) were detected in 1982. Cowpea mosaic virus (CPMV) was not detected. Mixed infections of these viruses were also present including the combination of BICMV and CMV which results in the disease, cowpea stunt. BICMV and CMV were by far the most common throughout the state. Both viruses are seed and aphid transmitted, and when present in combination, significantly suppress growth and yield of cowpeas.

EFFECTS OF METALAXYL ON MELOIDOGYNE INCOGNITA AND BLACK SHANK IN TOBACCO. A. S. Csinos and N. A. Minton, Plant Pathology Dept., University of Georgia and USDA, SE, ARS, Coastal Plain Experiment Station, Tifton, Georgia 31793

The effects of metalaxyl on populations of *Meloidogyne incognita* larvae and subsequent root galling were evaluated. Two tests which were designed to evaluate metalaxyl in combination with contact and fumigant nematicides on disease caused by *Phytophthora parasitica* var. *nicotianae* (PPN) in *Nicotiana tabacum* (NC2326) were located in separate fields, one heavily infested and one lightly infested with the fungus. Both areas were heavily infested with *M. incognita*. In both areas larval populations and root-knot gall ratings (RKGR) were higher in plots treated with metalaxyl alone than in untreated plots. All treatments of nematicides reduced larval populations and RKGR. Metalaxyl reduced disease caused by PPN. These data suggest that metalaxyl may, in a fashion yet undetermined, increase *M. incognita* populations in tobacco, irrespective of the levels of infestation of PPN.

Changes in morphology and virulence of *Septoria nodorum* during passage through wheat and barley. Barry M. Cunfer, Department of Plant Pathology, University of Georgia, Georgia Station, Experiment, GA 30212.

Biotypes of *Septoria nodorum* from wheat and barley have distinctive colony morphologies, are virulent only to the original host, and differ in fluorescence under near UV light. Isolates from each host were inoculated onto the opposite host. Passages through the opposite host were continued up to 5 times. After 2-4 passages of the wheat biotype through barley, both biotypes were recovered among single spore colonies isolated from inoculum suspensions prepared from conidia sporulating on leaves. After an additional passage, only the barley biotype was recovered. Symptom severity increased on barley during each passage. Original barley biotypes from barley and 2 barley biotypes (recovered from wheat biotypes) were passed through wheat 4-5 times. Only the barley biotype was recovered. Selection among heterokaryons during passage through barley is a likely explanation for selection of the barley biotype from the wheat biotype.

DETECTION OF RATOON STUNTING DISEASE OF SUGARCANE BY METAXYLEM AUTOFLUORESCENCE. K. E. Damann, Jr., Dept. Plant Path. & Crop Physiol., La. State Univ. Agric. Expt. Sta., Baton Rouge, LA 70803.

Treatment of cross sections of mature sugarcane internodes with 0.1M NH_4OH induced autofluorescence of vascular bundles when viewed with an epifluorescence microscope. The red fluorescence in cross sections of healthy tissues was confined to the phloem and xylem cap cells of the vascular bundles while cross sections of ratoon stunting diseased tissues exhibited bright red fluorescence of metaxylem walls. Young shoots from nodes of diseased stalks also exhibited red autofluorescence of metaxylem vessels indicating that the disease specific response occurs rapidly in young actively growing tissues.

SUPPRESSION OF CRICONEMELLA XENOPLAX BY THE FUNGUS HIRSUTELLA RHOSSILIENSIS. Eayre, C. G., Jaffee, B. A., and Zehr, E. I. Dept. of Plant Pathology and Physiology, Clemson University, Clemson, SC 29632

Greenhouse experiments were conducted to determine if *H. rhossiliensis* (Hr) suppresses *C. xenoplax* (Cx) populations. One-month-old Nemaguard peach seedlings were planted in plastic pots containing 1425 cm autoclaved soil plus Hr inoculum (75 cm^3 vermiculite moistened with V-8 broth and infested with Hr 1 mo earlier). Seedlings grown in soil plus autoclaved Hr inoculum were controls. One wk after planting, each pot was infested with 33 Cx/100 cm^3 soil. In one test, Hr-infested pots contained 947 and 1457 Cx/100 cm^3 soil and control pots contained 1695 and 7520 Cx/100 cm^3 at 12 and 16 wk after planting, respectively. In a second test, Cx/100 cm^3 soil averaged 5, 25, 33, 130, 392, and 233 in Hr-infested pots; and 10, 80, 150, 171, 765, and 1660 in control pots 4, 6, 8, 10, 12, and 14 wk, respectively.

COMPARISON BETWEEN STRAINS OF PSEUDOMONAS SYRINGAE PV. SYRINGAE IN VIRULENCE AND HOST SPECIFICITY. Eike Endert and D.F. Ritchie, Dept. of Plant Pathology, North Carolina State University, Raleigh, NC 27650.

Leaves on rapidly expanding shoots of peach, apricot, and plum cultivars were inoculated with strains of *P. s. pv. syringae* isolated from three hosts. Comparison of numbers of lesions indicated that these strains varied more in general levels of virulence than in specific infection capabilities. Fruitlets and seedlings were used as bioassays to evaluate their usefulness in detecting virulence in 15-20 strains of *pv. syringae* and other pathogens. For pathogenicity tests, immature stone fruitlets proved useful, whereas apple and pear hypocotyls were sensitive to relative levels of virulence. Bioassay methods varied in their usefulness for prediction of virulence in peach shoots. A technique was developed using cotyledon punctures in peach seedlings to detect pathogenicity in strains from a wide range of hosts. Both greenhouse and laboratory inoculations indicated *P. s. pv. syringae* possessed wide host ranges and lacked host-specificity. Furthermore, strains from other hosts were pathogenic to peach.

EFFECT OF TILLAGE SYSTEM AND IRRIGATION ON POPULATION DENSITIES OF NEMATODES IN FIELD CORN. B. A. Fortnum and D. L. Karlen. Dept. of Plant Pathology and Physiology, Clemson University, Box 271, Florence, S. C. 29503 and USDA - ARS, Coastal Plains Soil and Water Conservation Research Center, Box 3039, Florence, S. C. 29503

Numbers of plant-parasitic nematodes were monitored for 18 months in irrigated and non-irrigated corn grown under several tillage systems, including: conventional, minimum, and minimum tillage with 60 or 90 percent of the crop debris removed. Populations of *M. incognita* or *S. brachyurum* (irrigated plots) and *S. brachyurum* (non-irrigated plots) were higher in minimum tillage. Corn yields in all non-irrigated plots were increased during the 1982 growing season by the application of carbofuran (2.24 kg ai/ha) but nematode numbers were unaffected by nematicide application. No yield increases were observed following nematicide application in 1981.

A PARTICLE OF UNIQUE MORPHOLOGY ASSOCIATED WITH A DISEASE OF ROSE IN NORTHWEST ARKANSAS. R.C. Gergerich, K.S. Kim, and E.W. Kitajima. Dept. of Plant Pathology, PS 217, University of Arkansas, Fayetteville, AR 72701.

Witches' broom or rosette of rose has been reported by F. J. Crowe in Eastern Kansas and Western Missouri (Phytopathology 72:976). We report here that similar symptoms are present in hedgerows and commercial roses in Northwest Arkansas. The most

striking and characteristic symptoms are the bright red pigmentation of stunted leaves and buds on the tips of infected canes and mottled and deformed lower leaves. Infected canes eventually died. Thin section electron microscopy of both pigmented and mottled tissues revealed the consistent presence of unusually large virus-like, spherical particles 120-150 nm in diameter. The particles occurred singly or as groups of several particles only in the cytoplasm and associated with the endoplasmic reticulum and/or microbodies. Each particle consisted of an outer wall surrounding a less electron-dense center. The outer wall, 16 nm in thickness, had two electron-dense layers separated by an electron-lucent space.

IDENTIFICATION OF SUGARCANE MOSAIC VIRUS STRAIN H OCCURRING IN COMMERCIAL GRAIN SORGHUM IN TEXAS. Laura Giorda, R. W. Toler and R. Miller, Department of Plant Sciences, Texas A&M University, College Station, TX 77843, and Cargill Sorghum Research, Plainview, TX 79072.

