ABSTRACTS OF PAPERS

Presented at Meetings of the American Phytopathological Society
A CLOSTERIUM-LIKE VIRUS OF NANDINA DOMESTICA 'NANDA-PURPUREA'.
Nandina leaf extracts stained in 2% phosphate-buffered phos-photungstate (pH 7.2) revealed flexuous-rod particles; 66% of 114 were 725-795 nm long fonda 760 nm. Sectioned phloem cells stained in saline A revealed viral inclusions distinct from those of nandina mosaic (Acta Horticulturae 110:71-77, 1980). Tissues stained in calamine orange and Luxol brilliant green revealed no cytoplasmic inclusions indicative of potyviruses. The virus was graft, but not manually, transmitted to nandina seedlings and induced intermittenly expressed foliar mosaic and distortion symptoms. Infected plants also showed stem-pitting symptoms, but were not stunted. These data and virus particle ultrastructure suggest that the nandina virus is a subgroup II closterovirus (Lister & Bar-Joseph. 1981. Handbook of Plant Virus Infections, p. 810). Serum specific electron microscopy of grids precoted with protein A and apple stem grooving antiserum showed a strong homologous reaction, but no reaction with the nandina virus.

HYPERSENSITIVE-LIKE REACTION IN TOBACCO SUSPENSION CELL CULTURES TO PSEUDOMONAS PISI. M. M. Atkinson and J. S. Huang. Department of Plant Pathology, North Carolina State University, Raleigh, NC 27695.
Tobacco suspension cell cultures underwent a hypersensitive-like reaction (HLR) when inoculated with Pseudomonas pisi, a pathogen incompatible with tobacco. UV-killed F. pisi cells or cells of the compatible pathogen P. solanacearum K60 did not induce HLR. The reaction was characterized by a loss of electrolytes from tobacco tissue, tissue browning and increased respiration. Each of the above parameters was monitored over a 9h period after inoculation of tobacco cultures with 3-5x107 

P. pisi cells/mL. Tobacco tissues exhibited reduced H+, Na+, Ca2+ and K+ effluxes and K+ uptake during the first 5h of HLR. Increased Na+, Ca2+, K+ and H+ effluxes were observed within 9h. The differential effect on ion fluxes in the early stages of HLR suggests a primary effect on active transport systems which may be followed by general membrane disruption.


Citrus exocortis viroid (CEV) was consistently detected in 20 g citron (Citrus medica) roots 2 weeks after inoculation and in 20 g citrus leaves 3 weeks after inoculation with buds from field-grown, CEV-infected sweet orange and grapefruit trees. A polyacrylamide gel electrophoresis (PAGE) procedure for isolation of virus-stranded RNA from virus-infected plant and fungal tissues (Phytopathology 69:854-858) was modified to detect CEV from citrus. CEV-infected citrus tissue was homogenized in 9 volumes of extraction buffer containing 0.28% berciton. The viroid was partially purified by cellolose chromatography using 20% ethanol, concentrated by ethanol precipitation, separated by PAGE and detected by staining in eichidia bromide and viewing under UV light. The viroid was located on the gel by infectivity on citron, Gynura auriculata and tomato. The procedure worked with CEV isolates which took 2-4 months by the traditional citron index to confirm CEV infection.

A POTATO TUBER ROT IN TEXAS. L. L. Barnes and R. A. Taber. Texas Agricultural Extension Service and Texas Agricultural Experiment Station, Texas A&M University, College Station, Texas 77843.

Texas high plains potato growers have reported serious incidences of tuber rot in furrow-irrigated potatoes. Obvious foliar symptoms were not reported during the growing season but a firm tuber rot appeared either as tubers matured or following vine kill. Internal tissue of cut tubers was initially salmon-pink in color followed by a gradual blackening after several hours of exposure. A number of Alternaria species were isolated from diseased tubers. One has tenta- tively been identified as A. nicotine var. parasites. The second isolate has morphological characteristics which are distinct, but positive identification has not been made. Confirmation of both species is pending oospore induction. Koch's Postulates confims that both isolates are capable of inducing tuber rot, and it is suggested that they may form a complex with greater disease potential.

SURVIVAL OF RHIZOCTONIA SOLANI ANASTOMOSIS GROUPS 1, 2, 3, AND 4 IN DOTHAN LOamy SAND. D. K. Boll and D. R. Sumner. Plant Pathology Department, Coastal Plain Station, Tifton, GA 31793.
Pots of heat treated soil were infested separately with Rhizoctonia solani: 4, 11, 2 and 15 isolates of AG 1 to 4 respectively, in Dec. 1980. Pots were buried to 5 cm of the rim, watered, and left fallow. Soil was sampled 3 times, ending in Sept. 1981. Populations were determined by plating soil on Tryptic acid-benomyl agar, then snaphane and corn were planted in all pots. Root and hypocotyl disease severity (RDS) (1-5 scale) was determined after 2 wk. Temperature in the upper 10.2 cm of soil ranged from 4 to 40 C and 74 cm of rain fell on the plots. Populations averaged 3, 16, 13 and 10 propagules/100 g of soil for AG 1 to 4 respectively, after 283 days. One, 4, and 8 isolates of AG 1 to 4 were recovered from soil. The RDS for AG 1 to 4 averaged 2.3, 2.5, 1.2 and 2.4 on bean and 1.0, 1.7, 1.0 and 1.1 on corn. One AG 1 isolate was recovered from bean, 0 from corn; 4 AG 2 from bean, 5 from corn; 0 AG 3 from bean and 5 AG 4 from bean, 0 from corn.

BIOLOGICAL FACTORS RELATED TO COPEA STUNT DISEASE DEVELOPMENT. C. P. Bonner and C. W. Kuhn, Department of Plant Pathology, University of Georgia, Athens, GA 30602.
Certain factors associated with cowpea stunt disease, caused by a mixed infection of cucumber mosaic virus (CMV) and black-eyed cowpea mosaic virus (BCMV), were studied in 3 cultivars: one showed synergism with necrosis (SN) and the other synergism with no necrosis (S). At 21 to 30 C the concentration of both viruses was greater in doubly infected plants than in singly infected ones. Peroxidase activity was increased synergistically in the SN cultivar but not the S cultivar, and polyphenol oxidase activity and profiles of CMV RNAs were similar in both single and mixed infections. When temperatures of 33 to 35 C prevented both S and SN, CMV concentraion was increased in doubly infected plants, but BCMV concentration and peroxidase activity were similar in single and mixed infections. We suggest the cowpea stunt synergism is caused by some event in the BCMV replication cycle.

DECLINE OF SPINTY GREEK AND BLUE RUG JUNIPER CAUSED BY PRATYLENCHUS VULNUS. D. M. Bensen and K. R. Barker. Dept. of Plant Pathology, North Carolina State University, Raleigh 27750.
Disease to Juniperus excelsa stricta 'Spinty Greek' juniper and J. horizontalis 'Blue rug' juniper by Pratylenchus vulnus was studied over 29 mo. in microplots. Containerized, 3-yr-old
Plants were transplanted to fungicidal microplots infested with 2160 nem/500 cm² soil in May, 1979. Differences in growth were found in 3 and 16 months after transplanting for Spiny Creek and Blue rug juniper, respectively. At 29 mo after transplanting nematode-infected plants were 2-fold smaller than control plants. Xylem-water potential (Ψ) measured with a pressure bomb in Sept., 1982 was 1 bars greater for Spiny Creek plants infected with F. ginseng than control plants but similar for Blue rug plants. After 2 wk of drought, Ψ was 2 to 4 bars higher for nematode-infected plants of both species. Nematode density of F. ginseng was 0.93 after 12 mo but dropped to 0.57 to 0.09 for Spiny Creek and Blue rug juniper, respectively, after 29 mo as root systems were damaged.

MAIZE DWARF MOSAIC VIRUS TRANSMISSION EFFICIENCY OF THE GREENBUG, SCHIZOPHIS GRAMINUM (RODANALI), BIOTYPE E. E. R. Benger and R. W. Toler, Department of Plant Sciences, Texas A&M University, College Station, Texas 77841.

The maize dwarf mosaic virus (MDMV) transmission efficiency of the greenbug, Schizaphis graminum (Rodanali), biotype E, was compared to biotype C transmission efficiency. After either alate or apterous adults were allowed ten minutes acquisition access to MDMV-A infected sudangrass, late instar insects were assayed for inoculativity. A 1980 Texas isolate of biotype E was less efficient, transmitting MDMV at 24.9% and 11.00% for alates and apterae respectively. A 1980 Minnesota isolate of biotype C transmitted MDMV at 9.01% and 14.56% efficiency for alates and apterae, respectively, while a 1978 Minnesota isolate of biotype C transmitted MDMV at 20.54% and 20.06% for alates and apterae, respectively.


