Abstracts for the 1972 Annual Meeting of the Southern Division of The American Phytopathological Society

Rhizoctonia blight of Carissa grandiflora. S. A. ALFIERI, Jr., C. P. SEYMOUR, & J. C. DENMARK (Fla. Dep. Agr. & Consumer Serv., Gainesville). *Rhizoctonia solani* was determined to be the causal pathogen of a serious and often production-limiting blight disease of *Carissa grandiflora*, a tropical ornamental plant grown in south Florida. Controlled pathogenicity tests in two trials produced characteristic symptoms of blight in 7 days beginning as dark green, water-soaked lesions occurring at the base and margin of the leaves and progressing to irregular, coalescing, faintly zonate, brown necrotic lesions in 11 days. Stems are rarely invaded except for young stem tips. Of seven fungicides tested for disease control and phytotoxicity, Daconil, 75 WP (tetrachloroisophthalonitrile) at 1.5 lb./100 gal gave 100% control; benomyl, 50 WP at 0.5 lb./100 gal provided 99.6% control; and Mertect 160,60 WP [2-(4-thiazolyl) benzimidazole] at 0.75 lb./100 gal 99% control; whereas chloroneb, 65 WP at 0.16 lb./100 gal, Isobac, 20 WP [mono salt of 2,2-methylenebis (3,4,6-trichlorophenol)], at 1 pint/500 gal, Plantvax, 75 WP (5,6-dihydro 2 methyl-1-4 oxathiin-3 carboxanilide-4, 4-dioxide) at 0.125 lb./100 gal, and Terraclor 75, WP (pentachloronitrobenzene) at 0.75 lb./100 gal provided less than 65% disease control, resulting in unacceptable and unsalable plants. None of the fungicides tested produced phytotoxicity.

Reaction of soybeans to Fusarium moniliforme. D. C. BAIN & B. N. PATEL (Miss. State Univ., State College). In the culture of soybeans, there is a tendency toward continual cropping or rotations with grain crops such as wheat, oats, etc. The possibility of planting in stubble and refuse of grain crops after minimum tillage has also been suggested. Since *Fusarium moniliforme* is a ubiquitous fungus on grain crops and other grasses, it was deemed important to know what effects, if any, this organism might have on soybean. Fungus inoculum was prepared by growing an isolate from diseased corn seedlings on cornmeal with perlite as a carrier. Flats of both steamed and nonsteamed soils were utilized, and soybean seed (Lee 68) were planted in furrows either beneath or on top of the inoculum. In the controls, seed were planted directly in furrows in separate flats. Over 9,000 seed were used. Emergence in the inoculated soil was reduced by as much as 26%, and was significant regardless of placement of inoculum or condition of soil although emergence was less in nonsteamed soil. Seedlings were definitely stunted, but appeared to outgrow this condition in a month or so. Root formation, in general, was not as dense as in control plants, but there was no evidence of rotting. There was no seedling blight or damping-off due to *Fusarium*. Cotyledons often had lesions from which the fungus was isolated. Seedlings in control flats were normal; these results suggest that *F. moniliforme* could possibly have some adverse effects on soybeans when planted in rotations with grain crops.

Effect of nematodes and Phytophthora cinnamomi on mycorrhizae of shortleaf pine seedlings. R. O. BARHAM (Univ. Ga., Athens). Ectomycorrhizae aseptically synthesized with *Pisolithus tinctorius* and *Thelephora terrestris* and nonmycorrhizal feeder roots of intact seedlings of *Pinus echinata* were placed in individual glass cylinders and inoculated with 100 *Tylenchorhynchus claytoni* or 200 *Helicotylenchus dihystera* and 100,000 zoospores of *Phytophthora cinnamomi*. Root segments from the cylinders were examined histologically after 8 days' incubation. Both *T. claytoni* and *H. dihystera* penetrated and migrated through the fungus mantle and Hartig net of ectomycorrhizae formed by each symbiont. Vascular tissue of ectomycorrhizae of both symbionts was invaded by *T. claytoni. H. dihystera* disrupted the structural integrity of the fungus mantles of the ectomycorrhizae, creating infection courts for *P. cinnamomi*. Intracellular hyphae and vesicles of *P. cinnamomi* were also found in the cortex cells surrounded by the Hartig net of *P. tinctorius* ectomycorrhizae parasitized by *H. dihystera*. *P. cinnamomi* did not infect ectomycorrhizae penetrated by *T. claytoni*. This work indicates that nematodes are able to modify resistance afforded the host by fungus symbionts against *P. cinnamomi* attack.

Correlations of initial densities of Meloidogyne incognita on tomato with yield and incidence of early blight. K. R. BARKER (N.C. State Univ., Raleigh). Microplots (80 × 100 cm) previously fumigated with methyl bromide were infested with numbers of *Meloidogyne incognita* ranging from 0 to 4,000 larvae and 3,500 eggs/500 cc of soil by adding chopped, infected tomato roots and infested soil. Three 5-week-old Manapal tomato seelings were transplanted to each plot. Nutrients and water were provided as needed. Fruit was harvested in the pink stage every 3 to 14 days. Since early blight (*Alternaria solani*) developed in some plots 2 months before the final harvest, blight indices and numbers of lesions on the top five leaves were recorded. Total and marketable yields were correlated inversely with initial numbers of larvae as well as eggs and incidence of blight. Severity of blight also showed a direct positive relationship with numbers of larvae and eggs. Thus, part of the 51 to 85% reduction in marketable yield of plants infected with *M. incognita*, as compared to the controls, apparently was due to the nematodes interacting with the early blight fungus.

Relationships of soil temperature, moisture, and season to population changes of Meloidogyne incognita as determined by four assay procedures. K. R. BARKER & L. A. NELSON (N.C. State Univ., Raleigh). Four fields infested with *Meloidogyne incognita* were assayed biweekly from September through April by Baermann funnel (BF), bioassay, centrifugal flotation (CF), and sugar-flotation-sieving (SFS) to determine correlations among assay methods and population changes related to soil temperature, moisture, and time. Correlations of results from assay methods were high in fields with moderate to high densities, but were variable for fields with low densities. Assays by CF and SFS were highly correlated in all fields with low densities. Assays by CF and SFS were highly correlated in all fields ($r = .75$ to .91), and those by BF were most variable within and among fields. Bioassay was the most reliable method for fields with low densities. Nematode densities were correlated positively with soil temperature, and usually inversely related to soil moisture and time lapsed. A quadratic equation of the regression of the number of nematodes extracted by each method upon time and $(time)^2$ showed time curves to be variable, depending upon field and "season". In some cases, there was pronounced curvilinearity eith time, but in some "field-season" combinations, a linear trend with time was evident. R^2 did not exceed 0.70 in most cases. The results indicate that seasonal variation of densities of *M. incognita* in individual fields cannot be predicted with high precision.