Sugarcane mosaic virus (SCMV) was found to produce severe symptoms on commercial grain sorghum in Texas in 1980. The SCMV isolate infected sorghum resistant to maize dwarf mosaic virus strain A (MDMV-A). Identification of this isolate was based on host range including johnsongrass, symptomology on 26 sorghum accessions, morphology, serology and immunoelectron microscopy. The sorghum isolate was purified and the homologous antiserum produced. Sequential or simultaneous inoculation of 26 sorghum accessions with SCMV-H and MDMV-A gave no cross protection but were synergistic in symptom expression. The SCMV isolate found naturally infecting sorghum in Texas was strain H (SCMV-H). PAG 3387 was found to be a differential host for MDMV-A and SCMV-H.

CONTROL OF BACTERIAL BLIGHT AND CANKER OF COWPEA WITH BACTERICIDES. R. D. Gitaitis, Plant Pathology Department, University of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793

Cupric hydroxide (1.2 kg ai/ha) and copper ammonium carbonate (0.65 kg ai/ha), commonly used bactericides, were evaluated separately and in combination with manganous ethylenebisdithiocarbamate (2.2 kg ai/ha) for control of bacterial blight and canker of cowpea caused by *Xanthomonas campestris* pv *vignicola*. Treatments were begun on Mississippi Silver cowpeas after plant emergence and continued weekly until one week prior to harvest. All treatments significantly reduced leafspot severity (33% in nontreated plots versus 2% as highest level of severity among treatments) and canker incidence (32% in nontreated plots versus 0 in all treatments). Yield of whole pods was increased from 4261 kg/ha in nontreated plots to a high of 6116 kg/ha in treated plots. In spite of the excellent disease control, high levels (10^{-5} dilution end point) of seed-borne *X. campestris* pv *vignicola* were detected in all treatments, including symptomless plants.

EVALUATION OF RESISTANCE IN TOMATO TRANSPLANTS TO *PSEUDOMONAS SYRINGAE* PV. *SYRINGAE*. R. D. Gitaitis, Plant Pathology Dept., C. A. Jaworski, USDA, ARS, and S. C. Phatak, Horticulture Dept. Coastal Plain Exp. Stn., Univ. of GA., Tifton, GA 31793

A leafspot of tomato transplants caused by *Pseudomonas syringae* pv. *syringae* (PSS) has been a problem for the disease-free certification program in Georgia. Unlike bacterial speck caused by *P. syringae* pv. *tomato*, (PST) this disease does not appear to be a major threat to the tomato industry. However, its relative effect on different cultivars was unknown. Consequently 20 commercial cultivars of tomato transplants in replicated field plots were evaluated for their response to PSS during a natural epidemic in southern Georgia. Veevro, Peto 95, and Hunt 304 were highly susceptible, whereas significant levels ($P=0.01$) of resistance occurred in Campbell 28, Heinz 318, and Ohio 7663. Severity ratings for plants infected with PSS corresponded closely to those infected with PST in a previous study.

STUDIES OF THE SPORE LIBERATION MECHANISM OF THE PEACH SCAB ORGANISM *CLADOSPORIUM CARPOPHILUM*. T. R. Gottwald, USDA-ARS, P.O. Box 87, Byron, GA 31008-0087

Conidial discharge of *Cladosporium carpophilum* from heavily diseased peach fruits was studied under controlled relative humidity (RH), temperature, wind speed and infrared radiation (IR). As RH decreased from near saturation to 40%, spore

release was minimal, but further decreases stimulated considerable spore discharge which was enhanced by IR (>40 microeinsteins $M^{-2} Sec^{-1}$). Sustained periods of constant RH $<40\%$ also favored spore release but less than accompanying RH changes. Spore release was stimulated by short IR exposures (Circa 1 min) and brief RH changes of 2 min duration. Spore release at low RH was increased by vibration, created by dropping a 50 g weight 5 cm onto the specimen chamber, especially when specimens were exposed to IR.

DIFFERENTIAL RESPONSES OF *RHIZOCTONIA SOLANI* ISOLATES IN VITRO TO SELECTED FUNGICIDES. M.P. Grisham, Department of Plant Sciences, Texas A&M University, College Station, TX 77843

Five registered and two experimental fungicides which are effective against *Rhizoctonia* diseases were incorporated into potato dextrose agar plates at either 1 or 10 ppm. Seven isolates of *Rhizoctonia solani* from six gramineous hosts were seeded on the different fungicide plates. Percent inhibition of radial growth was recorded daily. Isolate by fungicide interaction was highly significant. Iprodione at 10 ppm was consistently either the most or second most inhibitory fungicide for all except a rice sheath blight isolate, which was inhibited the least by this fungicide. PCNB was one of the most inhibitory fungicides against all isolates except a ryegrass damping-off and the rice sheath blight isolate. CGA 64251 inhibited these two isolates more than any of the other isolates tested. OAC 3890 and chlorothalonil were effective inhibitors of all isolates, while fenerimol and triadimephon were intermediate in their inhibition of hyphal growth.

OCCURRENCE OF *SCLEROTIUM ROLFSSII* ON PREVIOUSLY UNREPORTED WEED HOSTS: *ELEUSINE INDICA*, *DACTYLOCTENIUM AEGYPTIUM*, *CYPERUS ESCULENTUS*, AND *C. ROTUNDUS* IN NORTH CAROLINA. R. S. Gurkin and S. F. Jenkins, Dept. of Plant Pathology, North Carolina State University, Raleigh 27650.

During the summer of 1982 we found *Sclerotium rolfsii* on goosegrass (*Eleusine indica*) and crowfootgrass (*Dactyloctenium aegyptium*) growing in carrot and cucumber plots and on yellow nutsedge (*Cyperus esculentus*) and purple nutsedge (*C. rotundus*) in carrot plots on the Horticultural Crops Research Station in Clinton, NC. Sclerotia were most numerous on goosegrass, occurring on upper and lower leaf blades as well as under the sheaths of drying blades. Mycelia occurred on upper and lower surfaces of leaf blades, inner and outer surfaces of leaf sheaths, and on stems (culms). These four previously unreported weed hosts of *S. rolfsii* are abundant in eastern North Carolina and may be important in increasing inoculum levels of *Sclerotium rolfsii* in cropland.

INFLUENCE OF TEMPERATURE & PLASMOLYSIS ON HMT-TOXIN INDUCED CELL DEATH: Martha C. Hawes, Department of Plant Pathology, University of Kentucky, Lexington, Kentucky 40546

Root cap cells from corn with Texas male sterile (Tms) cytoplasm are much more sensitive to HMT-toxin, the pathotoxin produced by *Helminthosporium maydis*, race T, than cells with normal (N) cytoplasm. Isolated corn root cap cells, which can survive for weeks after detachment from the root, were used to assay HMT-toxin. Each root yielded 3000-4000 cells, which were 98-100% viable, as judged by fluorescein diacetate. Toxin-induced cell death was highly temperature-dependent. At 35°C, 5 ng/ml HMT-toxin began to kill Tms cells within 6-8 hours, and 50 ng/ml or more caused 100% cell death within 10-12 hours. At least 50 ug/ml was required to kill N cytoplasm corn root cap cells. The rate of cell death was influenced by cell concentration, but plasmolysis did not influence HMT-toxin's lethal effects. Corn root cap cells provide a simple, sensitive, quantitative assay for HMT-toxin.

Sudden Death Syndrome of Soybean-A Disease of Unknown Etiology. Marc C. Hirrel, Dept. of Plant Pathology and SEREC, University of Arkansas, P. O. Box 3508, Monticello, AR 71655.

A serious and recurring problem of unknown etiology is reducing yields of soybeans in high production areas of east central Arkansas. External symptoms in the field are similar to those of Brown Stem Rot; however, internal symptoms are quite different. The most significant difference is the lack of any pith discoloration. A reddish-brown vascular discoloration does develop but is quite uniform; no streaking patterns de-

velop. The distribution pattern in the field strongly suggests a soil-borne problem. Symptoms are first noticed shortly after flowering, near R3-R4 and continue to develop through maturity. If symptoms develop before R6 there is a strong likelihood that complete defoliation and pod abortion will occur in 3-4 weeks. As yet, isolation of the causal agent and its pathogenic confirmation has not been completed. Graft transmission from discolored xylem tissues has also failed to reproduce symptoms.