Grain sorghum, Sorghum vulgare var. Broomdondi acreage is increasing in rotation with soybeans, cotton and corn in the southeastern states of the USA. It is grown in areas where root-knot and reniform nematodes are often a problem. Sorghum varieties, Pink G421, Pink G59, Pink G561, Pink G522A, Pink G52BB, Pink G550, Pink G611, Pink G623, and DeKalb 55 were greenhouse tested for root-knot and reniform host reactions. All varieties tested were highly susceptible to root-knot nematode, M. incognita, and reniform, M. incognita var. Wartelle. Numerous galls and egg masses occurred on the roots 49 days after exposure to 2nd stage larvae. Root galls were small on distorted, reddish discolored roots. All varieties were highly resistant or immune to reniform, M. incognita var. Wartelle. Few females and egg masses on the roots were observed. These varieties may be potential host reservoirs for M. incognita Wartelle, but could be used to reduce reniform nematode for subsequent crops.

THE INFLUENCE OF GROWTH REGULATORS ON JUuyểnOLE LEVELS IN PECAN. A. Borzani, C. H. Graves, Jr., and P. A. Hedin, Department of Plant Path. and Weed Sci., Miss. State Univ., and Boll Weevil Research Laboratory, USDA-ARS, Miss. State, MS 39762.

Juglone (5-hydroxy, 1,4-naphthoquinone) is identified as one factor for disease resistance in pecan (Carya illinomensis). Four growth regulators, 3-indoleacetic acid (IAA), gibberellic acid (GA₃), p-coumaric acid, and 1-dimethyl piperidinedicarboxylic acid treated with untreated checks for effects on the production and/or accumulation of juglone in mature trees. Single applications were made at 100 ppm in late April, using 1-tree plots, 3 replications, and random design. Juglone was monitored at 3-4 wk intervals through July. In 21 wks, leaf juglone in IAA and mequirit chloride treated trees was significantly increased at 3 wks; at 9 wks, juglone decreased in all. In juglone in nuts was higher at 12 wks following IAA and mequirit chloride. In the second year, increases in leaf juglone occurred following mequirit chloride, and in number of leaflets/leaf following CA and IAA. A decrease in terminal growth was noted for all treatments except CA.


Plots were established in spring, 1980 to determine the effects of metalaxyl (Subdue™) on growth and mycorrhizal incidence of Fraser fir. Non-mycorrhizal 1/0 seedlings were transplanted into plots in natural fir stands and fir nurseries. Half of each plot was treated in spring and fall 1980 and spring 1981 with [2E] 1.1 lb/A Metalaxyl. Seedlings were removed from each plot on 8 occasions during the following 18 mos. Seedling root and shoot dry weights from metalaxyl treated plots were significantly greater (P=0.01) compared to untreated controls during all samplings periods except for the final fall 1981 sample. Mycorrhizal incidence was greater and onset earlier in metalaxyl treated trees compared to controls with the exception of the final fall 1981 sample. Seedlings from plots that previously were 75-100% infected decreased in incidence to 72%, suggesting that these nonmycorrhizal roots may be more susceptible to soil borne pathogens.

HORSE PURSLENE TRIANDRUM PORTULACASTRUM AS A HOST OF MACROPHOMA PHASEOLINA. B. D. Bruten, USDA, ARS, SR, OTA, P. O. Box 76, Weslaco, Texas 78596.

Horse purslane (Triandrum portulacastum) is a common weed in vegetables grown in the Rio Grande Valley of Texas. During the 1980-81 seasons, numerous isolations were made from roots of horse purslane of M. phaseolina in cantaloupe (Cucumis melo) plots. Macrophomina phaseolina was frequently isolated from roots of apparently healthy horse purslane plants. Microscopic examination of roots revealed the presence of macrosporangia embedded in lateral root epidermis. Pathogenicity studies confirmed that M. phaseolina is capable of colonizing horse purslane by the presence of sclerotia in the roots. Although there appears to be little or no detrimental effect on horse purslane, it serves as a host to increase the sclerotia population in fields. Considerable increase occurs in cantaloupe every year from vine decline and postharvest decay caused by M. phaseolina. This is the first known record of horse purslane as a host of M. phaseolina.

MYROTHECIUM RORIDUM A POTENTIALLY DEVASTATING PATHOGEN OF MUSKELONGS IN SOUTH TEXAS. B. D. Bruten, USDA, ARS, SR, OTA, P. O. Box 267, Weslaco, Texas 78596.

Myrothecium roridum most often occurs on the fruit of muskelongs in south Texas. The disease on the fruit is characterized by shallow to deep sunken lesions, 2-50 mm in diameter, covered with a greenish-black mass of sporodochia. Fruits of cantaloupe and muskelongs infected with M. roridum in the field and under controlled conditions are usually reduced in marketability. Disease incidence on other plant parts is erratic and depends on frequent rainfall and high temperatures. Lesions on stems and petioles become elongated, necrotic and sunken. The crown area is often girdled killing the plant. Lesions on the leaves are round to irregular, 2-15 mm in diameter, with tan centers and brown margins and often having the appearance of concentric rings. These lesions may often be mistaken for Alternaria leaf-blight. Abundant greenish sporodochia may be arranged in concentric rings on both surfaces of the leaf. The central necrotic tissue often breaks away resulting in shot-holes. M. roridum also causes a seedling disease and root rot.

BLIGHT-LIKE SYMPTOMS INDUCED IN CITRUS ON ROUGH LEMON ROOTSTOCK WITH AMMONIUM SULFATE. Harry C. Burnett, FUWCS, Division of Plant Industry, 3027 Lake Alfred Road, Winter Haven, FL 33880, S. Nemec, USDA-SEA/AR, 2120 Camden Road, Orlando, FL 32803, M. Patterson, The Coca-Cola Company, Food Division, Forest City, NC 27521.

Soil around rough lemon-rooted grape trees and rough lemon budded with sweet orange scions in a greenhouse was drenched with solutions of ammonia hydroxide, urea and ammonium nitrate. Grape trees treated with these solutions after serious leaf blight infections, increases in leaf number, and decreases in leaf weight occurred following mequirit chloride, and in number of leaflets/leaf following CA and IAA. A decrease in terminal growth was noted for all treatments except CA.

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Fungi associated with tap roots of ladino clover in North Carolina. C. L. Campbell, Department of Plant Pathology, North Carolina State University, Raleigh, NC 27650.

Ladino clover (Trifolium repens 'Tillman') was seeded in rows (30.5 cm spacing) into tall fescue (Festuca arundinacea 'KV 317') and 9,790 seeds (30.5 cm of row, 20-25 cm deep) were taken monthly and washed. The diseased infested clover tap roots (2-2 cm sections) were placed in 2% water agar. Fungi growing from root tissue were placed on potato dextrose agar. Phytophthora humicola were identified. Most isolated genera colonized root tissue by 1/80. Spectrum of isolated genera varied little over time but proportion of isolates per sample varied for some genera. Potential root pathogens were categorized as follows: Mean percent of total isolates, range and seasonal variation for 3 clover pathogen were: Fusarium oxysporum 50.9% (29.4-85.12), nearly constant in all seasons; Rhizoctonia solani and R. solani-like fungus 7.2% (0.0-16.03), least frequent in winter; Pseudonema fertilis 5.6% (0.0-20.42), least frequent in summer.

Characterization of pepper strain, Race 1 of Xanthomonas campestris pv. vesicatoria. It has been found in Capsicum chacoense. Inoculation inoculation with 10^9 bacterial cells/ml followed by incubation at 30°C for 6 days. Twenty percent of inoculated leaf tissue within 24 hr. Concentration of bacteria in inoculated leaf tissue is drastically reduced during the third week of inoculation and the number of bacteria/mm^2 leaf tissue remains low for several weeks. Race 1, pepper strain, differs from race 2, pepper strain. In appearance of hypersensitive symptoms induced, pattern of bacterial multiplication in vivo, and the ability to escape from inoculated leaf tissue. It does, however, resemble the activity of the tomato strain of this bacteria. Hypersensitive resistance against C. chacoense was inherited as a single, dominant character in progenies of C. chacoense X C. annuum.

Effects of some herbicides on Rhizoctonia solani and trichodema harzianum. Tom C. Creswell and E.A. Curt, Dept. of Botany, Plant Pathology and Microbiology, Auburn University, AL 36849.

Rhizoctonia solani and Trichoderma harzianum were grown separately in Flasks containing Capek-Broch ammended with prometryn, cyanazine or norflurazon at concentrations of 0.5 and 20 mg/ml. Within the culture medium, determined at 5,7,9 and 11 days. Indeed, growth of R. solani was not significantly affected by any of the herbicides. Growth of T. harzianum was increased significantly at the rate of norflurazon at days 5,7 and 11. Colonization by R. solani of cotton roots, segments which had been treated, treated and buried in soil, was increased by all three herbicides at 5 mg/ml and by cyanazine at 20 mg/ml and was decreased by norflurazon and prometryn at 20 mg/ml. In standard tests on herbicide-amended Capek-Broch agar, the herbicides had little effect on antagonism of R. solani by Trichodema; however, the hyperparasitic action of Trichodema was reduced in the presence of prometryn and norflurazon.