An assay technique for some viruses in white clover. O. W. BARNETT (Clemson Univ., Clemson, S.C.). White clover in the Southeast is heavily infected with plant viruses. A white clover plant may be concurrently infected with alfalfa mosaic (AMV), clover yellow vein (CYVV), clover yellow mosaic (CYMV), peanut stunt (PSV), and white clover mosaic (WCMV) viruses. Serological techniques and a host range of *Vigna sinensis, Nicotiana tabacum* 'X-73', and *N. clevelandii* were used to detect and identify these viruses. Antiserum conjugated to latex was used to detect CYMV and WCMV directly from clover sap diluted one-tenth and one-one

hundredth to prevent antigen excess. PSV was detected by the systemic symptoms it causes on *V. sinensis*. AMV and CYVV may occur in concentrations too low for serological detection; consequently, clover extracts were inoculated to *N. clevelandii* and X-73 tobacco. Latex-antiserum was used to detect CYVV in undiluted sap from *N. clevelandii*. Gel diffusion in 0.85% agarose with and without saline was used to detect AMV in undiluted sap of *N. clevelandii* and X-73 tobacco. Some AMV isolates were detected by gel diffusion more readily from *N. clevelandii* and others from X-73 tobacco. Agarose was more reliable than Ionagar No. 2. This assay technique will be used to determine the prevalence of viruses in white clover.

Inhibition of acquired resistance and polyphenol oxidase by 2-thiouracil in virus-infected soybean. GOPAL K. BATRA & C. W. KUHN (Univ. Ga., Athens). A cowpea chlorotic mottle virus infection caused acquired resistance (AR) in the hypersensitive host soybean (*Glycine max* 'Bragg'). AR was based on fewer and smaller lesions (compared with noninoculated controls) produced on one half of a primary leaf, the other half of which had previously been inoculated. Development of AR was noticeable in 3 days and reached a peak in 6-8 days. When the inoculated plants were fed 10^{-3} M 2-thiouracil (TU) instead of water, AR did not develop. Lesion number and sap infectivity of challenged half-leaves were similar to those of controls without a primary inoculation, and greater than those of controls not treated with TU. Polyphenol oxidase (PPO) activity decreased 92% (compared with healthy, nontreated controls) in half-leaves that had been infected and TU-treated for 4 days, but decreased only 33% in the opposite noninoculated half-leaves. When noninoculated half-leaves were challenged, there was no further change in PPO activity. The decrease in PPO activity concurred with loss of AR, lesion enlargement, and increased virus infectivity, all events resulting from TU treatment. TU strongly inhibited PPO in in vitro tests, and the inhibition could not be removed or reduced by dialysis.

Susceptibility of maize dwarf mosaic virus-infected sorghum to Helminthosporium maydis. S. P. BENIWAL & R. T. GUDAUSKAS (Auburn Univ., Auburn, Ala.). *Sorghum bicolor* 'McNair 652' plants previously inoculated with maize dwarf mosaic virus (MDMV) showed higher incidence of necrotic leaf spotting than nonviral-infected plants in field plots near Winfield, Ala., in 1970. Isolations and pathogenicity tests indicated that the leaf spot was caused by *Helminthosporium maydis*. Healthy and MDMV-infected McNair 652 seedlings were sprayed with *H. maydis* conidia suspended in water containing 5% sucrose and held in a moist chamber overnight. Symptoms appeared within 24 hr as tiny, water-soaked spots which later became necrotic. On MDMV-infected plants, spots became progressively larger and concentric, often reaching 1-2 cm in diam. Spots on nonviral-infected plants failed to increase in size. Pathotoxin produced by the fungus in liquid medium caused characteristic symptoms only on MDMV-infected plants. Five of 16 sorghum cultivars tested showed positive correlation between MDMV infection and increased susceptibility to *H. maydis*.

Influence of fertilizer treatments and crop sequence on populations of root-knot nematodes, Meloidogyne incognita. R. J. COLLINS & R. RODRIGUEZ-KABANA (Auburn Univ., Auburn, Ala.). A 2-year study of root-knot nematode populations was conducted in plots of a 10-year-old fertility experiment. Plots were under a rotation sequence of corn, winter wheat, soybeans, and cotton, and in some plots a winter legume of crimson clover-vetch mixture as green manure. Fertilizer treatments varied from a complete formulation (N, P, K, lime, minor elements) to treatments deficient in one or more components. Populations of *M. incognita* were highest in plots with cotton and corn, followed by winter legume, soybeans, and winter wheat in decreasing order. High numbers occurred only in plots that received complete fertilizer treatments except plots deficient in P; in these, high populations occurred under all crops except cotton, in which populations were suppressed. Crops in K-deficient plots supported fewer root-knot nematodes than those in nondeficient soil except for corn, which supported higher numbers. The addition of minor elements did not affect root-knot populations. Nitrogen supplied as NH_4NO_3, rather than from winter legume, increased populations in all crops except cotton, where no difference was found. Omission of lime restricted root-knot populations in all crops.

Reactions of the trichloromethyl sulfenyl fungicides with histones. R. COUCH & M. R. SIEGEL (Univ. Ky., Lexington). The reactions of captan, its analogue folpet, and their decomposition product thiophosgene ($S{=}CCl_2$) with histones rich in lysine or arginine, were characterized by the use of labeled fungicides and polyacrylimide gel electrophoresis. The binding of label from S^{35} captan or C^{14} folpet and the polyacrylimide gel patterns of captan-treated histones rich in lysine or arginine were pH-dependent. More label from C^{14} or S^{35} folpet was bound to both histones at pH 9.0 than at pH 7.5. Gel patterns of histones treated with captan at pH 7.5 were no different from those of untreated histones. At pH 9.0, the aniline black-staining bands of captan and $S{=}CCl_2$-treated histones in polyacrylimide gels were characterized by band diffusion, loss of staining definition, and band migration. These data suggest that deprotonated site(s) on both types of histones bind all or a portion of the fungicide molecule. Captan and $S{=}CCl_2$ also appear to change the configuration and/or cause denaturation of the histone molecules. The reported mutagenic and teratogenic effects of the trichloromethyl sulfenyl fungicides may be the result of changes in the physical and chemical properties of nuclear proteins in cells exposed to these fungicides.

Mycoflora and aflatoxin contamination of Helminthosporium maydis-damaged corn. B. DOUPNIK, Jr. (Univ. Ga. Coastal Plain Exp. Sta., Tifton). Because of concern over the feeding of corn damaged by *Helminthosporium maydis*, the causal agent of southern leaf blight, 80 kernel samples (40 blight-damaged and 40 nonblight-damaged) were submitted in 1970 and 1971 for mycoflora and aflatoxin assays. Fungal assays were made by plating surface-disinfected kernels on rose bengal-streptomycin agar and incubating them at 28 C for 5 days. Colonies growing from the kernels were then enumerated and identified. Aflatoxin assays were made by the aqueous-acetone method. The mycoflora of the blight-damaged grain consisted primarily of *Fusarium moniliform* (79.2% of the total kernels infested), *Aspergillus flavus* (47.2%), *H. maydis* (32.4%), *Penicillium* spp. (13.6%), and other *Aspergillus* spp. (12.4%). The incidence of the above fungi in nonblight-damaged corn ranged from 1 to 10%. Aflatoxins were found in 25% of the blight-damaged samples, ranging from 15 to 3,205 ppb and averaging 728 ppb, whereas 5% of the nonblight-damaged samples contained aflatoxins ranging from 5 to 33 ppb and averaging 19 ppb. Southern corn leaf blight damage apparently predisposed the grain to invasion by secondary fungi and aflatoxin contamination.

Growth of the wheat stem rust fungus on a defined medium. A. S. FOUDIN & W. K. WYNN (Univ. Ga., Athens).