DIFFERENTIAL NATURAL INFECTION OF COWPEAS SUSCEPTIBLE TO SOUTHERN BEAN MOSAIC VIRUS. H. A. Hobbs and C. W. Kuhn, Dept. of Plant Pathology, Univ. of Georgia, Athens, GA 30602.

The natural spread of southern bean mosaic virus (SBMV) was studied in six cowpea lines: three susceptible (California Blackeye, Knuckle Purple Hull, Coronet), one moderately resistant (Early Pinkeye), one resistant (Iron), and one highly resistant (PI 186465). Natural spread of SBMV was studied by planting all six lines on each side of a central row of California Blackeye inoculated with virus. After typical SBMV symptoms were obvious on uninoculated susceptible plants, leaf samples were taken from each plant (100/line) and tested for SBMV via the enzyme-linked immunosorbent assay. Percentages of infection were as follows: California Blackeye-86, Knuckle Purple Hull-37, Coronet-23, Early Pinkeye-2, PI 186465-2, Iron-0. Presumably beetles were responsible for field transmission. The difference in infection rates among the susceptible lines could be due to preferential beetle feeding or to some plant factor affecting the infection process.

CASHEW BLOSSOM DROP IN BELIZE. J. P. Hollis, Dept. Plant Path. & Crop Physiol., La. State Univ. Agric. Expt. Sta., Baton Rouge, LA 70803.

The cashew, *Anacardium occidentale* L., domesticated and grown commercially in Brazil, India, and Kenya is native to Belize, where, as a wild plant, its nut yields result from unknown environmental complexes acting over previous years. Blossom drop caused by *Botrytis cinerea* Pers., discovered in March, 1979, results in 100 percent petal loss. A disease syndrome which follows blossom drop, manifests wilting and browning of new petals and necrosis of panicle branches; its etiology is unknown. Nut production on diseased panicle branches is reduced more than 95 percent. *B. cinerea* is a natural pinching agent in the first stage of the wild plant disease complex reducing nut set and assisting species survival by balancing nutritional supply and demand. Formation of new flowers on diseased panicles in May 1982, induced by application of fungicide in April 1982, supports a view of fungal inhibition of flower formation. Cumulative experience in Belize suggests no simple relation in cashew between flower formation/survival and nut yield.

RELATION OF PHYTOPATHOLOGICAL RESEARCH TO FUNDING SOURCES. J. P. Hollis, Dept. Plant Path. & Crop Physiol., La. State Univ. Agric. Expt. Sta., Baton Rouge, LA 70803.

The first 75 years American Phytopathological Society members encountered two major improvements: introduction of statistics by Fisher for objective assessment of data and progress in discriminating ability of workers themselves by use of the Horsfall-Barratt grading system. A third opportunity for marked enhancement lies in definition of research capital. Plant pathology was public funded from 1908-40; cause and effect relations were rewarding to all parties. After 1950 public funding of basic research rose into the 1960s, then declined; private funding increased in two areas: (a) mutual funds supplied by growers and politicized federal funding in crops have maintained status quo while reducing researchers to technicians and lobbyists; (b) venture capital in funding of both universities and companies such as Plant Genetics, Inc., Davis, CA is seeking new things, and upgrading research and opportunities in plant pathology.

DEVELOPMENT OF FUSARIUM WILT ON TEN WATERMELON CULTIVARS GROWN IN A FOUR-YEAR MONOCULTURE. D. L. Hopkins and G. W. Elmstrom Agricultural Research Center, University of Florida, Leesburg, FL 32748

Ten watermelon cultivars representing various levels of Fusarium wilt resistance were compared in a four-year monoculture. In the first year there was little wilt and yields were good with all cultivars. In the second year the highly

resistant cultivars, Calhoun Gray and Smokylee, had the least wilt and, along with the moderately resistant Crimson Sweet, had significantly higher yields than the other cultivars. There was no yield from the susceptible Florida Giant. Crimson Sweet, Calhoun Gray, and Smokylee were similar in the third year. In the fourth year Crimson Sweet had the least wilt and a significantly higher yield than any other cultivar. Generally categorized as moderately resistant, Crimson Sweet appeared to have a type of resistance which held up better in a monoculture than that of the highly resistant cultivars. This indicates the involvement of different resistance genes and that the mechanism of resistance might vary.

SCREENING SORGHUM FOR RESISTANCE TO BACTERIAL STRIPE AND STREAK M.L. Howell, and R.A. Frederiksen, Department of Plant Sciences Texas A&M University, College Station, 77843

In the field the best method for inoculating *Sorghum bicolor* (L.) Moench with *Pseudomonas andropogonis* (E. F. Smith) Stapp (PA) and *Xanthomonas campestris* pv *holcicola* (Elliot) Dye (XH) is by spraying 7-leaf plants with an aqueous suspension of the bacteria plus carborundum at 80-100 psi. The inoculation is made in the evening using an inoculum density of 10^9 cells/ml. For greenhouse inoculation by PA ultra-low volume spray application of a 10^8 cells/ml aqueous suspension of bacterial affords differential disease reactions on the 7-leaf plants. Two-leaf seedlings did not develop bacterial stripe (PA) at 22C but did develop bacterial streak (XH). Sorghum breeding materials consistently showing resistance to bacterial stripe include BTx 3197 and QL3 (India) while the lines CS3541 and Tx378 have consistent resistant reactions to bacterial streak.

CONTROL OF FRUIT ROTS OF PICKLING CUCUMBERS WITH FUNGICIDES APPLIED WITH CHEMIGATION. S. F. Jenkins, Dept. of Plant Pathology, North Carolina State University, Raleigh 27650.

Fruit rots of pickling cucumbers have caused significant losses in the Southeastern United States for many years. Belly rot or Rhizoctonia rot was significantly controlled ($P=0.05$) with captofol at 3.2 lb a.i./A when one application was applied with 0.1 acre-inch irrigation water or applied as a spray broadcast on the soil surface of plots inoculated with *Rhizoctonia solani*. A sprills (80 Sprills) formulation of captafol was as effective as the flowable (4F) in the control of belly rot. Chlorothalonil (2.25 lb a.i./A) also controlled the disease. Cottony leak was significantly controlled ($P=0.05$) with metalaxyl at 0.125, 0.25, and 0.5 lb a.i./A in one application at early bloom with 0.1 acre-inch irrigation water or as a spray broadcast on the soil surface of plots inoculated with *Pythium aphanidermatum*. Metalaxyl also controlled cottony leaf when applied as a spray in a 12-inch band over the row at seeding.

LIGNITE AND STILLAGE, A POTENTIAL DELIVERY SYSTEM FOR APPLICATION OF BIOCONTROL AGENTS TO FIELD CROPS. R. W. Jones, R. E. Pettit, & J. M. Sweeten, Department of Plant Sciences, and Department of Ag. Engineering, Texas A&M Univ., College Station, TX. 77843.

Successful exploitation of biological control agents for suppression of soil-borne pathogens is often limited due to a lack of a practical substrate and delivery system for their application. Seed coating often lacks persistence. Organic amendments require large carrier volumes. Fluid drilling with gels appear impractical for field crops. Several low cost substrates and carriers for *Gliocladium virens* have been tested. Low grade lignite (L), ground to a granular size and thin liquid stillage (S), a by-product of alcohol production, is being compared in combinations with diatomaceous earth (D) and molasses (M). Combinations include L+S; L+M; D+S; D+M. Results indicate that stillage provides an ideal growth medium. Lignite provides good absorption of stillage and suitable weight and size for delivery by present farm equipment. Greenhouse and field plot studies are underway to evaluate control.