Control of Phytophthora parasitica var. nicotianae in tobacco with cupravol and phosphatyl. A. A. A. Cook and V. G. Guerra, Department of Plant Pathology, University of Florida, Gainesville, FL 32611.

Metaxalyx and phosphoethyl A1 were evaluated for control of tobacco black shank in an experiment heavily infested with Phytophthora parasitica var. nicotianae. Metaxalyx at 1.12 or 0.56 kg a.i./ha preplant incorporated plus 0.56 kg a.i./ha layby controlled black shank as well as 2.24 kg a.i./ha preplant incorporated (60% control). In other tests, metaxalyx at 2.24 kg a.i./ha controlled disease where there was a slight growth of the fungus. Phosphoethyl A1 at 1.12 and 2.24 kg a.i./ha controlled disease 24 and 45%, respectively. In similar tests under lower infestations, phosphoethyl A1 controlled black shank up to 60%. Both fungicides increased yields of tobacco. In vitro 1 mg/l of metaxalyx in V-8 agar completely inhibited pathogen growth, but phosphoethyl A1 did not inhibit growth at 100 mg/l. Phosphoethyl A1, although inferior in control of disease at rates used, demonstrated 100% control of disease that was superior to that expected from in vitro growth inhibition studies.

Activities of collombolan insects in relation to the survival potential of chlamydospores of Fusarium oxysporum f. sp. vanescentum, E. A. Curl, Department of Botany, Plant Pathology, and Microbiology, Auburn University, AL 36849.

It has been suggested that collombolan insects in the rhizosphere of cotton seedlings may transport pathogenic fungal propagules to infection sites on roots. Results of laboratory experiments showed that collombolan species, Tricholomus minutus and Onychiurus encarpatus were readily attracted to non-germinated spores of Fusarium oxysporum f. sp. vanescentum on the surface of germinating seedlings. Their population within a 12-mm diameter area was reduced from 175 to 51 by approximately 20 insects in less than 3 hr, and germination of the remaining spores was reduced by 50%. Many of the consumed spores reappeared with walls intact. The fecal pellets were deposited on the agar. These collombolans did not germinate in situ nor were they transferred to nutrient agar. Transport of spores on the bristled bodies of collombolans has been demonstrated, however, these data would indicate it is unlikely that transport by ingestion and redeposition could contribute significantly to the inoculum potential.

Factors influencing elisa detection of sweet potato feathery mottle virus in sweet potato. F. R. Behmehadeh and J. W. Myer, Plant Pathology Department, North Carolina State University, Raleigh, NC 27650.

An indexing system for sweet potato feathery mottle virus (SPFMV) in sweet potato (Ipomoea batatas (L.) Lam.) was developed based on the enzyme-linked immunosorbent assay. The addition of 0.1% sodium diethyldithiocarbamato to the virus buffer, and 0.2% ovalbumin to replicate coat buffer was necessary. There was no significant difference in ability to detect virus between homologous and heterologous combinations of anti-SPFMV sera and their antisera. A highly significant difference (P < 0.01) in levels of detectable virus existed between leaf samples positions from the same shoot. Leaves at the base of the shoot were the most consistent source of detectable virus. Virus was most reliably detected in SPFMV-infected shoots 5 to 8 wk after emergence. Infected plants (i.e., a root and all shoots produced by that root) could be reliably detected by sampling two shoots per plant, using a composite sample of three leaves from each shoot.

Effects of inoculum density on bacterial wilt of potato. R. D. Gitaits, C. A. Jaworski, and S. C. Phatak. Coastal Plain Experiment Station, P. O. Box 746, Tifton, Georgia 31793.

Resistant (Ontario) and susceptible (Pungo) potato cultivars were used to study the effects of inoculum density on the development of bacterial wilt. Resistance in Ontario was displayed in the greenhouse only when dilute suspensions (10^6 cfu/ml) of Pseudomonas solanacearum were used as inocula. In the field, stem inoculations were made with four concentrations of bacteria (10^6 to 10^9 cfu/ml). Ontario displayed higher levels of bacterial wilt resistance than Illinois. A significant interaction between inoculum concentration and cultivar was observed. Amount of wilt in either cultivar increased in direct proportion to inoculum density to 10^5 cfu/ml but increasing inoculum concentration above that did not result in increased disease. Yield and tuber quality in Ontario were negatively correlated with increasing bacterial concentrations. No significant differences in yield or tuber quality occurred among different inoculum densities for the Pungo cultivar. Tuber yield and quality of inoculated Pungo plants were less than Ontario exposed to the highest inoculum level.

Chitinolytic activity of fungi isolated from cysts and eggs of heterodera glycines. C. C. Godoy, C. Morgan-Jones, and R. Rodriguez-Parana, Department of Botany, Plant Pathology and Microbiology, Auburn University, Auburn, AL 36849.

Chitinolytic activity of 2 fungal species isolated from cysts and eggs of Heterodera glycines was studied using an agar medium with 0.2% chitin. The fungi were: Neoscytarspora vasinfestis and Codinopsis heteroderae, Stagonospora sp., Thelivopsis terricola, Elaphothea lecanii, Gliocladium parasiticum, A. auburnense, Leptosphaeria gorybats, Chistochelos timbromas, Phoma monocystis, and P. microspora. Plates with medium were inoculated and incubated at 29°C for 5 days. GA was evidenced as a clearing zone around the perimeter of the plate to indicate the development of some fungal 12 hr after inoculation. C. heteroderae and V. lephtocystis showed peripheral clearing of T. terricola, C. timbromas, G. roseum, and Stagonospora sp. showed clearing within their colonies; the remaining species did not show clearing. When the fungal were
tested for pathogenicity against eggs of Meloidogyne arenaria, 7 of the species parasitized the eggs but only V. leptocephrum and P. multivittata infected more than 80% of the eggs on the surface of the agar.

SPORICE DISCHARGE STUDIES OF THE PEAC SCAB FUNGUS CLADOSPORIUM CARYGENUM CARYGENUM, T.R. Gottlieb, USDA-ARS, P.O. Box 87, Byron, Ga. 31008-0087

Conidia discharge of Cladosporium caryigenum from diseased leaf and nut shuck tissue of pecan, Carya illinoinensis, was studied under controlled conditions of relative humidity (RH), temperature, vegetative wetness (VW) and infrared radiation (IR). Decreasing RH from near saturation to 40% produced only minimal spore release while decreasing RH to below 40% stimulated considerable conidial discharge. This could be enhanced with specific exposure to IR of intensities >40 microinfrared watts m⁻² sec⁻¹. Sustained periods of <40% RH were also conducive to spore release and could be enhanced by IR. However, spore release was less during decreasing coolness than sustained periods. Spore release was stimulated by IR exposure periods of about 2 min and RH changes of 3 min duration. Vibration stimulated spore release at low RH; however, vibrational effects were less intense than those reported for other hypoxycetes.

POTATO TUBER EROS INDUCED BY DIFFERENT SPECIES OF PHYTOPHthora, M. P. Graham and R. A. Taber. Dept. of Plant Sciences, Texas A&M University, College Station, TX 77843.

Tuber rot symptoms caused by two isolates of Phytophthora (21001 and 21002) from potato in Texas were compared with symptoms caused by confirmed isolates of P. nicotianae var. parasitica (PNP), P. erythropoeta (PPE), and P. cryptogae (PC). Inoculum was placed in 5 cm dia. wells cut in tubers of cultivars Norgold Russet (NR) and Red LaSota (RLS). All isolates darkened the skin around the inoculum. Exposure of the inoculum NR was killing of the buds by all isolates. PNP and 21001 caused internal lesions of tubers to gradually turn salmon pink with exposure to air, reaching a maximum color intensity after 6 h. PPE and 21002 caused similar changes in tissue appearance, however, the discoloration was more definite and not as bright as the same period. Internal symptoms were more distinct in NR than RSL. Similarities in symptoms support the tentative identification of 21001 as P. nicotianae var. parasitica. 21002 differs from 21001 in morphology and symptoms. Identification is pending oospore induction.

BENIGNESKA BLIGHT OF SETARIA IN GEORGIA. R. T. Hanlin and E. A. Brown, Deps. of Plant Pathology and Extension Plant Pathology, University of Georgia, Athens, GA 30602.

A disease of knotroot bristlegrass (S. gigantea) growing on a farm in north central Georgia was brought to our attention by a farmer concerned about possible toxicity in his pasture grasses. The pathogen was identified as Benigneska spherophloa, a hyphomycete that forms white sporodochia on the leaves of the host. The conidiophores are circular to irregular in outline, up to 1.5 mm in diam., and are attached to the host by a bundle of parallel hyphae. Except for the sporodochia the mycelium is completely internal. Numerous globose, hyaline conidia are borne on demicellate directly on the sporodochial hypha. This is the first record of this fungus from Georgia. It has been reported only occasionally on grasses in the tropics.