Sustained axenic growth of *Puccinia graminis* f. sp. *tritici*, race 126-ANZ-6, 7, was obtained on a defined medium consisting of 1% agar, 3% glucose, Czapek's minerals, Burkholder and Nickell's trace elements, and a mixture of 16 amino acids in the proportions found in purified casein hydrolysate. The defined medium was developed by the initial screening of 25 commercial peptones, then comparison of representative products which did and did not support growth. Only six peptones were effective when incorporated directly into a basal medium; however, six more peptones supported growth after additional hydrolysis. Amino acid analyses of 12 representative peptones which did and did not support growth showed distinct amino acid patterns for both groups. Mineral analyses showed no unique levels of trace elements. Other organic components of some peptones, such as vitamins, did not affect growth. Since purified casein, hydrolyzed 48 hr, was found to support growth as well as the best commercial products, its composition was mimicked to prepare the defined medium. Mycelial growth from uredospores, measured at 28 days, on this medium was equal to that on media containing casein hydrolysate and superior to that on Evans' peptone.

Isolation and identification of a new lima bean virus. J. D. GAY (USDA, Ga. Coastal Plain Experiment Station, Tifton). A virus causing a mosaic disease of lima bean, *Phaseolus lunatus*, was isolated from plants of Jackson Wonder at Tifton. Symptoms were expressed as a mild mottle of mature leaflets and enations and mottling of young leaflets. The virus was mechanically transmissible and the host range included lima bean; snapbean, *Phaseolus vulgaris*; and southern pea, *Vigna sinensis*. The only local lesion host observed for the virus was *Capsicum frutescens* 'Tabasco'. The virus is not serologically related to southern bean mosaic virus (SBMV) or to cowpea chlorotic mottle virus (CCMV). Virus symptoms were observed in three of 1,000 Jackson Wonder plants grown from seed of infected plants. The in vitro physical properties of the virus were determined with sap from field-infected plants. Virus-containing sap maintained at 20 C was infective after 2 but not after 4 days. The dilution end point was between 10^{-3} and 10^{-4}, and the virus was thermally inactivated in 10 min at 55 C. The ultraviolet absorption curve had a peak at 260 nm and a valley with its lowest point at 236 nm. Extinction ratios of 0.49 and 0.61 nm were noted for 280:260 and 240:260 nm, respectively. Electron-microscopic observations of the virus revealed rod-shaped particles with dimensions of ca. 680 X 25 nm.

Studies on fungicidal control of black spot on roses after severe disease development. W. K. GLENN, Jr., L. W. BAXTER, Jr., & W. WITCHER (Clemson Univ., Clemson, S.C.). Folpet, chlorothalonil, benomyl, maneb, and a chlorothalonil-benomyl combination were tested for control of black spot on the rose varieties Peace and Crimson Glory. The spray programs conducted during 1968 and 1969 were begun after the plants were severely diseased. Data were collected at the end of the season by visual rating (1968) and as green weight of canes and leaves pruned 1 ft above the ground (1969). The latter method better reflected the health and vigor of the plants. Either folpet or chlorothalonil, when applied weekly as foliar sprays at 2,500 ppm active ingredient (ai) gave excellent control and maintained control throughout both seasons. Maneb as a foliar spray weekly at 2,500 ppm ai (1968 and 1969), benomyl as a foliar spray either biweekly at 625 ppm ai (1968) or weekly at 625 ppm ai (1969), and a chlorothalonil (2,500 ppm ai) -benomyl (625 ppm ai) combination as a foliar spray biweekly (1968) failed to control black spot. Chlorothalonil biweekly at 2,500 ppm ai (1969) did not afford acceptable control. Folpet caused slight foliar damage during hot, humid weather. In a separate test, chlorothalonil caused no apparent damage at 10,000 ppm ai when applied weekly during the period 27 June-18 July 1969.

A newly recognized virus disease of burley tobacco in North Carolina. G. V. GOODING, Jr., & M. SUN (N.C. State Univ., Raleigh). Burley tobacco plants (*Nicotiana tabacum*) with symptoms resembling those caused by potato virus Y(PVY) were observed in several fields in 1970 and 1971. Percentage of diseased plants in individual fields ranged from 2 to 60. The causal virus was also found on tomato (*Lycopersicon esculentum*), horsenettle (*Solanum carolinense*), and dock (*Rumex* sp.). The virus was transmitted nonpersistently from horsenettle and dock to burley tobacco (Burley 21) by the green peach aphid (*Myzus persicae*). Inactivation properties from Burley 21 were a dilution end point between 10^{-2} and 10^{-3}, thermal inactivation point between 60 and 70 C, and aging in vitro between 1 and 2 days. Flexuous particles about 13 by 730 nm and pinwheel inclusions were observed from infected Burley 21 plants. Serological cross-reactions among antisera to the new virus, potato virus Y, tobacco etch virus (TEV), and their respective antigens were negative. The new virus also could be distinguished from PVY and TEV on potato introduction No. 41956 and *Datura stramonium*. The virus is currently being compared with other viruses in the PVY group.

Control of rust and cercospora leaf spots of peanuts in south Texas. A. L. HARRISON (Tex. A&M Univ., Yoakum). Rust, *Puccinia arachidis*, alone can cause economic losses in peanuts. This was demosntrated by the superimposing of sprays of Bravo 75% WP, Bravo 6F (chlorothalonil), Dithane M45 (coordination product of zinc ion and maneb 80% WP), Fungi Sperse SZ (45% sulfur, 9.2% zineb), and Fungi Sperse MagiCal (30.5% sulfur, 5.7% zineb, 23% organic calcium compound), Plantvax EC (oxycarboxin), Du-Ter 47.5% WP (triphenyltin hydroxide) EL 279 (*a*-2-chlorophenyl-*a*-cyclohexyl-5-pyrimidine methanol), and Cosanil (25% zineb, 20% sulfur, 5% copper) on benomyl-treated peanuts. In 1970 (under moderate rust conditions), all treatments gave increases ranging from 400 to 600 lb./acre over the benomyl check. In 1971 under epiphytotic conditions, all treatments again increased yields over the benomyl check. Yields ranged from 1,324 (check) to 2,654 lb./acre in Frio County, and from 822 (check) to 2,806 lb./acre in Atascosa County. In other tests spraying with Bravo 75% WP, Bravo 6F, Dithane M45, El 279, Fungi Sperse, Manzate 200 (coordination product of zinc ion and maneb 80% WP), and tank mixes of benomyl + Manzate 200, benomyl + Manzate 200 + Humble Oil 795, benomyl + *Du-Ter*, and Benlate M (a factory mix of benomyl and Manzate 200) all reduced losses from combinations of *Cercospora* leaf spots and rusts.

Differences in sensitivity of soft rot Erwinia spp. to an inhibitory fraction from corn. J. R. HARTMAN, A. KELMAN, & C. D. UPPER (Univ. Wisc., USDA Pioneering Res. Lab., PS Div., ARS, Madison). The causal agent of bacterial stalk rot of corn, *Erwinia chrysanthemi* pathotype *zeae* (ECZ), is physiologically very similar to other soft rot *Erwinia*, but can attack corn, whereas other soft rot *Erwinia* cannot. A fraction obtained from water extracts of corn tissue was more inhibitory to *E. carotovora* (EC) than to ECZ. This differentially inhibitory fraction killed EC within 20 hr at concentrations of >0.75 g fresh wt equivalent of corn tissue/ml peptone-casamino acid-glucose broth, whereas >2.0 g/ml was required to kill ECZ. A longer lag phase in growth of EC, as compared to ECZ (based on viable cell count and turbidimetric assays), was caused by <0.75 g/ml.