THE ROLE OF *PYTHIUM SPINOSUM* IN THE FUNGAL COMPLEX CAUSING THE WATER-MOLD DISEASE OF WATER-SEEDED RICE. Podila Gopi Krishna & M. C. Rush, Dept. Plant Path. & Crop Physiol., La. State Univ. Agric. Expt. Sta., Baton Rouge, LA 70803

The predominate disease in water-seeded Louisiana rice is water-mold, caused by a complex of several aquatic phycomycetes. Germinating seed are rotted and seedlings are weakened or killed by

these fungi resulting in losses through reduced density, irregular stands and poor growth of infected seedlings. *Pythium dissotocum* and *Achlya klebsiana* were reported as the primary pathogenic components of the disease complex. Recently *Pythium spinosum* was isolated from rotted seeds and rice field soil. *Pythium spinosum* is differentiated from *P. dissotocum* by the presence of oogonial spines and the absence of zoospores. Pathogenicity tests were conducted in growth chamber tests simulating field conditions. Five rice cultivars were tested for susceptibility to *P. spinosum* alone or in complex with *P. dissotocum* and *A. klebsiana*. *P. spinosum* caused typical water-mold damage and is considered to be part of the fungal complex causing the water-mold disease of rice seedlings.

FUNGICIDES AND MORTIERELLA FOR THE PROTECTION OF AZALEAS FROM PHYTOPHTHORA ROOT ROT. R. C. Lambe and W. H. Wills, Dept. of Plant Path. & Physiol., VPI & SU, Blacksburg, VA 24061.

'Hershey Red' azaleas were grown in pine bark in 3785 ml black plastic containers in a shade house and inoculated with a *Phytophthora cinnamomi* (PC) mycelial suspension from V-8 broth and mixed with the bark one week before planting. A PC antagonist, *Mortierella alpina* (MA) was applied to the medium alone and in combination with the fungicide Truban® (etridiazole) (1-5 applications/season), and Subdue® (metalaxyl) (1 and 2 applications/season) at manufacturers registered rates during two growing seasons. At the end of the second season all plants were rated for root rot and root segments were plated out in an attempt to recover PC. Root rot ratings were lowest where Subdue® was applied twice per season and Truban® was applied 3-5 times per season. Infestation of the medium with MA resulted in root rot ratings slightly lower than among untreated inoculated (PC) plants but the difference was not statistically significant. PC was recovered from 13-100% of the plants in all treatments but was not recovered where Subdue® was applied twice/season.

CONIDIAL MASS DIFFERENCES FROM PERITHECIAL AND CHROMOGENIC TYPE CULTURES OF GLOMERELLA CINGULATA ON APPLE FRUIT LESIONS. A. J. Latham, Ala. Agri. Exp. Stn., Auburn University, AL 36849.

Conidia from cultures produced by perithecial and chromogenic (pink on PDA) types of *Glomerella cingulata* were inoculated into Golden Delicious apples. Both types produced orange conidial masses for up to 10 days at 28°C. In apples inoculated with the perithecial type, the orange color turned progressively gray then black from the lesion center outward after 10 days incubation. Orange conidial masses surrounded the black conidial masses until the apple was completely rotted, then all conidial masses became black. Coalescent conidial masses of the chromogenic type became reddish-brown in the lesion center upon drying. Conidia were washed from the lesions of both types and the apples incubated an additional 10 days. The epidermis of apples inoculated with the perithecial type remained caramel brown, those inoculated with the chromogenic type became black. These differences may allow researchers to differentiate types of *G. cingulata* on well-rotted apples.

A GERMINATION SELF-INHIBITOR FROM CONIDIA OF COLLETOTRICHUM GLOEOSPORIOIDES. A. R. Lax, G. E. Templeton, and W. L. Meyer. Department of Plant Pathology and Department of Chemistry, University of Arkansas, Fayetteville, AR 72701.

Dilute concentrations of conidia of *Colletotrichum gloeosporioides* (Penz.) Sacc. f. sp. *jussiaea* germinated readily, but concentrated conidia in water or on water agar germinated poorly. Supernatants of concentrated conidia inhibited germination of dilute conidia. An inhibitor was extracted from these supernatants with chloroform. Thin layer chromatography of the chloroform extracts gave a single spot of inhibition. Chloroform extracts were taken to dryness, and the inhibitor was crystallized from hexane as fine colorless needles, m.p. 108-110°C. Germination of conidia was reduced by approximately 50 percent at an inhibitor concentration of 2 µg/ml. Other *C. gloeosporioides* strains were sensitive, but several *Colletotrichum* species with falcate conidia were not inhibited at inhibitor concentrations of 4 µg/ml. The molecular structure of the inhibitor will be discussed.

CURATIVE ACTION OF CGA 64250 TO PEANUT LEAF SPOT PATHOGENS. R. H. Littrell, University of Georgia, Coastal Plain Station, Tifton, GA 31793.

Arachis hypogaeae (Florunner) were inoculated with 50,000 conidia/ml of either *Cercospora arachidicola* or *Cercosporidium personatum*. Chlorothalonil or CGA 64250 was applied at 1849 ppm 1, 2, 3, 4 and 5 days after inoculation. Plastic bags were placed over plants immediately after inoculation and removed at time of treatment. To another group bags were replaced after treatment and remained until the fifth day. Lesions were counted 16 days after inoculation and placed in moist chambers to induce sporulation. Penetration and infection occurred by both pathogens 24 hours after inoculation. Chlorothalonil prevented symptoms only when treated after 24 hours; however, CGA 64250 was effective when applied up to four days after inoculation. Plants in which plastic bags were replaced after treatment prevented symptoms even when treatment was delayed five days after inoculation. No sporulation was observed on plants treated with CGA 64250; however, sporulation was present on plants treated with chlorothalonil.

CONTROL OF SEPTORIA NODORUM ON WHEAT WITH CROP ROTATION AND SEED TREATMENT. H. H. Luke, P. L. Pfahler, and R. D. Barnett. USDA-ARS, Plant Pathology Dept. and Agronomy Dept., Univ. of Florida, Gainesville, FL 32611.

Crop rotation and seed treatment were tested to determine their effects on disease development of glume blotch of wheat caused by *Septoria nodorum*. Crop rotation did not reduce disease development when infected seed was used for planting. Benomyl seed treatment in conjunction with 1-year of rotation did not significantly reduce disease development. But, seed treatment plus 2-years of rotation reduced the amount of disease 47%. When non-infected seed was used, 1 year of rotation significantly reduced disease development and 2 years of rotation reduced disease 58%. A significant positive correlation of disease on the glumes and seed infection was found when disease severity was low (< 20%) but not when disease severity was high. A significant negative correlation of percent glume blotch, and thousand kernel weight was observed when disease severity was low (< 20%).

POPULATION RESISTANCE TO WEB BLOTCH IN 'FLORUNNER' PEANUTS. E. S. Luttrell, Dept. of Plant Pathology, University of Georgia, Athens 30602.

To determine whether populations of peanut cv Florunner in pure stands might show a level of resistance to web blotch (*Mycosphaerella arachidicola* Chochrjakov) higher than that shown by plants exposed to exogenous inoculum, three-row plots with rows 3 m long and 0.75 m apart were planted in May 1981 at six widely separated locations near Athens, Georgia. In three plots all rows were planted to Florunner to give pure stands. In three plots a center row of Florunner was flanked by rows of the more susceptible Spanish peanut cv Tamnut 74 to give mixed stands. Initial inoculum was furnished by a packet of overwintered diseased peanut stems placed in the middle of each outside row after seedlings emerged and removed when the first web blotch symptoms appeared. Counts of infected leaves were made on five plants in each row monthly during June-September. Percentages of leaves with web blotch in center rows of Florunner were in the three plots with mixed stands 51.5, 35.6, and 34.1 and in the three with pure stands 0, 0, and 0.2.

DISEASES LIMITING PRODUCTION OF JERUSALEM ARTICHOKE IN GEORGIA. S. M. McCarter and S. J. Kays, Departments of Plant Pathology and Horticulture, Univ. of Georgia, Athens 30602.