FURTHER STUDIES OF THE APHID TRANSMISSIBILITY OF ARAJUA MOSAIC VIRUS. D. S. Heron, R. Chadwardian, and F. M. Hofmeister. Plant Pathology Department, University of Florida, Gainesville, FL 32611

The potyvirus Arajua mosaic virus (AJMV) is transmissible both mechanically and by aphids to some members of the Asclepiadaceae (Phytophthora 70: 909-913, 1980). In our aphid transmission studies, some of 22 species of Ochlerotus, a Japanese species of 17 plant families other than the Asclepiadaceae exhibited symptoms following aphid inoculation of AJMV, nor was AJMV detectable in these species when manual back-inoculations were made from them to healthy Morrena odorata or Araujia aequorica (Asclepiadaceae). Indicator plants. The virus was efficiently transmitted in a Kelley-borne manner by the aphids Myzus persicae or Aphis nerii from AJMV-infected M. odorata or A. aequorica to healthy seedlings of M. odorata; A. aequorica seedlings were inoculated using M. persicae. The results provide further evidence that AJMV has a very restricted host range, and may be a suitable biocidal agent for M. odorata, a troublesome weed in Florida citrus groves.

A COMPARATIVE ANALYSIS OF THE VIRUS-SPECIFIC PROTEINS OF TWO BEAN YELLOW MOSAIC VIRUS ISOLATES AND A CLOVER YELLOW VEIN VIRUS ISOLATE. E. Hiebert, J. Nagel, and F. W. Zetler, Plant Pathology Department, University of Florida, Gainesville, Fl 32611

Bean yellow mosaic virus isolates from gildiolus (BYMV- G) and red clover (BYMV 204-1) and a clover yellow vein virus isolate from white clover (CYVV-P) were compared by serological tests and product immunoblotting. The CNVR and PBL-4 isolates of the virus in vitro were also compared. The two BYMV isolates and the CYVV-P all contained long RNAs. Immunodiffusion Tests using antisera to BYMV-G, BYMV 204-1, and CYVV-P indicated that the 2 BYMV isolates were closely related to each other but were distantly related to CYVV-P. In vitro translation studies using the rabbit reticulocyte lysate system revealed that at least three of the six distinct translation products of CYVV-P were different in estimated MW from those of the BYMV isolates. The proposed gene map for the BYMV isolates is 5'- end- 84-85,000 (BYMV) protein- 44-45K protein - 58K cylindrical inclusion protein - 65K inclusion protein - 36K capsid protein - 3'- end. The proposed gene map for CYVV-P is 5'-end - 82K protein - 45K protein - 44K protein - 69K cylindrical inclusion protein - 59K protein- 37K capsid protein - 3'-end.

NATURE OF RESISTANCE IN CONIFER TO SOUTHERN BEAN MOSAIC VIRUS. H. A. Hobbs and C. W. Kuhn, Department of Plant Pathology, University of Georgia, Athens, GA 30602.

After preliminary screening of conewea lines, 12 were selected to study the nature of resistance to southern bean mosaic virus (SBMV). Virus accumulation in inoculated primary leaves varied from less than 1 to more than 1,000 µg/g of leaf tissue, but the magnitude was distinct for each line. Although symptoms did not occur on five lines, virus replicated and moved into noninoculated tissue in all 12. Necrotic local lesions developed on two lines, one of which produced 50-100 times as much virus as the other, and it also developed systemic necrosis. Plant growth at 3 and 6 weeks after inoculation was generally correlated with virus concentration. One line, however, had over 1,000 µg/g of tissue and no significant reduction in early plant growth. In susceptible lines mosaic virus was produced in plants inoculated at 27°C than at 33°C but an opposite effect was found in one resistant line. A new strain of SBMV developed when resistant plants were maintained at 21 and 24°C.


The genus Coelophthalus was erected by Spencer in 1972 to accommodate the fungus that causes leaf spots and streaks of daily (Hemerocallis). The fungus is primarily a wound pathogen that induces limited necrosis at inoculation or infection sites. Leaf yellowing associated with infection frequently extends well beyond infection sites. Mosaic activity at daily wound-inoculation sites suggested a more generalized rotting capability for Coelophthalus. Artificial inoculations of common fruits showed that C. hemerocali produces a firm rot of lime, lemon, sweet orange, Satsumo orange, komquat, grape, avocado, Japanese persimmon, peach and apple. The fungus was also pathogenic on rainly (Zephrantes sp.), cotton boll, false garlic (Nothocordum inodorum) and cactus (Bylocereus sp.).


Soybean roots of mature plants (Davis var.) heavily gallled by Meloidogyne incognita Kofoid and White and containing a layer of phosphatase on their surface were inoculated with excess moisture in plastic bags for 9 days at 70° day and 70° night F. temperatures. Nematode extractions from root surfaces and soil thereon yielded large mixed populations of

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nematodes, including **Aphelenchus** species. 1865. Large
globules swarms (5-7 thousand specimens) of **A. avenae** in all
stages were selected and purified by transfer to clean water
in Syracuse water glasses and maintained for 60 days. This
is the first report of swarming (now known as swarming disease)
in a nematode easily cultured in vitro since discovery of the
A. avenae swarms are particularly useful in disease mortality
studies.

**FUNGI ASSOCIATED WITH POD AND PEG ROT OF PEANUT (ARACHIS HYPOGAEA L.) IN SOUTH CAROLINA.** M. W. Hotchkiss and L. W. Baxter, Jr., Dept. of Plant Pathology and Physiology, Clemson University, Clemson, SC 29631.

Isolation frequency of fungi from pod and pegs in South Carolina was examined and certain isolates were tested for pathogenicity. Selected fungicides were tested for inhibitory properties and control of the disease. Fusarium, Penicillium, Colletotrichum (Cylindrocladium) crotalariae, Tricho-
derma, Nectromospora varians, Rhizopus, and Aspergillus were iso-
lated from more frequently than **Sclerotium rolfsii** and **Rhizoctonia solani**. Pods were inoculated in the greenhouse by the dip or spray. The incidence into slits made in sterilizer sterilized soil close to undisturbed young pods. R. solani, C. crotalariae, N. varians, and **Fusarium** sp. were recovered from inoculated pods but always at a low frequency. C. crotal-
ariae caused more rotted pods and was reisolated more often than other fungi. Pods inoculated with **S. rolfsii** showed typical symptoms of infection but **S. rolfsii** was not recovered from the pods. Certain fungicides were inhibitory in vitro, but tests for disease control were inconclusive.

**IN-FURROW BENOMYL TREATMENT REDUCES INCIDENCE OF PEANUT BLACK-
HULL DISEASE IN MEXICO, 1971 to 1981.** David C. B. Soti, New Mexico State University, Middle Rio Grande Experiment Station, Los Lunas, NM 87031.

**Leucaena leucocephala** Benth. caused blackhull of Valencia pea-
ut plants (defined as more than 25% of the shell area discol-
ored) in New Mexico since 1963. In chemical screening tests, benomyl was consistently effective in inhibiting the growth and development of **T. album**. Final experiments using long rep-
licated four-row plots were conducted in heavily infested areas
since 1971. The soil was treated with benomyl at varying rates applied in furrow as a spray at planting time. One to ten
locations were used yearly during the growing season. The incidence of blackhull was significantly reduced, from 26-79% untreated
to 10-33% by treatment with benomyl at dosages 1.7 kg a.i./ha
or higher. A 24-C label was finally granted in 1981 after long-
term field trials and application of benomyl at 3 lbs. Benlate per acre or 1.7 kg a.i./ha on commercial grown peanuts for blackhull control in New Mexico.

**ON THE STATUS OF STATISTICS IN PHYTOPATHOLOGY.** Steven B. Johnson and R. D. Berger, Plant Pathology Dept., University of Florida, Gainesville, FL 32611.

Authors used multiple comparison procedures in nearly
300 tables and figures published in 12 recent issues of PHYTOPATHOLOGY. These statistical methods were inappropriately used in over 60% of the cases. Two examples of multiple comparison procedures were application to (1) levels of quantitative factors like temperature or inoculum density, and (2) treatments in factorial experiments where interactions are present. The proper techniques are to use regression analysis or a curve fitting procedure to compare quantitative levels and to analyze separately where interactions occur before making comparisons within main-effects or within sub-effects in factorial experiments. Improper use of statistics invariably leads the author to improper conclusions.

**EVALUATION OF METHODS FOR SEPARATING PSEUDOMONAS SYRINGAE PV. TOMATO FROM P. SYRINGAE PV. SYRINGAE OCCURRING ON TOMATO TRANS-
PLANTS.** J. B. Jones, Univ. of Florida, Bradenton 33508, R. D.
Gibson, and S. W. McVetty, Univ. of Georgia, Tifton 31793 and Athens 30602, respectively.