Of 30 bacterial isolates tested, 11 pathogenic to corn (including *Pseudomonas syringae* [2], *P. albo-precipitans* [2], *E. stewartii* [1], and ECZ [6] were generally less sensitive to the inhibitory fraction than were 13 other plant pathogenic isolates (eight species) and six species of saprophytes. Detectable levels of the inhibitory fraction were not extracted from boiled or autoclaved tissues.

Dasheen mosaic virus infections in commercial plantings of aroids in Florida. R. D. HARTMAN & F. W. ZETTLER (Univ. Fla., Gainesville). Surveys of 1969-71 indicate that dasheen mosaic virus (DMV) is prevalent in plantings of aroids in Florida. DMV infections were assessed on the basis of symptoms expressed and recovery of virus to seedlings of *Philodendron selloum* (≥4 seedlings manually inoculated/sample). Symptoms of all *P. selloum* seedlings infected in recovery trials corresponded with those reported for DMV by *Zettler et al.* All 13 *Caladium hortulanum* and 24 *Dieffenbachia picta* samples assayed in recovery trials were infected. Other aroids commonly found infected with DMV were *Aglaonema modestum, Dieffenbachia amoena, Xanthosoma* spp., and *Zantedeschia* spp. Species of *Anthurium, Arisaema,* and *Spathiphyllum*, not found to be naturally infected, proved susceptible, however, to DMV when inoculated as seedlings. Plants with symptoms were observed in all caladium and malanga (*Zanthosoma* spp.) fields surveyed and in all foliage nurseries visited. Based on our surveys, we postulate that certain aroids such as *Candidum caladium* and the Exotica and Perfection cultivars of *D. picta* are uniformly infected with DMV, and that the use of such techniques as mericloning may be necessary to obtain virus-free plants of these cultivars.

Infrared photography of southern corn leaf blight. J. W. HILTY & B. S. AUSMUS (Univ. Tenn., Knoxville and Oak Ridge Nat. Lab., Oak Ridge). *Helminthosporium maydis*-infected corn was photographed in plots established in Tennessee through the 1970 epiphytotic using remote sensing techniques. Color infrared, black and white infrared, and conventional color films were exposed using an assembly of four 70 mm Hasselblad cameras mounted in the ventral portal of a DC-3 aircraft. Various filter combinations were used with the color infrared film to determine those optimum for determining healthy and diseased corn and differentiating disease severity ratings. Imagery was interpreted as optical density values assigned by the Tech/Ops Scandig Model 25 High-speed Digital X-Y Scanning Microdensitometer. Density value ranges of two or three successive numbers were then assigned symbols and computer printout consisted of symbolic maps. Using computer drawn histograms of density values, the per cent of ground area and density ranges corresponding to disease severity ratings were calculated. Infrared film gave better contrast between healthy and diseased foliage. Ground truth studies correlated disease indexes of *H. maydis*-infected corn with photographic imagery.

Association of bacteria with rind necrosis of watermelon in Florida. D. L. HOPKINS (Univ. Fla., Leesburg). A brown, corky, dry necrosis of the rind, from which bacteria can consistently be isolated, has been observed in watermelon in Florida for several years. Bacteria could not be isolated from healthy watermelon rinds. Most of the bacterial isolates obtained from necrotic watermelon rinds were species of *Erwinia*; however, a few isolates of green, fluorescent *Pseudomonas* species were also obtained. When injected into watermelon rinds, water suspensions of the isolates of both *Erwinia* and *Pseudomonas* reproduced the symptoms of the disease at the inoculation site, and the bacteria could be reisolated from these necrotic areas. Limited spread of the rind necrosis occurred in some cases, but the extensive systemic browning of the rind that is often found in natural infections did not develop after inoculation by injection.

Mercury content of sprouts and harvested roots from treated sweet potato mother roots. D. HUISINGH & L. W. NIELSEN (N.C. State Univ., Raleigh). Mercury-containing fungicides have been used extensively for seed and root disease control, but data on the fate of the mercury (Hg) are scarce. Experiments were designed to see if Hg applied to propagative sweet potato roots increased the Hg-content of edible roots. Roots were treated with Semesan Bel (hydroxymercurinitrophenol + hydroxymercurichlorophenol), Mertect (Thiabendazole: 2-[4-Thiazolyl]-benzimidazole), or Botran (2,6-Dichloro-4-nitroanaline) at recommended rates or with water. Treated roots were bedded into sandy loam soil, and the plants were harvested at 2 and 3 months after bedding. Some sprouts transplanted at 2 months were grown to maturity, and the harvested roots were analyzed. Hg analyses were performed by flameless atomic absorption. Roots treated prior to planting with Semesan Bel, Mertect, Botran, and water contained 23.0, 0.05, 0.03, and 0.03 μg/g dry wt, respectively. At the 2-month harvest, the leaves and stems of the Semesan Bel-treated plants contained 5 times more Hg than those of the other treatments. By the 3-month harvest, the amount of Hg in plant leaves and stems from Hg-treated roots was 2 to 3 times that of the others. Fall harvested fleshy roots contained 0.03, 0.02, 0.03, and 0.03 μg/g dry wt Hg for the Semesan Bel, Mertect, Botran, and water treatments, respectively. This demonstrates that the Hg applied to the mother root was translocated to the new plant, but little if any was translocated to the new fleshy roots.

Strawberry fruit rot caused by Dendrophoma obscurans. C. M. HOWARD (Univ. Fla. Agr. Res. Center, Dover). During recent years, a previously undescribed ripe fruit rot has caused extensive fruit loss in plantings of California strawberry varieties in Florida. In early stages the lesions are usually circular, soft, and light pink, but occasionally may be gray or tan. The lesions enlarge until the entire berry is affected and turns brown, then black, as numerous pycnidia are formed. Isolation from the lesions usually yields only *Dendrophoma obscurans*, the causal organism of strawberry leaf blight. Potted Tioga plants and ripe and green fruit were inoculated with spore suspensions from isolates obtained from fruit and leaf blight lesions. Leaf blight lesions developed on plants inoculated with either isolate and held at 27-31 C. Within 5 days, typical rot lesions developed at many inoculation sites on ripe fruit. Lesions developed on only a few of the green berries, generally those that had begun to ripen. The fungus was readily reisolated from foliage and fruit lesions. These results show that *D. obscurans* can cause a strawberry fruit rot.

Factors influencing survival and germination of Helminthosporium sorokinianum conidia in South Carolina. G. C. KINGSLAND (Clemson Univ., Clemson, S.C.). Conidia of *Helminthosporium sorokinianum* survived for 44 weeks (22 May 1970 to 30 March 1971) on oat straw segments on the surface or at 0.5-inch depths in a Cecil sandy-loam soil under field conditions. Soil moisture varied between 018 and 16.0% (average, 7.2%). Soil temperature weekly highs varied between 54 and 108 F; weekly lows varied between 22 and 72 F. The average high was 73; the average low was 52; the over-all average was 62 F. Germination of conidia after 44 weeks was influenced by the suspension medium and the method for counting. Germination, for example, varied between 71% for conidia suspended in 7% glucose and counted on water agar and 8% for conidia suspended in

distilled water and counted on depression slides. Significant differences in germination were recorded between suspension media (54% in glucose and 34% in water), between methods for counting (65% when spores were counted on water agar and 23% when counted on depression slides), between the two isolates studied (40 and 47%), and between location of spores in the soil (50% on the surface and 38% at 0.5 inch in the soil). Fewer than 1% of the recovered conidia were lysed. Survival of conidia of *H. sorokinianum* in the soil may be an important factor in the initiation of primary disease cycles on cereal grains.