Jerusalem artichoke (*Helianthus tuberosus* L.), historically considered a minor food crop in the United States, has received recent attention as a potential source of fermentable carbohydrate for alcohol production. Field tests conducted near Athens, GA, during 1981 and 1982 indicated that southern blight (*Sclerotium rolfsii*), rust (*Puccinia helianthi*) and powdery mildew (*Erysiphe cichoracearum*) are the major diseases that may limit large-scale production of Jerusalem artichokes in the southeastern United States. *S. rolfsii* was a major tuber-rotting organism during the growing season and increased in severity with continuous culture on the same land. *Fusarium* spp. and *Pseudomonas* spp., primarily *P. marginalis* and *P. fluorescens*, were the organisms isolated most commonly from decaying tubers held in the field or in refrigerated storage during the winter. Isolates of both genera were pathogenic in laboratory tests.

HOST-PARASITE RELATIONSHIPS IN COMMON LEAF SPOT OF ALFALFA. S. L. F. Meyer, Dept. of Plant Pathology, Univ. of Georgia,

Athens, GA 30602.

Pseudopeziza medicaginis produces single apothecia in restricted lesions in living leaves of alfalfa. Light and electron microscopy show that intracellular hyphae invade the host tissues. During early disease stages, infection results in breakdown of host cell protoplasts. In the area occupied by the developing ascocarp, entire host mesophyll cells are digested and replaced by fungus tissue. Beneath the apothecium, spongy mesophyll cell contents are replaced by hyphae without destruction of host cell walls. At the lesion margins, hyphae extend into host cells that contain intact organelles. Studies with ^{14}C -sucrose indicate that the fungus can still take up nutrients from the plant at this stage. Characteristics suggesting that *P. medicaginis* may be considered a tissue replacement disease pathogen are biotrophy, selective destruction of plant tissue with maintenance of a compatible host-parasite relationship, and separation of hyphae from the physical environment by host tissues.

EFFECT OF VARIOUS LEVELS OF LEAF DAMAGE ON ONION BULB YIELD. Marvin E. Miller, Texas Agricultural Experiment Station, 2415 East Highway 83, Weslaco, Texas 78596.

Beginning 10 weeks prior to harvest, 0, 25, 50, 75 and 100 percent of the leaves were removed weekly from different onion plots to simulate damage caused by *Alternaria porri* and to determine the effects of this leaf damage on bulb yields. Plants with 25 percent of the leaves removed did not have significantly different yields ($p = .05$) from the controls, whereas, plants with the 75 and 100 percent treatments had significant yield reductions. Yields of plants with the 0, 25 and 50 percent treatments were not significantly affected by the time of leaf removal; however, plants with 75 and 100 percent of the leaves removed 9-10 weeks prior to harvest had a significant yield reduction over plants with leaves removed 1-2 weeks prior to harvest.

EFFECTS OF NEMATOCIDES ON NEMATODE POPULATIONS AND CORN AND SOYBEAN YIELDS IN DOUBLE-CROPPING CULTURE. N. A. Minton and M. B. Parker, SE-ARS, USDA and Coastal Plain Experiment Station, Tifton, GA 31793.

Irrigated corn and soybean were grown in 1981-82 in a Tifton sandy loam infested with *Meloidogyne incognita*, *Paratrichodorus christiei*, and *Belonolaimus longicaudatus*. Corn was planted rip-plant and soybean was planted in a moldboard-prepared seedbed. Ethylene dibromide at 26.9 kg ai/ha, phenamiphos at 2.2 kg ai/ha, and aldicarb at 2.2 kg ai/ha were applied at planting to either corn, soybean, or corn and soybean. Untreated plots served as controls. Nematode populations varied with the nematocides and with the time of application. Corn and soybean yield differences among chemical treatments were not significant. Average yields for corn were increased across nematocides in plots in which corn or corn and soybean were treated. Also, average yields for soybean were increased in plots in which corn, soybean, or corn and soybean were treated.

GERMINATION OF BOTRYOSPHAERIA DOTHIDEA CONIDIA. Mary E. Montgomery and Larry D. Smith, Biology Dept. and Plant & Soil Science Dept., Tennessee Tech. University, Cookeville, TN 38501.

Conidia of *B. dothidea* isolates from Yoshino cherry cankers were observed to germinate over a broad temperature range. Over the range of 12-39 C, 95% of the conidia germinated after 24 hrs. After four hrs the percent germination was significantly correlated to temperature ($r = .895$) and was described by the regression equation $y = -28.3 + 3.7x$.

EFFECTS OF OVERSEEDING BERMUDAGRASS ON THE POPULATION OF CERTAIN SOIL INHABITING FUNGI. C.P. Müller and T.E. Freeman, Plant Pathology Dept., University of Florida, Gainesville, 32611.

Bermudagrass golf greens are commonly overseeded (OS) in winter with cool season grasses. Despite control of diseases during this period, there is concern that the population of pathogenic fungi are increased by overseeding. The population of *Pythium* spp., *Rhizoctonia* spp. and *Helminthosporium - Curvularia* spp. complex were monitored by soil dilution samplings from overseeded and non-overseeded (NOS) plots

utilizing selective media. Populations were assayed in the 2.5 cm layer of thatch and in the first 2.5 cm layer of soil. *Pythium* and *Helminthosporium-Curvularia* complex were significantly higher in number in the thatch than in the soil at each sampling date, but there was no difference between OS and NOS plots. *Rhizoctonia* population varied widely. It is concluded that the degree of thatch affected the population more than the overseeding.

SORGHUM VIRUSES IN MEXICO. J. Narro S., P. H., Berger and R. W. Toler. Inst. Nacional de Invest. Agrícolas, Ceylala, Mexico: Department of Plant Sciences, Texas A&M University, College Station, TX 77843.

The International Sorghum Virus Nursery was grown in Mexico at two locations during 1981 and 1982. Plants were inoculated either naturally or mechanically with maize dwarf mosaic virus (MDMV). Most variety reactions were comparable to those previously observed in Texas. New Mexico 31 had a milder than normal reaction to infection while SC97-14E reaction was more severe. All "QL" accessions were symptomless. Serological tests were also performed on naturally and artificially inoculated plants. MDMV was the most prevalent virus but sugarcane mosaic virus (SCMV) was found in some complex infections with MDMV.

FACTORS ASSOCIATED WITH CITRUS BLIGHT-SUPPRESSIVE FLORIDA FLATWOODS ORGANIC SOILS. S. Nemeec, USDA, ARS, Orlando, FL 32803; M. Patterson, Coca Cola Foods Div., Forest City, FL 32751; D. Calvert, Univ. of Florida, Ft. Pierce, FL 33450.

Mineral and microbiological analyses were made in two flatwoods sites where citrus blight was severe on sands adjacent to blight-suppressive organic soils. Ca, Mg, K and P and most minor elements were higher in organic versus sandy soils, and higher in surface compared to subsurface soils, with Mg, Ca and P most limiting to plant growth in subsurface sands. In general, organic soils supported higher populations of Pseudomonads, gram negative bacteria and fungi than sands. Fibrous root mass was greater in organic than in sandy soils. Fibrous root loss in shallow flatwoods soils is due to fluctuating water tables, the root rotting fungus *Fusarium solani*, and possibly other factors. Improved water-holding capacity, better subsoil nutrition, especially Ca, a higher competitive microflora to *F. solani*, and possibly other factors are likely responsible for better established fibrous root systems in organic soils, and may account for the reduction of blight.

EVALUATION OF PEANUT GENOTYPES FOR TOLERANCE TO *CERCOSPORIDIUM PERSONATUM* USING DISEASE MANAGEMENT STRATEGIES. Robert Neundorfer and Robert H. Littrell, University of Georgia, Coastal Plain Station, Tifton, GA 31793.

Genotypes of *Arachis hypogaea* were evaluated for leaf spot development and pod yield under three levels of disease management (DM) over two years. Chlorothalonil (1.24 kg/ha) was applied: i) six times, ii) three times and iii) no treatment. Disease development was assessed five times per season. There was low disease pressure in 1981 and severe disease pressure in 1982. Genotypes differed in yield loss under minimum DM and no treatment based on maximum DM. Genotypes A 7109 and UF 80202 exhibited 6% and 9% yield loss, respectively, compared to 57% for Florunner, under minimum DM. Under no treatment, Florunner exhibited 69% yield loss whereas A 7109 and UF 80202 expressed 26% and 27% yield reduction respectively. Leaf area index of UF 80202 under minimum DM was seven times greater than that of Florunner and lesion diameter was half that of Florunner.