When 134 leaf lesions from 13 transplant fields were triturated
in water and tested by indirect immunofluorescence (IF) with
antisera prepared against **P. syringae** pv. **tomato** (PT) and for
tests using **P. syringae** pv. **syringae** (PS) for the two tests,
respectively. However, 25% of 119 cultures from the
lesions were PT whereas 69% were **P. syringae** pv. **syringae** (PS).
All PT isolates were IN neg.(-) and came from lesions that were IN - and IF. Although only 65% of PS isolates origin-
grated from lesions that were IN - but 4% of PT were IN + pure culture. These results suggest that neither IF nor IN alone differenti-
ates PT from PS in tissue but when used together provide for
rapid and highly accurate identification of pure cultures.

**Erytricol (PS +) and DL-lactate (PS +) use degradation of
OH 5.0 pacte medium (PST +), and syringomycin production (PS +) are reliable confirmatory tests.**

**EVALUATION OF 25 COMMERCIAL SOURCES OF CARRIZO CITRANGE ON
RADOPHOLUS SIMILIS REPRODUCTION.** D. T. Kaplan and J. H.
O'Bannon, USDA, ARS, Horticultural Research Laboratory,
2120 Camdon Road, Orlando, FL 32803

Carrizo citrange (**Citrus sinensis** X **Poncirus trifoliata**) is
generally considered tolerant of the burrowing nematode **Nacobbus 
(Platyhelminth) and in citrus rootstocks, a serious problem on this rootstock have been reported. Greenhouse evaluations were made using 10 plants each of 25 commercial sources of Carrizo citrange 8 months after inoculation with an identified citrus population of **R. similis**. Similar root populations of nematodes were inoculated in roots of test plants in 9
years; in 1-4 test plants of 14 sources; whereas nematodes were
IN + in 3 test plants of 2 sources. Nematodes did not affect root or top growth under greenhouse conditions. These findings do
determine the feasibility of host involvement, but emphasize the importance of host source because variability exists in the germination between and within root-
stock sources.

**EFFECT OF FLOODING ON PHYTOPYTHORA ROOT ROT OF FRASER FIR.** C. M.
Kenneally, K. Papke, L. F. Grand, and R. I. Bruck. Dept. of
Plant Pathology, N. C. State University, Raleigh, NC 27650.

Effect of flooding on **Phytophthora** root rot of Fraser fir was assessed in soil naturally infested (NI) with **Phytophthora cin-
ematica** without seedlings, and with 2-year-old seedlings trans-
planted into NI or noninfested soil, each with continuously
flooded soil for 0, 24, or 48 hrs. Propagule density was quanti-
fied and root rot severity assessed 27 da after flooding. At 9 and 16 days propagule density was greater (P<0.01) in
 treatments with seedlings present. Propagule density was greater
(P<0.01) with flooding than without flooding within treatments
or between treatments. No differences in propagule density were found among water regimes without the host. Seed-
ling mortality was higher (P<0.01) in infested than in non-
infested soil. Flooding increased (P<0.01) seedling mortality
compared to non-flooded treatments in NI soil. The increase in disease commonly observed in nursery beds after flooding may be the result of interactions between a physiologically stressed host and the rapid production of pathogen inoculum.

**EFFECTS OF REPEATED EXPOSURES OF SO, AND NO2, ON SOYBEANS.** C. J.
Elder and S. A. Retzer. Department of Plant Pathology, North
Carolina State University, Raleigh 27650

Greenhouse grown soybeans (**Glycine max** cv, **Bragg**) inoculated
with **Rhizobia** inoculums were exposed to SO (0, 0.2, or 0.3
ppm) and NO2 (0, 0.1, 0.2 ppm) singly and in combination. Three
time exposures were initiated when plants were 3 weeks
old and continued every other day until plants were harvested
at 10, 15, or 20 weeks after planting. After 5 exposures NO2 and SO2
interacted to reduce dry shoot weight. As number of exposures
increased, NO2 and SO2 acted independently to reduce shoot weight.
At the final harvest only SO2 reduced shoot weight. Shoots also reduced the number of exposures increased the two gases interacted to reduce root weight. Pollutants interacted to reduce fresh
module weight at all 3 harvests. Maximum weight reduction
ranged from 17 to 35% depending on the variable measured. More
studies are needed to understand the mode of action and
physiological effects of SO2 and NO2 on soybean.

**EFFECT OF NAPROANE ON GROWTH AND MORPHOLOGY OF PHLEビCTONIA
SOLANAE.** Mark M. Curtis, Delta Branch Experiment Station,
Stoneville, MS 38776, A. Wayne Cole and William E. Batson, Jr.,

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Growth and development of *Rhizoctonia solani* Kuhn in response to napropamide [2-(a-naphthoxy)-N,N-diethylpropionamide], and 2,4-dinitrophenol were studied. Napropamide at 2.2, 4.4, and 8.7 \times 10^{-2} M concentrations inhibited growth 15%, 69%, and 78%, respectively, by 96% at 25 C, and 2,4-dinitrophenol, at 3, 6, and 12 \times 10^{-2} M, inhibited growth 43, 54, and 72% by 72 hours at 25 C. *R. solani* could not utilize napropamide as a sole carbon or nitrogen source. Napropamide did not alter pH of growth media in liquid culture and no degradation of napropamide by *R. solani* occurred over 20 days. Somatic hyphae of *R. solani* were examined microscopically for effects of napropamide on number of nuclei per cell. Napropamide at 4.4 \times 10^{-2} M resulted in 7, 8, and 27% of the tip, mid, and y type cells, respectively, having more than eight nuclei/cell. No other treatment resulted in more than a one \% increase.

**SPALSH DISPERAL AND CULTURAL CONTROL OF PHYTOPHTHORA PARASITICA CAUSING DIEBACK OF RHODODENDRON**

C. R. Kuske and D. W. Benson, Department of Plant Pathology, North Carolina State University, Raleigh, NC 27650

Splash dispersal of *Phytophthora parasitica* propagules was studied on hybrid rhododendron cv. Purple Splendor grown under lath in containers on a naturally-infested pine bark base. Plants in all tests were irrigated (0.6 cm/day) by overhead sprinklers. Height of lesion occurrence was recorded on two height classes of plants from 8 June to 10 October, 1981. Splesh dispersal was characterized by frequency distribution of lesion heights. Average height of lesion development (site) on plants averaging 33 and 64 cm tall was 26 and 39 cm, respectively. Cultural control was studied by planting 1-yr-old rhodo- dendron in 3.8 liter pots under lath on either naturally-infested (NI) pine bark or NI pine bark covered with a 5 cm layer of gravel. Lesion incidence per plant for plants on bark and gravel averaged 2.8 and 0.3, respectively. Average mortality was 75 and 56, respectively.

**MELODIOGYNE SPECIES IDENTIFICATION USING ISOELECTRIC FOCUSING**

T. J. Lawson, III, and George E. Carter, Jr., Dept. of Plant Pathology and Physiology, Clemson University, Clemson, SC 29631

Isoelectric focusing (IEF) is an electrophoretic separation technique which can be used to separate proteins from complex mixtures. The proteins form bands at their isoelectric points in a pH gradient established in a polyacrylamide gel matrix. We applied this technique for the first time to the biochemical systems of plant-parasitic nematodes. This technique detected twice as many protein bands in extracts of *Meloidogyne* species as did disc-gel electrophoresis. M. haplo, M. javanica, M. incognita, and M. arenaria were distinguished from each other by the protein profiles generated by the IEF of total soluble proteins extracted from eggs. Haplopalma columbus and Heterodera glycines also produced distinct protein profiles. Extracts from eggs, larvae and egg-laying adults of M. incognita gave different protein profiles.

**RESISTANCE TO COPPER IN XANTHOMAXIUM CAMPESTRE PV. VESICATORIA**


Resistance to copper was detected in 12 of 18 cultures of *Xanthomaxim* *Campes* PV. *Vesicarioria* isolated during the past 15 years from pepper in Florida. Resistant isolates were not killed during 24-hr exposure to desiccated water extracts from 3 or 6 g/l of Cu(OH)\(_2\) or tribasic copper sulphate. Sensitive isolates were killed with less than 0.1 ml of the same concentration of soluble copper in water extracts was determined to be between 1 and 2 ppm. Sensitive isolates were killed by 1 ppm of Cu as Cu(SO\(_4\))\(_2\) during 3-hr exposure, but 8-16 ppm were required to kill the resistant isolates. Both copper resistant and sensitive isolates were resistant to desiccated water extracts of the combination of Cu(OH)\(_2\) and mancozeb suspended at 3.0 and 1.5 g/l respectively. Extracts of mancozeb (1.5 g/l) were not toxic to the bacteria. In field tests with pepper plants inoculated with copper resistant and sensitive isolates and sprayed with Cu(OH)\(_2\), resistant isolates were not controlled, but sensitive isolates were controlled. The combination of Cu(OH)\(_2\) and mancozeb controlled both types of isolates.