Influence of cell-free soil extracts on germination of conidia of two Helminthosporium spp. G. KINGSLAND & C. CROSS (Clemson Univ., Clemson, S.C.). Germinability of conidia of one isolate of *Helminthosporium maydis* and three isolates of *H. sorokinianum* was investigated in cell-free extracts of three soil types to provide information concerning soil mycostasis and survival of conidia in the soil environment. Conidia were suspended in Millipore filter-sterilized extracts from each of three soil types, in sterile distilled water, in 7% glucose, and in glucose plus soil extracts. Germination averages for conidia of *H. maydis* were 92% or more in all four germination media. There were no differences in the germination of *H. sorokinianum* conidia in extracts from different soils. Differences in germination did occur between isolates of *H. sorokinianum* (29, 44, and 60% for the three isolates), thus substantiating the hypothesis that germinability is an inherent character. Germination of conidia of *H. sorokinianum* in glucose-extract (79%) and in water-extract (44%) was significantly higher than in glucose (36%) or in water (18%). Carbohydrate dependence for germination was reaffirmed. Inhibition of germination by soil extracts did not occur. Conversely, extracts stimulated germination of *H. sorokinianum* conidia.

Effect of relative humidity on dissemination of Fusicladium effusum conidia. A. J. LATHAM (Auburn Univ. Agr. Exp. Sta., Auburn, Ala.). Kramer-Collins spore collectors were installed in two pecan orchards to study dissemination of *Fusicladium effusum*, causal agent of pecan scab. On 22 July, clusters of infected pecans were positioned within 2.5 cm of the collector orifice. Abundant populations of *F. effusum* conidia were trapped continuously on silicone grease-coated microscope slides in 1-hr bands until 28 August, when populations became comparatively low. Severely infected pecans fell from the trees before the last collection date, necessitating relocation of another infected cluster under the collector orifice. When relative humidity (RH) was 100% at night or during rainy periods, no *F. effusum* conidia were trapped; however, abundant conidia of other fungi were trapped under these conditions. Some *F. effusum* conidia were trapped on the first hourly band after a drop of RH below 100%. Average RH during these periods ranged from 89 to 99%. Numerous conidia were deposited 3.5 hr after RH dropped below 100%. Maximum deposits of conidia occurred 5 hr after the RH drop, with highest number of *F. effusum* conidia trapped when RH was below 89%.

Effect of some pesticides on infectivity of maize dwarf mosaic virus. D. W. LINDSEY, R. T. GUDAUSKAS, & S. P. BENIWAL (Auburn Univ., Auburn, Ala.). Effect of dimethylsulfoxide (DMSO), benzimidazole (BZ), benomyl, and 5,6-dihydro-2-methyl-1,4-oxathiin-3-carboxanilide-4,4-dioxide (Plantvax) on maize dwarf mosaic virus (MDMV) infectivity in virus-chemical mixtures and also in preventing or eradicating MDMV-infection in corn seedlings was determined. MDMV diluted in aqueous solutions of 0.1-1% DMSO showed little loss in infectivity; however, infectivity was reduced by 75% when the virus was suspended in 5% DMSO, and by 90 and 100% in 20 and 50% DMSO, respectively. MDMV in 0.01-1% benomyl and 0.01-0.1% Plantvax solutions was about as infectious as virus suspended in water only; infectivity was reduced 50% in 1% Plantvax and 96-100% in 5 and 10% solutions of either chemical. BZ in concentrations of 0.1 and 1% appeared to enhance infectivity. None of the chemicals applied as foliar sprays, soil drenches, or seed treatments protected corn seedlings from subsequent infection by MDMV; foliar sprays did not suppress symptom development in previously infected seedlings.

Mycoflora associated with leaf scorch of pecan. R. H. LITTRELL & R. E. WORLEY (Univ. Ga. Coastal Plain Sta., Tifton). Five-mm leaf discs were removed from scorched leaflets, soaked for 5 min in 1:10 sodium hypochlorite solution, plated on potato-dextrose agar, and incubated for 10 days at 28 C. Twenty-five leaf discs were plated from leaves collected from each of ten cultivars. Each cultivar was given a leaf scorch index (LSI, number of leaflets/leaf with leaf scorch symptoms, based on 100 leaves/tree). The following genera were recovered: *Pestalotia, Nigrospora, Phoma, Alternaria, Epicoccum, Curvularia, Fusarium, Gloeosporium,* and *Helminthosporium*. Per cent recovery ranged from 75 for *Pestalotia* to less than 1 for *Gloeosporium* and *Helminthosporium*. Cultivars Cape Fear, VanDeman, and Schley had significantly higher LSI ratings (2.78-2.18) than Desirable, Pensacola Cluster, Mobile, Hastings, Harris Super, Stuart, and Starking Hardy Giant (LSI 0.87-0.11). Additional tests were run to compare mycoflora from healthy and diseased tissue. Leaf discs from Stuart trees were plated, and correlation coefficients (r's) of mycoflora with leaf scorch were determined. Significant r's indicated that scorch was associated with *Pestalotia, Epicoccum, Curvularia,* and *Fusarium*. This study suggests that leaf scorch is associated with at least four genera of fungi, and cultivars differ in disease susceptibility.

Reasons for differential transmission of isolates of cauliflower mosaic virus by aphids. M. LUNG (Univ. Ky., Lexington). Studies were made to determine why the Cabbage B and New York 8153 isolates of cauliflower mosaic virus (CIMV) are readily transmitted by *Myzus persicae*, whereas the Campbell isolate is not. There were no differences in the concentration of the isolates in either epidermal or whole leaf tissue; the distribution and location of virus particles in cells, as determined by electron microscopy, was the same for all isolates. Campbell particles migrated to a point between the transmissible isolates, in gel electrophoresis. None of the isolates could be transmitted by aphids from purified preparations. Campbell could be transmitted from plants also infected with Cabbage B, or by aphids which had previously probed plants infected with Cabbage B. Purified New York 8153 could be transmitted by aphids which had previously probed plants infected with Cabbage B. It is suggested that a factor necessary for aphid transmission of CIMV is present in leaves of plants infected with transmissible strains, and is not present in leaves infected with nontransmissible strains or in purified virus preparations. This factor may be acquired by aphids which probe leaves infected with transmissible strains; this enables the aphids to subsequently transmit nontransmissible isolates or purified viruses.