VERTICILLIUM NIGRESCENS ASSOCIATED WITH SOYBEANS. D. V. Phillips, S. J. Vesper, and J. T. Turner, Jr., Department of Plant Pathology, Georgia Experiment Station, Experiment, GA 30212.

A study of the succession of fungi on soybean pods and their effects on seed quality revealed that *Verticillium nigrescens* Pethybr. occurred frequently at some locations, particularly those with a long history of cotton production. *V. nigrescens* frequently grew from the end of the pedicel and rarely grew from other parts of the pod. *V. nigrescens* was isolated from soybean flowers and pods at all stages of development at eight locations in Georgia during 1977-1981. The incidence in pods ranged from 1 to 36%, was highest 3-5 wk after initial pod

set, and declined gradually to a low at maturity. Most soybean cultivars are susceptible to invasion. The fungus was readily isolated from soil and high soil moisture levels were related to increased infection. Apparently *V. nigrescens* can be a subtle pathogen of soybean which causes loss of pods but not vascular discoloration or wilting.

LIGHT AND SCANNING ELECTRON MICROSCOPIC OBSERVATIONS OF CALCIUM OXALATE CRYSTALS PRODUCED BY *SCLEROTIUM ROLFSSII* IN CULTURE AND IN INFECTED TISSUE. Z. K. Punja and S. F. Jenkins, Dept. of Plant Pathology, North Carolina State University, Raleigh 27650.

Crystals of calcium oxalate (CX) were readily observed with the light microscope in colonies of *Sclerotium rolfsii* grown for 48 hr on cellophane overlaying 1.5% water agar. The crystals were birefringent, soluble in 0.2 N HCl, insoluble in 5% CH₃COOH, and stained black with 5% AgNO₃:30% H₂O₂ (1:1) or AgNO₃ followed by dithiooxamide in 70% ETOH containing NH₄OH. Addition of 5-10 mM K₂HPO₄ or Na-succinate to water agar increased the abundance of CX formation by eight isolates. Localized deposits of CX were observed with the light microscope in *S. rolfsii*-infected sugar-beet leaf discs that were fixed in glacial acetic acid:95% ETOH (1:1) for 36 hr and stained with AgNO₃:H₂O₂ for 30-45 min. With the SEM, a similar abundance of CX associated with the infecting hyphae was observed in OsO₄-fixed tissues 72 hr after inoculation. These rapid qualitative methods for detection of CX can be used to study the mode of pathogenesis of *S. rolfsii* and factors influencing *in vivo* formation of calcium oxalate.

EFFECT OF CLOVER YELLOW VEIN AND PEANUT STUNT VIRUSES ON YIELD OF WHITE CLOVER CLONES IN A CLOVER-TALL FESCUE STAND. Cynthia K. Ragland and C. Lee Campbell, Department of Plant Pathology, North Carolina State University, Raleigh 27650.

The effects of clover yellow vein (CYVV) and peanut stunt virus (PSV) on yield of clones T7 and T17 of 'Tillman' white clover were determined in a clover-tall fescue grass stand. Plots (0.6 m diam; completely randomized with 10 replications/treatment) consisting of 2 clover and 4 tall fescue plants were established in fumigated Cecil clay soil near Raleigh on 11-12 May 1982. Treatments for each clone were CYVV and PSV-free, CYVV-infected, PSV-infected, and CYVV+PSV-infected. Dry wt values from 3 harvests (29 June, 19 July and 19 August 1982) revealed that clone T7 was more tolerant of CYVV infection (yield reduction (YR)≈20%) than clone T17 (YR≈35%); PSV infection was more severe on T7 (YR≈80%) than on T17 (YR≈50%). CYVV+PSV infection reduced yield of both clones by about 75% compared with plants initially CYVV and PSV-free. Yields of tall fescue were not different among clover virus treatments.

CYLINDROCLADIUM CROTALARIAE ASSOCIATED WITH CROWN AND ROOT ROTS OF ALFALFA AND RED CLOVER IN FLORIDA. D. A. Roberts and T. A. Kucharek, Department of Plant Pathology, University of Florida, and C. L. Schoulties, Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Gainesville, Florida 32611.

A rapidly developing crown and root rot killed alfalfa plants of the Florida 77 variety in scattered areas throughout a field in northern Florida. *Cylindrocladium crotalariae* was always present in decaying crowns and black root lesions. The same fungus was also isolated from dying red clover plants and from crown-rot-diseased alfalfa plants in experimental plots at Gainesville. *Cylindrocladium crotalariae* affects forage legumes in a few widely separated locations in northern Florida. It seems more virulent, however, than the ubiquitous crown- and root-rot-inducing *Rhizoctonia solani* and *Fusarium solani*, and thus threatens swift depletion of stands of alfalfa in contaminated soils.

FACTORS AFFECTING INVASION OF SUNFLOWER SEED BY FUNGI. J. A. Robertson and G. W. Chapman, USDA, ARS, Russell Research Center, Athens, Georgia 30613

High-oil hybrid sunflower seed exposed to RH's of 65, 84, and 93% in environmental chambers at 10C attained equilibrium moisture (mc) of 7.3, 10.0, & 13.3% respectively and were stored under these conditions for up to 10 mo. At 7.3 & 10.0 mc, germinability of seed changed very little during storage, but at 13.3% decreased to 86.5% after 7 mo. Free fatty acids (FFA) did not significantly change at 7.3 & 10.0% mc, but at 13.3%,

FFA increased significantly with time. At 10% mc, fungal invasion decreased during 10 mo storage; the predominant genus was *Alternaria*. At 10% mc, fungal invasion also decreased and *Aspergillus* began invading seed after 6 mo storage and by 10 mo was about equal to *Alternaria* in occurrence. At 13.3% mc, the predominant genus after 1 mo storage was *Alternaria*; seed had already been invaded by *Aspergillus* and *Penicillium*. After 7 mo, the predominant genus was *Aspergillus* followed by *Alternaria* and *Penicillium*. Data indicate that at 10% mc and 10C, fungal deterioration will be a problem after 6 mo storage.

FUNGICIDAL CONTROL OF RICE SHEATH BLIGHT. M. C. Rush & Zhuo-Tong Yu, Dept. Plant Path. & Crop Physiol., La. State University Agric. Expt. Sta., Baton Rouge, LA 70803.

Field tests were conducted at the LSU Rice Experiment Station at Crowley, LA to determine the efficacy of fungicides for control of sheath blight caused by *Rhizoctonia solani*. Formulations, rates, and timing of applications were tested. Outstanding treatments included formulations of triphenyltin hydroxide (TPTH) (Griffin, Thompson-Hayward), OAC3910 (Olin), NTN19701 (Mobay), mepronil (Elanco), iprodione (Rhone-Poulenc), and Tilt (Ciba-Geigy). Foliar applications at the boot and heading stages of growth, first joint elongation + 2 weeks, or single applications at the boot stage gave the optimum disease control. Applications of TPTH at boot and Benomyl at heading gave yield increases up to 1000 lb/A and significant disease control. The degree of disease control in the first crop was positively, significantly correlated with the number of ratoon tillers produced in the second crop.

THE EFFECT OF THREE WINTER MANAGEMENT PRACTICES ON THE POPULATION DYNAMICS OF *PRATYLENCHUS BRACHYURUS* (STEINER) ON PEANUTS IN FLORIDA. J. A. Saunders and D. W. Dickson, Graduate Student and Professor, respectively, Department of Entomology and Nematology, University of Florida, Gainesville, Florida 32611.