**EFFECTS OF SELECTED FUNGICIDES ON RHIZOCTONIA BLIGHTS OF TALL FESCUE IN THE GREENHOUSE**

S. A. Martin, C. L. Campbell, and L. T. Lucas, Department of Plant Pathology, North Carolina State University, Raleigh, NC 27650.

Benzomyl, carboxin, PCNB, triadimeton, iprodione, and chlorothalonil at 0, 100, and 1000 mg a.i./l were applied to tall fescue foliage in incomplete factorial combinations in repeated experiments. Four-week-old plants were inoculated with isolates of *Rhizoctonia solani*, binucleate *Rhizoctonia*-like fungus (RLF), and multineucleate *Rhizoctonia* sense-like fungi (RFZ) and rated after 10 days. All main effects and interactions were significant (P<0.01) for benzomyl, carboxin, and PCNB, however disease control was similar for methiocarb, carboxin, and chlorothalonil. Benzomyl did not control foliar blight induced by RLF and RFZ. RLF-induced disease was not controlled with PCNB, and benzomyl enhanced disease caused by RLF isolates. PCNB was not as effective as the other fungicides tested for control of R. solani. Results indicated that specific identification of the pathogens is necessary for the proper selection of a fungicide for the effective control of some brown patch diseases.

**RESISTANCE AND SUSCEPTIBILITY OF CUCURBITA SPP. TO FUSARIUM OXYSPORUM**

E.S. Murphy and B. D. McLaughlin, Dept. of Plant Sciences, Texas A&M University, College Station, 77843.

Formae speciales of *F. oxysporum* are noted for their host specificity. *F. sp. niveum*, causal agent of watermelon wilts, is well documented on hosts outside the Cucurbitaceae but not so within the family, especially the genus *Cucurbita*. Thirty-four cultivars encompassing 6 species of *Cucurbita* were tested for resistance or susceptibility to *F. oxysporum* f. sp. niveum. All *Cucurbita* spp. tested were resistant except some cultivars of *C. pepo* var. melopepo, which include the zucchini and yellow summer squashes. Ten of the 29 cultivars or accesses melopepo showed significantly more wilt than comparable plants in uninoculated soil. Percent wilt in the susceptible cultivars ranged from 37-100%. ‘Golden Eagle’, ‘Hyric’, ‘Straightneck’, and ‘Early Frollic Straightneck’ were the most susceptible. ‘Yellow Grooveck’ was resistant to *F. sp. niveum* as were bush, scallop, cushion and pumpkin. This confirms earlier reports that the winter squashes are resistant to *F. sp. niveum* and extends the host range to include some of the summer squashes.

**THE IB-4 PROGRAM IN THE SOUTHERN REGION**

Charles W. Meister, Pesticide Research Lab., IFAS, University of Florida.

Farmers, growers, nurserymen and others using fungicides can utilize the IB-4 program to expand pesticide labels for minor uses. A pesticide clearance request is sent from the IB-4 State Liaison Representative to National Headquarters, Rutgers University, where experimental protocol is derived from consultations with EPA and the manufacturer. The IB-4 Regional Leader Laboratory at the University of Florida financially supports field studies and residue analyses required for the collection of efficacy, persistence, toxicity and pesticide residue data. Data and information from required areas are assembled by IB-4 and submitted to EPA for expanded registration. Since 1972 IB-4 data has been used to substantially expand the ornamental labels for eight fungicide formulations. Currently there are fungicide projects underway on 20 food commodities and 84 ornamental species and work is expected to expand by 25% in 1982.

**EFFECTS OF FUNGICIDE TREATMENTS ON THE RATE OF INCREASE OF ONION FOLIAGE DAMAGE CAUSED BY ALTERNARIA PORRI**

Marvin E. Miller, Texas Agricultural Experiment Station, Wesaco, Texas 78596.

Branco 500 (tetrahydroisophthalantrile) and Manzate 200 (cim- manganese salt of ethylbenzethidithiocarbamate) delayed an- tione of foliage damage caused by *A. porri* (Ell.) Cif. by 7-10 days and 3-5 days, respectively, on Texas Grano 502 and New Mexico Yellow Grano onions over untreated controls when the leaf damage level was 10-20%. However, above 20% damage, the rate of increase of damaged foliage tissue was approximately the same for all treatments on both varieties. At foliage damage levels below 20%, fungicide treatments apparently reduced the rate of new infection site establish- ment. However, once established, the lesions girdle the leaf causing death of tissue distal to the lesion and in advance of funear growth. As a result, effects of fungicide treatments are masked and increases of damaged tissue are similar for fungicide treatments and untreated controls.

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EFFECT OF INOCULUM DENSITY, SAPROPHIC FUNGI AND CITRUS SPECIES ON MILD SEVERITY AND SOIL POPULATIONS OF PUSARUM OXYSPORUM F. SP. CITRI has been described in Florida (Phytopathology 69:730). Mexican lime seedlings were inoculated with 1, 100, 1,000, 4,000 and 8,000 microconidia per gram of soil, and pathogen severity increased with increasing inoculum density. In experiments where potting mix was inoculated with *Aspergillus ochraceus*, *Penicillium rustici* and *Pichia species* at 5,000 conidia per gram of soil, only *A. ochraceus* increased severity. All *Pichia species* reduced *P. rustici* increased and *P. ochraceus* had no effect on disease severity. Prior inoculation with *A. ochraceus* also reduced populations of the pathogen. In naturally and artificially infected potting mix, populations of the pathogen were generally higher where highly susceptible Mexican limes had grown than where resistant species were used.


Twenty-seven gladiolus isolates of bean yellow mosaic virus from the United States (FL, CA, CO, MI, MN, NJ), Holland and Egypt were compared with single isolates from *Trifolium pratense* (204-1), *T. repens* (CVYV-P), *Pisum sativum* (58-1027), *Alpinia sp.* (AI) and *Freesia sp.* (FR). These were or were collected from the same fields as *T. pratense*, Holland, respectively. The gladiolus isolates were indistinguishable from each other but differed from the others. Whereas 204-1, CVYV-P, Al, and Fr isolates readily infected *Phaeosphaeria vulgaris*('Bountiful'), systemically, the gladiolus isolates did not. Only CVYV-P induced systemic necrosis in *P. sativum* ('Alasko'), and only CVYV-P and 58-1027 induced intranuclear inclusions visible by light microscopy. Gladiolus were susceptible to 204-1, CVYV-P, and several gladiolus isolates by manual inoculation. In immunodiffusion tests with isolates 204-1, CVYV-P, and a gladiolus isolate, all the gladiolus isolates reacted identically but could be distinguished by spur formation from the others. Similar results of gladiolus isolates were obtained in ELISA tests with 204-1 and CVYV-P antiserum.

EFFECTS OF FUNGICIDES AND NEMATICIDES ON CITRUS BLIGHT IN FLORIDA. S. T. Hines, USDA, ARS, Orlando, FL 32803; B. Burtill, Mobay Chemical Corp., Lake Park, FL 33344; J. B. O'Connell, USDA, ARS, Prosser, WA 99350; and M. Patterson, Coca Co., Forest City, FL 27251

Control of citrus blight was attempted in 4 field tests with fungicides and nematicides in the last 6 years. Chlorothalonil, chlorothalonil, sodium azide, thiophanate-methyl + ethanol, thiophanate-methyl, thiophanate-methyl + bentonite, and benomyl + thiram were used. Drenches 4 times in 1 year did not halt disease 21 mo after the first treatment in 1 test. In another test, soil applications of 3 rates of granular NaN, did not improve tree health after 1 year. Symptoms were not reduced by folic acid synthase of 2% of examixi, soil drenches of benomyl or a combination of both, nor by fenamiphos and aldicarb granules applied to soil in a grove with high populations of *Telenchus semipenetrans*. Nematode populations in soil and roots were not appreciably changed by nematicides in soil up to about 50% of the control.

FIELD EVALUATIONS OF SYSTENIC RESISTANCE TO BLUE MOLD IN TOBACCO INDUCED BY INOCULATIONS WITH THE BLUE MOLD PATHOGEN. W. C. Neeth, V. Cohen, Joseph Kov and Harvey Spurr, Univ. of Kentucky, Lexington, KY and USAM-ARS, Oxford, N. C.

Commercially produced, *Nicotiana tabacum* L. 'Burley' transplant seedlings were inoculated with the field with *Peronospora tabacina*, the causal agent of blue mold, to study systemic resistance. Inducing inoculations involved pouring 1 ml of a 5 x 10^{-3} conidia suspension on the stem-root-interface at transplanting or by means of a slurry inoculated in contact with the root after transplanting. Both were observed as controls. Protective fungicides were applied twice weekly for 3 weeks to reduce natural infections. Necrosis of the cambium and phloem developed at the inoculation site in 20.6 and 2% of the transplant inoculated. Inoculated seedlings were highly resistant to further *P. tabacina* infections. Inoculated plants that did not develop systemic necrosis were not protected against blue mold.