Factors influencing the invasion of cotton bolls by Diplodia gossypina. S. M. MC CARTER (Univ. Ga., Athens). The carpel walls of mature, green, excised Coker 201 cotton bolls were inoculated with mycelial plugs of *Diplodia gossypina* to study the influence of temperature, portal of

entry, and isolate on disease development. The rate of both disease development and growth of the fungus in vitro increased from 10 to 30 C, but not from 30 to 35 C. At 30 C, bolls were completely decayed in 4 days when the inoculum was placed over a deep wound (dissecting needle passed through the carpel wall), in 5-7 days when inoculum was placed over a shallow wound (surface scratched) or between artificially cracked sutures, and in 9 to 11 days when inoculum was placed on noninjured bolls. Fourteen isolates of *D. gossypina* from different locations varied in their capacity to invade injured and noninjured bolls. Differences were greatest on noninjured bolls. Wounding of bolls greatly increased the rate of disease development regardless of the isolate used. These results indicate that both high temperatures and boll injuries, and to lesser extent the fungal isolate, are important factors in the rapid development of Diplodia boll rot.

Efficacy of benomyl (Benlate) and triarimol (EL-273) against juniper blight of Juniperus sabina tamariscifolia. L. S. MORRISON (Okla. State Univ., Stillwater). Benomyl and EL-273 (triarimol) were evaluated for the control of juniper blight on container-grown "tam junipers" planted in a mixture of crushed pine bark and shale (pH 5.3). Preliminary results in 1969 indicated that benomyl (Benlate 500 and 1,000 ppm preplant mix) would give control. In 1970, no significant differences were noted between treatments due to low disease incidence. Treatments in 1971 were applied to the same plants used the preceding year; EL-273 spray at 14-day intervals (100 ppm) with or without Nu-Film 17, an extender, EL-273 drench at 6-week intervals (100 or 200 ppm), benomyl spray at 14-day intervals (600 ppm = 0.50 lb./Benlate/100 gal) with Triton B-1956 or Nu-Film 17 and benomyl drenches at 6- or 12-week intervals (600 or 1,200 ppm). All benomyl treatments gave significant control over all EL-273 treatments. Benomyl-treated plants were 93-100% salable; those treated with EL-273 were 28-74% salable; whereas untreated plants were only 25% salable.

Infection studies and source of resistance to Glomerella dieback and canker of camellia. L. W. BAXTER, JR. (Clemson Univ., Clemson, S.C.). Dieback and canker of camellia stems caused by *Glomerella cingulata* affects most cultivars of both *Camellia japonica* and *C. sasanqua.* Infection occurs through pruning wounds, and the fungus progresses down these stems and continues to kill back the growth. However, when infection occurs naturally through leaf scar wounds, the infection typically results in canker formation, and the cankers tend to increase to a maximum size of about 20-25 mm. Inoculations made through leaf scar wounds during either spring or fall result in shallow, elongated lesions during the 1st week. After the 1st week, there is no appreciable further elongation of infection, but transverse development continues for several weeks. A few cultivars of *Camellia sasanqua* have been found to heal after canker formation, provided the infection was on stems with diameters larger than 4 mm. One cultivar of *C. sasanqua* has been identified which resists the transverse development, and there is only limited circumlongitudinal development. This cultivar produces seed readily. Inoculations made on two plants of *C. oleifera* for the purpose of identifying sources of resistance to *Glomerella* indicate that this species is extremely susceptible.

Aphanomyces blight of amazon sword plant. W. H. RIDINGS & F. W. ZETTLER (Fla. Dep. Agr. & Consumer Services, Univ. Fla., Gainesville). A disease caused by the fungus *Aphanomyces* sp. was found on amazon sword plants (*Echinodorus brevipedicellatus*) at an aquatic nursery in south Florida. Suspensions of zoospores or comminuted mycelial fragments infected 28 of 45 inoculated plants of *E. brevipedicellatus*. Symptoms were identical to those seen under field conditions and on plants inoculated with water from containers of infected plants. *Aphanomyces* sp. was repeatedly recovered from infected tissues. The following alismataceous species did not become infected when inoculated: *E. grisebachii, E. longistylis, E. martii, E. rangerii, Sagittaria lorata,* or *S. sinensis.* Likewise, inoculated specimens of *Hydrilla verticillata, Myriophyllum spicatum,* and *Alternanthera philoxeroides* remained healthy. The morphology of oogonia, oospores, antheridia, and primary and secondary zoospores of this fungus in water agar cultures closely resembled two isolates of *A. euteiches* used for comparison and published descriptions of this species. Moreover, the amazon sword plant isolate infected seedings of pea (*Pisum sativum* 'Alaska' and 'Little Marvel'). The two *A. euteiches* isolates, however, failed to infect plants of *E. brevipedicellatus.*

Fusarium roseum pathogenic to water hyacinth in Florida. R. E. RINTZ & T. E. FREEMAN (Univ. Fla., Gainesville). A recent survey of Florida for diseases of water hyacinth (*Eichhornia crassipes*) resulted in isolation of a form of *Fusarium roseum* from diseased plants at Lake Griffin. Pure cultures when placed on the leaves and petioles in small potato-dextrose agar (PDA) blocks, induce elongated necrotic lesions. Chlorosis and vascular discoloration proceed in advance of necrosis in a narrowing band from the point of infection toward the leaf tip, and do not expand over the entire leaf surface. Macro- and microconidia are produced on the surface of the lesion, and the fungus is easily reisolated from necrotic tissues. In culture, the fungal colony is salmon-pink and cottony, producing abundant chlamydospores and macroconidia. The latter are 0- to 3-septate, the 2-septate forms being the least abundant. The optimum temperature for disease development and growth in vitro is approximately 25 C. Replacement culture filtrates of the fungus induce vascular discoloration in excised leaves. The toxic principle is effective to dilutions of 1:60, and is partially destroyed by autoclaving. To our knowledge, this constitutes the first report of a *F. roseum* isolate affecting water hyacinth in the western hemisphere.

Blast: a serious new disease of forage grasses in Louisiana. M. C. RUSH, G. D. LINDBERG, & R. B. CARVER (La. State Univ., Baton Rouge). A leaf spot and blast disease of rye, *Secale cereale* 'Vitagraze'; ryegrass, *Lolium multiflorum* 'Gulf'; and wheat, *Triticum aestivum,* was observed in production areas throughout Louisiana in October and November 1971. Symptoms consisted of small brown spots or gray-green, water-soaked spots on the leaves and stems of seedlings, which developed into round or elongated lesions with gray or blue-gray centers and dark brown or purple margins. Older lesions were surrounded by a chlorotic or yellow zone. Lesions were concentrated on the tip half of leaves, causing a rapid necrosis of leaves from the tip. The disease was epiphytotic throughout early planted ryegrass, affecting several thousand acres in Louisiana. The disease was especially severe in southern Louisiana. *Piricularia* sp. was fruiting on leaf and stem lesions. Conidia from the three hosts were morphologically similar to those of *P. grisea,* which causes similar diseases on crabgrass and St. Augustine grass throughout the southeastern United States. Unseasonally warm weather in October and early November and the use of high rates of nitrogen fertilizers probably contributed to the severity of the disease. This is the first report of *Piricularia* sp. pathogenic on rye, ryegrass, and wheat in the USA.