In 1981 field plots were set up to evaluate the effect of fallowing, rye, and undisturbed winter treatments on the population dynamics of *Pratylenchus brachyurus* on peanut, *Arachis hypogaea* L. Soil from each plot was sampled monthly at three depths: 0-35, 36-70, and 71-105 cm and was processed and the number of nematodes counted. Peanut was planted and the yield and number of nematodes per one gram of shells was taken from each peanut plot. There was a significant difference in the yield in each treatment. Fallowing produced the highest yield and rye produced the lowest yield of peanuts. The rye grass significantly increased the population of the nematode during the winter months and the fallowing caused a significant decrease in the population.

EFFECT OF HOST RESISTANCE LEVEL ON SPREAD OF *PHYTOPHTHORA PARASITICA* VAR. *NICOTIANAE* UNDER FIELD CONDITIONS. H. D. Shew, Dept. of Plant Pathology, N. C. State University, Raleigh 27650.

Four tobacco varieties, representing four levels of black shank resistance, were planted in small field plots. The varieties were 'Hicks', no resistance; 'Coker 319', low resistance; 'Coker 411', moderate resistance; and 'NC 82', high resistance. After the last cultivation, a single plant in each row (10-13 plants/row and 18 rows/variety) was chosen at random and inoculated by injecting 3 ml of a mycelial suspension of *P. parasitica* var. *nicotianae* into the stem 3 cm below the soil line. The plots were not entered for the next 45 days at which time disease ratings were made. Spread was determined by symptom expression on plants other than the inoculated plant. Spread was detected in 78, 67, 20, and 13% of the rows and percentage of total plants expressing symptoms was 38, 15, 10, and 8% for 'Hicks', 'Coker 319', 'Coker 411', and 'NC 82', respectively. Assays of soil taken at predetermined distances from the point source of inoculum in rows where spread was not detected indicated that the pathogen had moved in all rows.

OCCURRENCE OF A HYPERPARASITE OF *CERCOSPORIDIUM PERSONATUM* ON PEANUT IN FLORIDA. F. M. Shokes and R. A. Taber, Univ. of Florida, Agric. Res. and Educ. Ctr., Quincy, FL 32351, Dept. of Plant Sci., Texas A & M Univ., College Station, Texas 78843.

Hansfordia pulvinata (=Dicyma) was observed parasitising *Cercosporidium personatum* (CP) on peanut leaves at the Agricultural Research Center, Jackson County, Florida. The site

of occurrence is located in North Florida 5 miles north of Marianna. The hyperparasite was first observed on September 16, 1982 in research plots on the cultivar 'Early Bunch'. Within 3 days it was observed in a second area on Florunner peanuts. It was found at all levels of the canopy and was preventing sporulation of CP. Lysing of the stromatic cells underlying the conidiophores of CP was apparent. This is the second report of the occurrence of *Hansfordia* in the U.S. and the first in the peanut growing areas of the southeastern U.S.

TALL FESCUE ENDOPHYTE: DISTRIBUTION IN KENTUCKY AND CHEMICAL CONTROL. M. R. Siegel, D. Varney, M. Johnson and W. Nesmith Plant Pathology, University of Kentucky, Lexington, KY 40546

The endophytic fungus *Epichloe typhina*, associated with fescue toxicosis in cattle, is easily detected in leaf sheaths, stems and seeds of tall fescue using ELISA. The fungus is widely distributed in Ky; 194 of 200 fields (97%) surveyed in 1981 were infested. Compounds having antifungal activity in an agar plate assay ($ED_{50} < 5\text{ppm}$) were propiconazole, etaconazole, fenarimol, nuarimol, imazalil, prochloraz benomyl, thiabendazole, triadimenol and bitertanol. Certain of these fungicides were used for seed, pot and field treatments. Infected seed treated with Baytan (triadimenol) at 5.2, 3.9, 2.6 and 1.3 gm ai/kg seed gave 100, 85, 45 and 25% control of the endophyte in 12 week old seedlings, respectively. Other fungicides gave 15-80% control depending on concentration. The fungus was eradicated from infected plants in pots in the greenhouse by Baycor (bitertanol, 2.5 mg ai/g soil). The endophyte could not be controlled in the field by foliar application of various fungicides.

BURSAPHELENCHUS BIOASSAY FOR CARBOFURAN. Larry D. Smith, Plant and Soil Science Department, Tennessee Tech. University, Cookeville, TN 38501.

Recent studies have focused on the effect of systemic nematocides on *B. xylophilus* in its hosts. A bioassay was developed to determine *in vitro* concentrations of carbofuran. Twenty to thirty nematodes were observed in wells of a glass plate containing 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 1000 and 10,000 ppm carbofuran. The length of time required for death of half of the population in each concentration was recorded. Tests were replicated four times. *B. xylophilus* was not killed in 24 hrs in 1, 10 and 20 ppm. In the range 30-100 ppm a highly significant negative correlation existed ($r = -.982$). The times required to kill half the population was described by the regression equation $y = 27.24 - .185x$. The nematodes were dead after 6.74 and 4.93 min in 1,000 and 10,000 ppm respectively but these data were not included in the regression equation. The data indicate that this bioassay can be used to determine the concentration of carbofuran. The bioassay is being extended to *in vivo* tests.

RESISTANCE IN SNAPBEAN BREEDING LINES TO RHIZOCTONIA SOLANI AND RHIZOCTONIA-LIKE FUNGI. Donald R. Sumner, University of Georgia, Coastal Plain Experiment Station, Tifton, GA. 31793

Nine snapbean breeding lines and the cultivar Eagle were grown in heat-treated (70 C for 30 min) Tifton loamy sand infested separately with *Rhizoctonia solani* AG-4, AG-2 type 2, and AG-2 type 1; and *Rhizoctonia* spp. (binucleate) CAG-3 and CAG-5. Isolates were from soils or plant roots in the Georgia Coastal Plain. The most severe root and hypocotyl decay and damping-off were caused by *R. solani* AG-4 and AG-2, type 2, respectively. Breeding lines 924R, 204-8R, 5181R, B4175, B4173-2X, and Venezuela 54 were more resistant to *R. solani* AG-4 than Eagle, but PI165426 and Wisconsin RRR46 and RRR36 were not. None of the breeding lines were more resistant than Eagle to *R. solani* AG-2 type 2, and RRR46 and PI165426 were more susceptible than Eagle. All of the snapbeans were resistant to *R. solani* AG-2 type 1 and *Rhizoctonia* spp. CAG-3 and CAG-5, except PI165426 was moderately susceptible to CAG-5. Differences among breeding lines were greater at inoculum densities of 100 or 500 than at 5 to 15 propagules/ 100 g of soil.

PUCCINIA CANALICULATA AS A BIOCONTROL FOR CYPERUS ESCULENTUS: UREDINIOSPORE STORAGE AND RETRIEVAL. E. M. Sarker, University of Georgia, Coastal Plain Station, Tifton, Georgia 31793.

Systems of storage of *Puccinia canaliculata* urediniospores were

studied to evaluate this rust's potential for manipulation as a biological control for yellow nutsedge, *Cyperus esculentus*. Less than 5% of the urediniospores were viable when stored for 21 days at 24, 20 and -15 C ca.; 50% of spores were viable and virulent on yellow nutsedge after 30 days at 9 C and 400 days at -73 C. Optimal retrieval procedure after storage at -73 C was a 4 minute heat shock at ca. 40 C. Urediniospores in zip-lock polythelene bags stored at -73 C were heat shocked at 40 C for 4 minutes eight times at 5 day intervals without a drastic reduction in percent germination. Thus, it appears that storage of urediniospores at -73 C is a viable option as a reliable method of keeping urediniospore inoculum of *P. canaliculata* overseason to initiate field epidemics of rust as a biological control on yellow nutsedge.

EFFECT OF TEMPERATURE AND DURATION OF LEAF WETNESS PERIODS ON INFECTION OF CANTALOUPE BY ALTERNARIA CUCUMERINA. Claude E. Thomas; USDA, ARS, SR, MAA, U. S. Vegetable Laboratory, 2875 Savannah Highway, Charleston, SC 29407.