THE ASSESSMENT OF PEANUT LEAF SPOT (CERCOSPORIDUM PERSOPHORUM) IN FIELD EXPERIMENTS. D. J. Nevill and R. H. Littell, Post Doctoral Associate and Department Head, Plant Pathology Department, Coastal Plain Station, Tifton, GA 31793.

Field tests of fungicides, dosages and spraying schedules were used to compare methods of control in peanut. Immediately before harvest, numbers of infected leaves and numbers of lesions were recorded for 3 main stems per plot. Starting 100 days from planting, percentage necrosis on the fourth, six and eight leaves below the growing point of the main shoot and percentage leaf area affected were recorded on every 10th day. Observations of necrotic area gave a fast means of severity estimation that was closely associated with results of the techniques involving lesion counts. Multiple regression analysis indicated that 96% of the variation in yield loss could be explained by estimates of percentage necrosis and defoliation.

PROPAGULE EFFICIENCY IN THE RHIZOSPHERE. K. M. Reynolds, D. M. Benson, and R. L. Bruck, Department of Plant Pathology, North Carolina State University, Raleigh, N. C. 27690.

We propose an expansion of Gilligan's root-infection model (Phytopathology 69:878-884) to include propagule distance from the root surface and environmental effects since inoculum efficiency of root pathogens (Infection probability) is dependent upon these factors. The model is:

\[
I = 1 + I_N \cdot \left( c \cdot \frac{d \cdot (1 - I)}{1 - d} \right) - I_N \cdot \left( c \cdot \frac{d \cdot (1 - I)}{1 - d} \right)
\]

where: \( I \) = total expected infections; \( I_N \) = average susceptible root length per root (cm); \( N \) = number of susceptible roots; \( D \) = inoculum density (propagules/cm); \( c \) = constant; \( r \) = root radius; \( r^* \) = radial distance from center of root axis to an outer annulus; \( f \) = frequency of infection. This model for infection probability is exponential and is a simple propagule in an annulus i. Our model provides for variable inoculum efficiency as an explicit function of radial distance from the root surface (i.e., \( r^* \)). Also, "c" and the shape and scale parameters of \( r^* \) can be made functions of environmental parameters which exert both direct and indirect effects of the propagule.

STEM CANKER OF SOYBEAN INCITED BY ISOLES OF DIAPOTHES AND PHYTOPHOMOPSIS FROM COTTON. Kenneth W. Roy and William A. Miller, Department of Plant Pathology and Weed Science, Mississippi State University, MS 39762.

Fungal cultures produced the *Diaepothes* stage, *Phytophthora* stage, or both, were isolated from fully-developed cotton leaves and hypocotyls. All isolates were pathogenic when inoculated into stems of flowering soybean plants in the field. Stem canker size, which varied with isolate tested, ranged from 0.9 cm to 12.6 cm in length. Interval leaf necrosis and killing of plants were associated with infection by 37% and 34% of the isolates tested, respectively. Symptoms induced in soybean by cotton isolates were comparable to those induced by isolates of *Diaepothes phaseolorum* from soybean.

EFFECT OF AERIAL AND SOIL TEMPERATURE ON DISEASE SEVERITY IN TOBACCO INOCULATED WITH POTATO VIRUS Y AND MELIODOGYNE INCISEDITA. R. C. Rusty, N. T. Powell, and C. V. Gooding, Jr., Dept. of Plant Pathology, N. C. State University, Raleigh 27605.

Strain N-5 of Potato Virus Y causes necrosis on *Nicotiana tabacum* cultivars resistant to the root-knot nematode (Meloidogyne incideita) but not on root-knot susceptible cultivars. Effects of soil and air temperature on reactions to root-knot and Y virus strain N-5 were studied. Inoculation resistance becomes ineffective at high temperatures. At 28°C soil temperature, M-95 (root-knot resistant) plants inoculated with Y virus and root-knot nematodes developed severe necrosis in response to the virus and no galls were detected. At 32°C, viral necrosis was mild and 10% of the root system showed galling. No virus necrosis occurred at 35°C and galls were formed on the root system. Fewer smots were smaller in aerial temperature experiments. The results indicate that high root-knot resistance also inhibits the necrotic reaction to M-95 strain of Y virus. Therefore, it is possible for these two reactions to be due to pleiotropic effects of a single gene.

A VIRUS OF TRIFOLIUM AMBIGULUM BIEB. Simon W. Scott and O. W. Bonnett, Jr., Department of Plant Pathology and Physiology, Clemson University, Clemson, SC 29631.
An isometric virus was isolated from T. ambiguum; a species considered resistant to clover viruses commonly occurring in the U.S. Incorporation of this resistance into T. repens L. offers a solution to the virus problems encountered with the use of white clover, but susceptibility of T. ambiguum to this new virus may limit the usefulness of this source of resistance. Virus particles are 25 nm in diameter and sediment as three bands in rate-zonal centrifugation in 10-40% sucrose gradients. The physical properties of the virus are: longevity in vitro 2-5 days, thermal inactivation point 50-60°C and dilution end point 10^-3-10^-4. The virus has a host range similar in many respects to that of broad bean wilt virus (BBWV) but does not appear to be related serologically to any of the BBWV strains. In the latter stages of purification, the virus tends to aggregate irreversibly.

ALTERATION IN CYTOKININ LEVELS IN SOUTHERN PINES INOCULATED WITH THE FUSIFORM RUST FUNGUS. Dallas Seifert and V. D. Ammon, Department of Plant Pathology and Weed Science, Mississippi State University, Mississippi State, MS 39762.

Pine tissue susceptible, tolerant, and resistant to fusiform rust was sampled to determine changes in cytokinin levels following infection. Cytokinin-like activity (CLA) in tissue extracts from infected and uninfected pine was negligible. At 6-8 mo, CLA had increased in extracts from both healthy and inoculated trees and, with the exception of resistant shortleaf pine, CLA was higher in tissue extracts from healthy than from inoculated pine seedlings. Qualitative differences were observed among the three groups and between uninoculated and inoculated trees.


Polyvinyl chloride tubes (5.6 cm diam) supported in Büchner funnels were filled to depths of 1, 2, 4, or 8 cm with soil naturally infested with Phytophthora cinnamomii (Pe.). Three soil columns of each depth were exposed to simulated rainfall (-2.4 cm per exposure, 2 hr 17 min average exposure duration) adjusted to pH 5.6, 3.0, 2.4, or 2.4. Effluent pH from each column was measured after each exposure. In soil columns exposed to pH 2.4, when 9.0 ml of effluent was removed at the end of the fifth exposure and Pc populations (average ppg for whole columns) varied directly with soil depth (all pH < 0.05). Soil depth had no significant effect on either effluent pH or Pc populations. When columns exposed to pH 4.0 and 5.6 treatments. Results indicate that this soil buffers rainfall acidity within the top 4 cm and that Pc populations in this layer are decreased by rain of pH 4.0.

EFFECTS OF PLANT STRESS ON INCIDENCE OF SOUTHERN STEM ROT OF PEANUT. B. B. Shear and M. K. Beute. Department of Plant Pathology, North Carolina State University, Raleigh 27605.

The effects of moisture level, fertilizer and insect infestation, and leafspot on incidence of Southern stem rot of peanut were examined in field microplots (1 m²) during summer 1980 and 1981. Peanut plants cv. Florigiant were grown with adequate moisture (40), or rainfall and irrigation were withheld (dry). Plots were not sprayed, or sprayed with an acaricide (dicoctol[1980] or propargite[1981]), insecticide (carbaryl), or fungicide(chlorothalonil). Treatments were applied in all combinations at low (10 scleotiomy of Sclerotium solani/plot) and high (100 scleotiomy of S. solani incubum levels. By both years, disease incidence was lowest in dry-low inoculum plots, highest in soil-high inoculum plots, and intermediate in dry-low inoculum and soil-low inoculum plots. Within the soil-high inoculum plots, treatments with dicoctol[1980] and chlorothalonil[1981] increased disease (p<0.01). Highest disease incidence in both years occurred with treatments promoting development or maintenance of foliar canopy.


A survey of 12 North Florida peanut fields was made from August 19-21, 1981, using three sampling methods to assess leafspots caused by Cerocospora arachitica Hori (CA) and Cerocosporidium peronosporum (Dk.). Extension scouting (method 1) one leaf was randomly taken at mid-canopy level from each of 50 sites within the field. Method 2 consisted of 5 leaves from the top of each of 50 sites along the four arms of an 8.5 m W-shaped pattern. In method 3 the three leaves from the top third of the canopy were taken from the same sites as method two. A comparison of the scuturing method (Method 1) and method 2 gave a linear correlation. The total lesions/leaflet of CA and CP (r^2=0.98) and for lesions/leaflet of CP alone (r^2=0.97). Method three detected fewer lesions/leaflet than the other methods and had a high r^2 only for lesions/leaflet of CA (r^2=0.92). Of the 48,417 leafspots counted 13.9% were CA and 86.12% CP.