A new Cercospora leaf spot of Ligustrum japonicum in south Georgia. E. K. SOBERS & D. L. GILL (Univ. Ga.,

ARS, USDA, Coastal Plain Exp. Sta., Tifton). Two species of *Cercospora* are found on leaves of *Ligustrum japonicum* in south Georgia. *C. lilacis* produces irregularly circular lesions up to 15 mm in diam, with tan to brown centers, reddish brown to reddish purple margins of varying width, and usually only two to three lesions/leaf. The second species, not previously reported on Ligustrum, produces lesions that are irregularly circular, up to 20 mm in diam, mostly yellow to slightly tan in the center, usually without a distinct margin or occasionally with a light brown margin, and often coalescing to form large irregular lesions that cover much of the leaf surface. Conidia of the two species are subhyaline to very pale olivaceous, linear to narrowly obclavate, straight to curved, septate, and 35-145 × 2.4-4.1 μ. They differ, in that *C. lilacis* produces stroma up to 60 μ in diam, whereas the unreported *Cercospora* exhibits small stroma consisting of 20-30 cells. Conidiophores of *C. lilacis* are olivaceous, 35-175 μ, and occur in dense fascicles. Conidiophores of the unreported species are pale olivaceous and only slightly darker than the conidia, 20-50 μ in length, and arise singly or occasionally in fascicles of 2-6.

Biological control of tobacco brown spot. H. W. SPURR, JR. (ARS, USDA, N.C. State Univ., Oxford). Typical brown spot lesions can be induced on susceptible tobacco under certain conditions by inoculation with pathogenic isolates of the fungus *Alternaria alternata*. When tobacco leaves were spray-inoculated with conidia of a nonpathogenic isolate (F646) several days prior to inoculation with a pathogenic isolate (A5), an average reduction in brown spot of about 60% was observed in field and laboratory experiments. In culture, isolate F646 was not antagonistic to the mycelial growth or conidial germination of isolate A5. Examinations of stained tissue indicate that F646 may alter the leaf surface sufficiently to stimulate A5 to grow on the surface and not to invade the tissue. The inoculation of plants with nonpathogenic microorganisms to alter pathogenesis may be of potential value for plant disease control.

The effect of inoculum density on severity of Fusarium wilt of watermelon. D. R. SUMNER (Univ. Ga. Coastal Plain Exp. Sta., Tifton). Eight isolates of *Fusarium oxysporum* f. sp. *niveum* were grown on cornmeal-sand (CMS), and each was mixed with 2×10^2, 10^3, or 10^4 Tifton loamy sand. Autoclaved CMS was mixed 1:200 in the controls. Seven days later, the propagules per gram (PG) of air-dry soil was determined by the dilution plate method using peptone-PCNB agar modified with streptomycin sulfate and chlortetracycline HCl. Inoculum density (ID) varied from $0\text{-}77 \times 10^4$ PG. Seven cultivars of known reaction to Fusarium wilt were grown for 28 days at 27-44 C in each soil in the greenhouse. Slightly resistant or susceptible cultivars were severely wilted (30% of the plants dying) at 28 days by 10^2-10^3 PG, at 23 days by $1\text{-}2 \times 10^3$ PG, at 19 days by $2\text{-}5 \times 10^3$ PG, and at 16 days by 10^4-10^5 PG. Progressively more ID was required before resistant cultivars wilted. There was no severe wilt in the controls. Emergence was reduced at an ID above 10^3 PG. Some isolates reduced emergence and increased wilt significantly more than others. Each cultivar was grown 22 days in naturally infested soil from seven fields cropped to watermelons in 1970 or 1971. All cultivars wilted 100% in one or more soils. In two soils with an ID of 10^3 PG, an average of 6% wilt was observed as compared to 40% wilt in two soils with an ID of 2×10^3 PG.

Resistance in St. Augustine grass Stenotaphrum secundatum to St. Augustine decline. R. W. TOLER, N. L. MC COY, & G. C. HORN (Texas A&M Univ., College Station, Univ. of Fla., Gainesville). St. Augustine decline incited by a mechanically transmissible virus appeared in epiphytotic form in 1968, 1969, 1970, and 1971 in Texas. The disease occurrence increased from 8 counties in 1968 to 49 counties in 1971, and has recently been identified in Louisiana and Mexico. Inoculations under greenhouse conditions were made on over 200 different commercial St. Augustine cultivars, breeding lines, and accessions. The plants were categorized as susceptible, symptomless carriers, those in which the virus multiplied but did not express symptoms, resistant, and those in which no virus multiplication could be detected when assayed into proso millet (*Panicum milliaceum*), the indicator host. Susceptible plants showed mottling, stunting, and chlorosis. Incubation time ranged from 18 to 48 days. Plant material showing varying degrees of resistance were evaluated in the field. Some accessions previously classified as resistant became infected and produced symptoms when naturally infected in disease production sites. The variety Roselawn exhibited resistance, and the breeding line Florida 110 has demonstrated the highest level of resistance in both greenhouse and field experiments.

Treatment of Cephalosporium wilt disease with a benomyl fungicide. E. P. VAN ARSDEL, S. D. LYDA, & T. W. JARES (Texas A&M Univ., College Station). Infected post oak, blackjack oak, and elm saplings (nine each) were treated with benomyl by drenching the surrounding soil, the stems, or the foliage with 9.5 g/liter in dimethylformamide (DMF) at 1.9 liter/tree. Bioassays showed the presence of benomyl in branches and twigs, but foliage injury was severe. Later leaves were healthy as judged by visible and infrared detectable symptoms. Six bimonthly twig isolations showed the absence of the fungus; however, dissection after 18 months disclosed living fungus deep in the boles of some. Five infected sycamores were drenched with 2 g/liter benomyl in DMF at 11.4 liter/tree. Bioassays showed penetration throughout the bole and twigs. Monthly post treatment isolations have been negative, but foliage phytotoxicity was severe. Treated trees recovered slowly (18 months to a fairly full crown), but untreated check trees died. One live oak 10-inch diam breast height (DBH) was treated the same as the sycamores. Post treatment isolations were negative, leaf size increased, and a good crown developed. Leaf injury was only moderate. A 45-tree treatment of post oaks (6- to 11-inch DBH) comparing water suspensions and powder to DMF solutions showed that a bole drench at 8 g/liter benomyl in DMF was necessary for control. A similar 20-post oak treatment at 15 g/liter was unsuccessful.

Uptake of dimethylformamide solutions of benomyl in sycamore, live oak, and post oak. E. P. VAN ARSDEL & D. L. BUSH (Texas A&M Univ., College Station). In an effort to control Cephalosporium wilts, the butts of 4- to 6-ft-long branches of sycamores, live oaks, and post oaks were cut off under the surface of liquid, and the amount of liquid taken up in 6 hr was measured. Solutions used were 64 g benomyl/liter in dimethylformamide (DMF), and serial 1/10 dilutions to 10^{-5}, pure DMF, 0.125 g/liter water, and water. At 64 g/liter, the benomyl precipitated in the vessels and stopped uptake. Good uptake was obtained at 0.64 g/liter, and the best at 10^{-4} g/liter. Bioassays and volume uptake showed good uptake and transport in sycamore through 4 ft from the cut end for all benomyl dilutions in DMF (except the 10^{-5} g/liter) and inhibition through 4.5 ft on live oaks, but post oaks stopped uptake after 2 hr and transport was limited to 1.5 ft. No enhanced inhibition was observed in samples from branches in pure DMF, benomyl in water, or pure water. The best uptake and transport were obtained in sycamore at 10^{-4} g/liter DMF. Live oaks had good uptake and transport to the same dilution. Uptake was limited to 2 hr in post oak, and no benomyl was transported more than 2 ft.