The first two true leaves of 21-day-old cantaloupe (*Cucumis melo* 'Perlita') plants were inoculated with a 5000/ml suspension of conidia of *Alternaria cucumerina* in all experiments. The optimum temperature for germination of conidia was 15C. The optimum temperature for infection following inoculation was 10C. Only a trace (< one lesion/leaf) of infection occurred at either 5C or 35C. Number of infections declined sharply from 10C to 35C. Duration of leaf wetness periods was studied at 20C since this is the average night temperature when the disease first appears during the growing season. No infections occurred with a leaf wetness period of 2 hr. A trace number of infections occurred at 4, 6, and 8 hr. Significant infections did not occur until 10 hr (4.4/leaf) and the number of infections increased sharply as the hours of leaf wetness increased through 24 hr (22.1/leaf).

EFFECT OF MOISTURE, TEMPERATURE AND LEAF AGE ON LESION GROWTH AND CONIDIAL PRODUCTION BY COLLETOTRICHUM LAGENARIUM ON CUCUMIS SATIVUS 'CALYPSO'. D. C. Thompson and S. F. Jenkins, Dept. Plant Pathology, North Carolina State University, Raleigh 27650.

Lesion growth (LG) and conidial production (CP) were measured on *C. sativus* 'Calypso' inoculated with a spore suspension of *C. lagenarium*. Following a 24 hr inoculation period, plants were atomized and covered with polyethylene bags for the 12-hr dark period, either daily or just prior to sampling. A third group of plants was not atomized or covered. Following inoculation, the plants were grown in controlled environment chambers for 4 wk at constant 16, 20, 24, 28 and 32 C. Old (1-3) and younger (5-7) leaves were sampled from the misted plants. In general lesion formation and growth, and CP were slower at 16, 20, or 32 C than at 24 or 28 C; however, maximum lesion area and CP occurred at 16 and 20 C. LG and CP were increased by misting; however, frequency of misting had no effect. Older leaves had increased LG and CP. CP continued until leaves senesced or became totally necrotic, regardless of temperature.

FIELD INOCULATION TECHNIQUES FOR INFECTING CORN KERNELS WITH ASPERGILLUS FLAVUS. D. H. Tucker, Jr. and S. B. King. Dept. of Plant Pathology & Weed Science and USDA-ARS, Mississippi State University, Mississippi State, MS 39762.

Pinbar, silk, knife and exposed kernel inoculation techniques were tested on corn hybrids in the field in 1982 to determine their effectiveness in inducing kernel infection by *Aspergillus flavus*. Of four hybrids used, two had shown low and two had shown high infection frequencies in previous field tests using pinbar inoculation. In the current study, significantly higher levels of infection (11.2%) were achieved by pinbar inoculation. Exposed kernel inoculation gave infection levels (5.9%) significantly higher than silk inoculation (0.2%) and noninoculation (0.8%), but did not differ significantly from knife inoculation (2.3%). Resistant hybrids consistently had lower infection frequencies than susceptible hybrids, regardless of inoculation technique. In our tests, pinbar and exposed kernel inoculation were used effectively in determining differences among hybrids for frequency of infection by *A. flavus*.

BROME MOSAIC VIRUS NATURALLY INFECTING COMMELINA SPECIES R. A. Valverde. Department of Plant Pathology, PS-217, University of Arkansas, Fayetteville, AR. 72701

Brome mosaic virus (BMV) was isolated from Commelina communis, C. diffusa and five Gramineae species growing in a lawn in Fayetteville, AR. Three different types of isolates were obtained: BMV-1 from two samples of C. communis, BMV-2 from one sample of C. diffusa, and BMV-3 from seventy-two samples representing both Commelina species and five grasses. The isolates differed in certain host reactions and were readily distinguished by the reaction of mechanically inoculated Datura Stramonium. They were serologically identical to each other and to the type strain of BMV and contained the typical four RNA components of BMV. All three isolates induced mosaic symptoms when inoculated to C. communis, but unlike these three isolates, the type strain of BMV did not infect C. communis. The chrysomelid beetle, Lema sexpunctata, transmitted BMV-1 to C. communis.

STATUS OF SUGARCANE SMUT IN TEXAS. Benigno Villalon, Texas Agricultural Experiment Station, 2415 East Highway 83, Weslaco, Texas 78596.

Smut of sugarcane (Saccharum officinarum hybrids) incited by Ustilago scitaminea Syd., was discovered in South Texas in August 1981 in cultivar CP 65-357. The 1982 survey indicated a higher incidence of smut development in previously infected fields confined to the central part of the Lower Rio Grande Valley. However, a lower incidence of smut development was found in a previously-infected field in the extreme western portion of the Valley. Screening experiments designed to find adapted sugarcane cultivars resistant to U. scitaminea Syd., for the area were initiated. Twenty out of thirty-five sugarcane cultivars exhibited smut whips in the field when artificially inoculated twice with smut spores in the greenhouse. In field-grown cane located in the western portion of the Valley, no disease reaction was observed 6 months after inoculation of over 500 cultivars.

A FIELD INOCULATION TECHNIQUE FOR CERCOSPORA SORGHII ON SORGHUM. G.C. Wall, G.N. Odvody, and R.A. Frederiksen, Department of Plant Sciences, Texas A&M University, College Station, 77843 and Texas Agricultural Experiment Station, Corpus Christi 78410

Good inoculation techniques have not been available for Cercospora sorghi Ell. & Ev. on Sorghum bicolor (L.) Moench because of the difficulty in getting abundant in vitro sporulation of this fungus. By cutting disks from the periphery of 10-day-old V8 agar cultures, transferring them to fresh culture plates, exposing them to 48 hr UV radiation (400 nm, 24C), then placing them in the dark for 24 hr, abundant conidia were produced (3 x 10⁶ conidia/plate). A water suspension of spores was prepared (35,000 conidia/ml) and sprayed onto plants during the

evening in the field via an ultra-low volume applicator. Plants were inoculated before the booting stage. Symptoms were evident 2 wks later. This technique is currently being used to screen sorghum for resistance to C. sorghi. Resistant and susceptible reactions can be readily distinguished. Since conidial production is synchronous, this technique is also ideal for epidemiological studies.

VARIABLE ANTAGONISM IN VITRO BETWEEN ISOLATES OF TRICHODERMA HARZIANUM AND RHIZOCTONIA SOLANI AG 4. Homer D. Wells and D. K. Bell, ARS, USDA and Plant Pathology Department, Coastal Plain Station, Tifton, GA 31793.

Fifty-three randomly selected Rhizoctonia solani AG 4 isolates from the Tifton area were individually paired with each of forty-one randomly selected isolates of Trichoderma harzianum in vitro on 20% V-8 Juice agar in 9 cm petri dishes. All pairings were replicated five times in a completely randomized experimental design. The overall average response showed highly significant differences between R. solani AG 4 isolates in their ability to withstand antagonism by T. harzianum. On the average, twenty percent of R. solani AG 4 isolates were more competitive than the T. harzianum and 34% of the T. harzianum isolates were less competitive than R. solani AG 4 isolates. The significant T. harzianum x T. solani AG 4 interaction indicates that apparently many genes from both organisms interact to regulate the amount of antagonism between this plant pathogen and T. harzianum.

SELF-REPAIR OF MITOCHONDRIA DAMAGED BY HMT-TOXIN. Harry Wheeler, Plant Pathology, University of Kentucky, Lexington, Ky 40546

Evidence that initial responses to victorin are qualitatively, but not quantitatively, similar in both susceptible and resistant tissues led to the hypothesis that resistance to this, and perhaps other pathotoxins, depends on timely self-repair. Mitochondrial uncoupling by Helminthosporium maydis, race T (HMT)-toxin has been reported to be reversible (Plant Physiol.59:540) but as with victorin, the toxin used was impure. With pure HMT-toxin (supplied by J. M. Daly) and 30-min treatments at 37C, the minimum doses required for ultrastructural damage to all mitochondria in epidermal root cells were 3 ng/ml and 30 µg/ml for T and N plants, respectively. When roots given these toxin-treatments were then placed in a slurry of charcoal (Norite A, 10 mg/ml) for 4 hr, no damaged mitochondria were found in N roots but 30-50% of those in T roots were damaged. These results indicate that mitochondria in T cells are heterogeneous and less capable of self-repair than N mitochondria.