LEAF SPOT DISEASE OF CALATHEA AND MARANTA SPECIES INCITED BY DRECHSLERIA SETARIAE. G. W. Simone, Plant Pathology Department, University of Florida, Gainesville, Florida 32611.

Samples of Calathea roseo-picta and Maranta leuconoevar var. Kerchoveana were received at the Florida Plant Disease Clinic with unusual foliar disease symptoms. Leaf lesions on both plant species were round to slightly irregular, measuring 2-16 mm in diameter. Lesions were typically enclosed by a 1-3-mm-bond of chlorosis. Calathea leuconoevar var. Kerchoveana lesions were narrowly zonate, golden tan with a white center. Lesions on C. roseo-picta were dark brown and typically lacked the zonation and white center. Isolations from lesioned tissue resulted in a malnourished-looking culture of Drechslera setarica. Isolates of D. setarica were grown on acidified potato-dextrose agar (pH 4.5). Condial suspensions of 5 x 10^4 spores/ml were used to inoculate plants of both species in the greenhouse. Typical leaf symptoms noticed approximately five days after infection. Isolates from Maranta and Calathea were pathogenic on both hosts. The causal fungus was readily reisolated from inoculated plants with symptoms.

TRANSLOCATION OF LABELED PHOTOSYNTHETIC CARBON IN GRASSES INFECTED WITH MYIOPHURGOSPORA ATREMENSIOSA. R. J. Smith, W. M. Bacon, and E. S. Lottrell, Dep. of Plant Pathology, University of Georgia, Athens, GA 30602.

The growth of Myiophyphora atremensosa is entirely superficial and on the expanded leaves in restricted to isolated stromata near the tips of the leaves. Stromatal bridges may be formed as successive opposing leaves are bound together at the tips of their adaxial surfaces by the fusion of stromata. The superficial nature of these stromata bridges the dissection and fractionation of host and pathogen tissue. Supplying 14C02 to illuminated infected bahigra grass plants demonstrated that labeled photosynthesis was translocated into the stromata. Chromatographic identification of some of these labeled carbohydrate in both leaves and stromata was undertaken to determine the nutritional relationship of host and fungus.

MYCELIAL INTERACTION BETWEEN ISOLATES OF MONILIA C. FRUTICULOA R. M. Sonoda, University of Florida, Agricultural Research Center, Fort Pierce, FL 33464 and J. M. Ogawa, Department of Plant Pathology, University of California, Davis, CA 95616.

Sixty seven monoascosporic isolates of Monilzia fruticulosa from seven ascocarps were plated 2.5 cm apart on oatmeal agar in all combinations at light to dark, single or double, lines of interaction formed between mycelia of some isolates. The 67 isolates could be separated into 14 groups of non-interacting isolates. Each ascus contained members of two to seven groups. A direct ascospore contact coefficient of the two groups. The occurrence of mycelial interactions provide an additional marker for epidemiological studies of M. fruticulosa, the causal agent of brown rot of stone fruits.

CROP ROTATION AND YIELD LOSS IN CORN IN SOIL INFESTED WITH RHIZOCTONIA SOLANI AG-2 AND AG-4. D. Donald R. Summer and D. K. Bell, Coastal Plain Station, Tifton, Georgia 31793.

Soil in 0.7 m² field microplots of Tifton loamy sand was infested with DD-MNCS in Feb. 1980 and separately infested with Rhizoctonia solani AG-2, AG-4, Rhizoctonia-like fungi (binucleate) (RBN), or noninfested. Corn or peanut, or double crops of cucumber-southern pea or turnip-soybean were planted in 1980. After harvest the soil was not tillled until the spring of 1981, and corn planted following the legumes. Populations of R. solani AG-2, AG-4 and RBN in soil following legumes averaged 1, 5, 7, and 24 propagules/100g, respectively, in Feb. 1981. Only
R. solani AG-2 caused brown, crown, and lateral root diseases in corn. Treatments did not influence growth and yield of corn in 1980, but in 1981 root growth and height were less and yields were reduced 36% in soil infested with AG-2 compared with non-infested soil (9.0 vs 5.8 M/I ha). Corn grown in soil infested with AG-4 or RBN was not different from the control. None of the cropping systems influenced populations of AG-2 or growth and yield of corn.

EFFECT OF TEMPERATURE ON SPORE GERMINATION OF Leptosphaeria BRONSIANA. Wayne Thel and C. Lee Campbell, Department of Plant Pathology, N. C. State University, Raleigh 27695.

Determining temperature response of spore germination is an initial step in modeling the Leptosphaeria bronsiana-alalfa system. Three pathogenic single-spore isolates were used to initiate colonies for spore production by blending a colony in 30 ml sterile distilled water and placing droplets on V8 juice agar medium. Cultures were grown under fluorescent light (12 hr light/dark) at room temperature. After 6-7 days, 6 cm cellulose squares were placed in lids for a 4 hr spore collection period. Cellulose squares (with spores) were put on temperature adjusted water agar, incubated at 8-30C for 6.5, 15, 3.0, 3.5, 6.0, and 29.0 hr, stained with safranin (0.1% in 95% EtOH) and refrigerated. Percent germinated spores for 200 spores per treatment was determined. Optimum germination occurred between 22 and 25C for all isolates at each time. After 30 hrs, germination was at or near 100% between 16-30C but was significantly less at 8 and 36 C.

THE POTENTIAL FOR CONTROLLING DOWNY MILDEW OF CANTALOUP USING PLANT INTRODUCTION SOURCES OF RESISTANCE. Claude E. Thomas, USDA, ARS, SR, OPA, P. O. Box 257, Weslaco, Texas 78596.

Twenty-one Cucumis melo plant introductions (PI's) and 14 cantaloup varieties were evaluated in replicated field plots for resistance to Pseudoperonospora cubensis in South Texas in 1978. Disease severity was monitored as percent leaf loss. Percent leaf loss among PI's ranged from 13 to 97% and among varieties from 29 to 90%. The calculated percentage of disease control (PDC) indicated that the levels of resistance in 12 PI's were significantly higher than in the most susceptible variety. The most resistant PI, ICP0283, had a calculated PDC of 97% compared to the most susceptible variety, 'Perilla', and 55% compared to the most resistant variety, 'Smith's Perfect'. The comparative PDC between PI ICP0283 and its imbedder derivative was 85%. This study indicates the potential for improving the levels of resistance in the tested PI's and, thus, the level of downy mildew control in cantaloupe varieties that are developed utilizing these sources of resistance.

EFFECTS OF FUNGICIDES AND HARVEST TIMES ON SOYBEAN SEED QUALITY. J. T. Turner, Jr., Dept. of Plant Pathology, Univ. of Georgia, Georgia Experiment Station, Experiment, GA 30221.

Soybeans from seed lots with low germination test results (50-80%) were collected and cultured. The most frequently isolated fungi were Phomopsis spp., which were found in nearly 50% of the seeds of some lots. Other genera commonly found were Alternaria, Fusarium, Cercospora, Aspergillus, Penicillium, and Colletotrichum. A seed treatment mixture of thiram and capton increased germination by an average of 18% in a laboratory test, but increased field emergence by an average of only 6%. Fungal fungicides delayed invasion of pods by certain fungi, but at maturity the fungal populations were similar to those of controls. In all treatments and controls, seeds harvested from subplots at maturity had high germination rates. When harvest was delayed 2 and 4 weeks, germination rates were lower. Among the fungi isolated from the seeds, Phomopsis spp. showed a corresponding increase over time. Harvesting promptly at maturity was essential to high quality seed regardless of fungicide use.

DNA ISOLATED FROM A MYCOVIRUS OF THE AQUATIC FUNGUS, RHIZIDIOMYCES APOTHEIUS ZOEPF. V. H. Wojtczak and C. W. Kuhns, Dept. of Plant Pathology, University of Georgia, Athens, GA 30602.

A pathogenic isoccepheral mycovirus (60 nm) has been found in eight isolates of Rhizidiomyces. The virus infection reduced the mycoparasitic activity of the fungus on oogonia of plant pathogens. Virions concentrated by Amicon pressure filtration and purified by sucrose density gradient centrifugation had the same size and shape as those observed in infected whole fungal cells. The nuceloc acid was extracted by pronase-pH7. SDS procedures. Diphenylamine and DAPI tests were positive for DNA. The perchloric acid hydrolysate contained thymine but not uracil. Nucleic acid properties such as DAPI fluorescence and agarose gel electrophoretic bands were lost after treatment with DNase I. The viral nucleic acid had an average melting point of 85.5 C indicating a G:C ratio of 41.8%. The A260/ A280 ratio for whole particles suggests a nucleic acid content of 0.10% and an extinction coefficient of 0.3. We conclude that the mycovirus contains dsDNA. No previous report of DNA isolated from a mycovirus was found.