Effect of tobacco etch virus on growth and yield of bell peppers. B. VILLALON (Texas A&M Univ., Weslaco). Pepper seedlings, *Capsicum annuum* 'Yolo Wonder A', were inoculated with tobacco etch virus (TEV) at weekly intervals for 5 weeks beginning 4 weeks after seeding. There were six treatments with four replications including the noninoculated control. Plants were dusted with Carborundum, and three to four leaves inoculated with TEV (PV 69) using a pipe cleaner. Prior to harvest, plants were assayed for TEV by serology and host range symptomatology. All of 50 plants selected at random from the inoculated plots contained TEV. All plants in control plots were assayed. Control plots were 5, 13, 7, and 3% naturally infected. Yield and plant height were obtained simultaneously from 10 plants in the center of each plot row. Total yield reduction ranged from 6 to 53%. None of the fruit harvested from inoculated plots was of marketable quality. Plant growth was not significantly reduced; however, taller and more vigorous plants were observed in controls.

Effect of fertilizer rate on Rhizoctonia-caused root rot of azalea. J. T. WALKER (Univ. Ga., Experiment). Fertilization affected the severity of root rot caused by *Rhizoctonia solani* (RS) on 5-month-old azalea (*Rhododendron obtusum*). Cuttings (8-9 cm) from 3 cultivars were dipped in rooting compound, plunged into 280-cc containers of a vermiculite-sand-peat moss mixture (1:2:1), and held under mist for 2 months. After removal from the propagating bench, 29.9 g or 14.8 g/liter of a commercial water-soluble fertilizer (20-20-20) was applied on alternate weeks for 3 months with a 20:1 proportioner. Rooted cuttings were then removed from the rooting mixture, and the roots thoroughly washed with water and placed in cellophane pouches (14.5 × 16 cm) containing 20 g of vermiculite. Inoculum consisted of 7- to 14-day-old potato-dextrose agar cultures of RS blended in a total volume of 120 ml water/pouch. Plants were incubated in a growth chamber at 24 C and 12 hr light for 2 weeks, then indexed for disease (0-3). The higher fertilization rate resulted in greater root and stem disease indices than the lower fertilization rate with all cultivars. Inoculated plants of 2 cultivars weighed less than control plants. Average weight of noninoculated plants increased with increased fertility.

Overwintering of bean pod mottle virus in bean leaf beetles. H. J. WALTERS, F. N. LEE, & K. E. JACKSON (Univ. Ark., Fayetteville). Bean leaf beetles were collected during the winter months from duff or trash in or near fields where a high percentage of soybean plants had been infected with bean pod mottle virus (BPMV) the previous season. Single beetles were transferred to individual soybean seedlings and left for a minimum of 24 hr, or until they fed or died. The following numbers of beetles collected on various dates, which fed on test plants, transmitted BPMV: 6 January 1969, 1/43; 24 March 1969, 1/87; 5 April 1969, 3/34; 15 December 1969, 3/35; 16 January 1970, 0/41; 29 January 1970, 0/77; 11 February 1970, 11/64; 26 February 1970, 1/113; 25 March 1970, 4/158; and 15 April 1970, 0/125. Although the percentage of virus transmissions by beetles was low, sufficient transmissions occurred so that primary infection of virus could be established in volunteer soybeans and other available hosts in the spring. Generally, beetles collected at below freezing temperatures required 5-10 days to feed, whereas those collected at warmer temperatures required less time. It appears that BPMV overwinters in hibernating beetles, although it is possible that the virus is acquired during winter months by feeding of the beetles on the underground parts of infected dormant plants.

Trichoderma harzianum, a biocontrol for Sclerotium rolfsii. H. D. WELLS, D. K. BELL, & C. A. JAWORKSI (USDA, ARS, Univ. Ga. Coastal Plain Experiment Station, Tifton). *Trichoderma harzianum* was isolated from diseased sclerotia of *Sclerotium rolfsii* infecting blue lupine. We prepared inoculum for evaluating *T. harzianum* as a biocontrol agent by growing it for 10 days on a mixture containing 1 part annual ryegrass seed and 10 parts Tifton sandy loam and comminuting with an equal amount of the fresh media immediately prior to application. On 20 April 1971, Urbana tomatoes were seeded in the field 1 cm deep, 160 seed/m of row, rows on 35 cm centers, 4 rows/bed, and beds on 185-cm centers. Plots were 1 bed wide and 300 cm long. The inoculum was applied to the soil surface at a rate of 1.5 g/cm of row over a 10 cm-wide band. In the first tests, a factoral of treatments consisted of applying the inoculum on 4, 13, and 24 May separately and in combinations, and a nontreated control. Controls yielded 21.9% healthy plants on 6 July, whereas plots receiving 1 or more treatments yielded 90% and more disease-free plants. In a second factoral test, clipped versus nonclipped plants and treated versus nontreated plants were evaluated. Response from clipped versus nonclipped plants was not significant. *T. harzianum*-treated plots yielded 88-94% disease free plants compared to 40-46% for nontreated.

Pathogenicity, host range, and distribution of Colletotrichum graminicola on maize. H. WHEELER, D. J. POLITIS, & A. S. WILLIAMS (Univ. Ky., Lexington). Previous work with a culture of *Colletotrichum graminicola* isolated from maize in 1969 suggested that a race of this fungus, more pathogenic to maize than those previously found in the United States, was present in Kentucky. Tests in which 10-day-old maize plants were sprayed with spore suspensions (2×10^5 spores ml), showed that all *C. graminicola* isolates obtained from maize during 1971 (a total of 20 from 5 states) were like the 1969 Kentucky isolate in that leaves were rapidly invaded and many plants killed within 5 days. Maize isolates failed to produce visible disease symptoms on oat, wheat, or barley seedlings. Isolates of *C. graminicola* from sorghum and alfalfa and of *C. falcatum* from sugarcane failed to produce symptoms on maize. The severity of disease caused by maize isolates on maize seedlings was greatly increased under conditions of high humidity and low light. Severe stalk rot developed in 10 of 12 maize cultivars when spores were injected into stalks of plants at the pollination stage of development. These results indicate that a race of *C. graminicola* capable of causing seedling blight and perhaps stalk rot of maize is widely distributed in the United States.

Stimulation of fungus growth and sporulation by extracts from cultural filtrates of pythium. C. Y. YANG (Univ. Ky., Lexington). Culture filtrates of *Pythium debaryanum* and/or three other *Pythium* spp. grown in a chemically defined medium possessed factors that stimulate the growth and sporulation of several rhizospheric and plant pathogenic soil fungi. At least two distinct components which were isolated on Sephadex G-75 gel columns from culture filtrates were responsible for stimulation. One of these produces a pronounced stimulation of mycelial growth and sclerotium production by *Rhizoctonia solani*. Chromatographic analysis of alcoholic extracts of this component indicates that it is particularly rich in sugar. The extracts contain trehalose, glucose, cellobiose, maltose, lactose, rhamnose, fructose, galactose, and several unusual sugars. The other component supports mycelial growth as well as oospore production by

Aphanomyces euteiches. It has a characteristic ultraviolet-absorption spectrum with a single peak at 274 nm. Upon acid hydrolysis, this component yields 17 amino acids, with a least molecular weight estimated at 12,000. In the analytical ultracentrifuge, it behaves as a small globular protein having a sedimentation coefficient of 1.6 S. During electrophoresis, it moves toward the cathode as a single compound on cellulose acetate strips at pH 8.6.

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