

Abstracts of the 1970 Annual Meeting of the Caribbean Division of The American Phytopathological Society

Effect of packaging on vascular streaking of fresh cassava roots. C. W. AVERRE (N. C. State Univ., Raleigh). Storage and shipping conditions of fresh cassava roots (*Manihot utilissima*) influence the development of black vascular streaking caused by an oxidative enzymatic process. Two experiments were conducted using fresh, white roots from South Florida. The roots were washed, cut in lengths of 10-15 cm and packaged in (i) closed paper bags; (ii) sealed polyethylene bags; (iii) sealed polyethylene bags + decaying leaves; and (iv) sealed polyethylene bags with roots previously dipped in a sucrose solution. Experiment 1 was for 23 days with diurnal temperatures of 15-21 C; experiment 2, 15 days at 21-35 C. The per cent of roots in the two experiments which developed black vascular streaks were 100; 100, 45; 19, 0; and 0, 0 for treatments 1, 2, 3, and 4, respectively. Roots in treatments 3 and 4, where anaerobic conditions developed, showed much bacterial soft rot.

Determining the threat of Helminthosporium turcicum attacks in sweet corn. R. D. BERGER (Univ. Fla., Belle Glade). The amount of Northern leaf blight at harvest was a function of: the weather (average number of blight favorable hr = [BFH]/day); the number of *Helminthosporium turcicum* spores in the air (spore trap monitoring); time of first major disease spread; inherent varietal resistance; and fungicide spraying. Infection rates (r) of fungicide-sprayed blight-susceptible, -tolerant, and -resistant sweet corn cultivars in a moderate blight severity year (1970) were 0.13, 0.10, and 0.06, respectively. Aerial sprays of fungicide on days of peak spore flights appeared to give substantial disease control as measured by the lack of subsequent disease spread. Few additional lesions occurred from spore deposits after full silk, despite the occurrence of major spore flights. The greatest damage by late season blight came from the rapidly enlarging lesion areas rather than from new infection centers. Once parameters of blight spread for particular cultivars had been established, fungicide spraying could be governed conveniently by BFH, or accurately by daily spore count values to achieve commercial *H. turcicum* control.

Residue monitoring, a method for timing spray schedules. C. H. BLAZQUEZ (Univ. Fla., Immokalee). A method for timing spray schedules was developed by relating the degradation rate of fungicide leaf residues with their ability to inhibit spore germination and fungal growth. Fungicide residues of Dyrene 50 WP [2,4-Dichloro-6-(*o*-chloroanilino)-*s*-triazine] were analyzed from tomato leaves beginning 3 hr after spraying, and every 24 hr thereafter until complete breakdown of the concentrations of residues obtained daily were tested for their ability to inhibit spore germination and fungal growth of *Alternaria solani*. By relating residual degree of concentration with inhibition of spore germination and fungal growth, it was possible to determine the duration of Dyrene fungicidal activity against *A. solani* at any one time after spraying. It is suggested that this knowledge would allow a more efficient timing of spray applications for early blight control. The phrase "residue monitoring" is offered to describe this analytical-bioassay method.

Bacterial blight of rice in tropical Asia in relation to strains of Xanthomonas oryzae. I. W. BUDDENHAGEN, A. P. K. REDDY, & J. SILVA (Univ. Hawaii, Honolulu). Bacterial blight of rice in tropical Asia has become severe since the advent of high-yielding cultivars and high nitrogen levels. Differences in disease severity among countries could be due to climatic factors or to pathogen strains. Seventy-two isolates from nine countries were tested by inoculation on a set of rice cultivars of Japonica and Indica types. Isolates

with highest virulence for the majority of cultivars were from Indonesia, India, Burma, and Ceylon. Isolates from Japan and Thailand were less virulent, with Taiwan isolates intermediate. Several cultivars were generally resistant except to isolates from Ceylon, Burma, and India. Cultivars BJ1 and P.I. 209938 exhibited moderate resistance throughout, indicating considerable horizontal resistance. From 27 cultivars, BJ1 and JC70 were selected as horizontally resistant and susceptible cultivars, respectively; 7 others were retained as differentials: Kogane Maru, Semora Manga, TKM6, Lacrosse-Zenith-Nira, Giza 38, Tsao Tsuan, and Peta. It appears that representative pathogen isolates from different countries are not identical in potential virulence spectrum.

Synergistic effect between Macrophomina phaseoli and Xanthomonas phaseoli on bean foliage. C. DIAZ POLANCO (Centro Invest. Agron., Maracay, Venezuela). The fungus bacterium complex (*Macrophomina phaseoli*-*Xanthomonas phaseoli*) was observed in bean fields of two geographically and ecologically different areas of Venezuela. The synergistic association was confirmed under greenhouse conditions. Leaf inoculations with each pathogen separately and with both simultaneously were carried out at high relative humidity (80-90%) and at fluctuating temperatures (19-26 C), resembling field conditions where the synergism was observed. Two Venezuelan black bean varieties (Coche and Cubagua) were used as host plants. Both varieties were equally susceptible to each pathogen alone, while Coche was more susceptible to the presence of both pathogens. Dual-inoculated Coche plants presented areas of invasion by both pathogens which were 3 times greater than those of the bacterium alone, 6 times larger than necrotic spots induced by the fungus, and twice as large as the simple addition of the bacteria and fungus foliar damage.

Chemical control of Alternaria and Botrytis on carnations under epiphytotic conditions. A. W. ENGLEHARD (Univ. Fla., Bradenton). Spraying 16 fungicides for 5 months at either 1, 2, or 3 times/week failed to give good control of *Alternaria dianthi* and *Botrytis cinerea* on flowers under epiphytotic conditions. The White Elegance carnations were grown in ground beds in a saran cloth house. Alternate plots were left unsprayed to provide an abundance of inoculum. Moisture and temperature were conducive for disease development. Daconil 2787 (tetrachloroisophthalonitrile) provided good control of *Alternaria* on leaves and stems; it was also the best treatment for the control of both *Alternaria* and *Botrytis* on the flowers. *Alternaria dianthi* was more severe on the leaves and stems of plants sprayed with benomyl than on plants sprayed with water.

Chemical control of red algal disease on Citrus in Florida. FRAN. E. FISHER & R. T. MC MILLAN, JR. (Univ. Fla., Lake Alfred, Homestead). The parasitic alga, *Cephaleuros virescens*, frequently causes severe damage to leaves and twigs of *Citrus* spp., particularly under the high-moisture conditions of the coastal lowlands of Florida. Outbreaks of algal disease may also occur in the nonsprayed groves of the interior. Copper sprays have been the only successful means of control. However, tests conducted in 1970 on Tahiti lime trees (*Citrus aurantifolia*) showed that Daconil, 1.5 lb./100 gal applied at petalfall was more effective than basic copper sulfate, 0.75 lb./100 gal. Disease incidence on trees sprayed with ferbam, 1.5 lb./100 gal or Difolatan, 0.75 lb./100 gal was comparable to that of trees sprayed with basic copper sulfate.

Chenopodium spp. indicators of potato cork virus. ANA MARIA HINOSTROZA & E. R. FRENCH (Inst. Phytopathol. Res., Wageningen, The Netherlands, N. C. State Univ., Mission to Peru, Lima). Tuber cork disease of *Solanum tuberosum* ssp. *andigena* occurs in Peru at elevations above 2,500 m, but not in coastal plantings with corky seed. From the slightly raised, circular, necrotic lesions or sunken and cankerous, older, dried-out lesions, fungi and bacteria were occasionally isolated; but only *Fusarium oxysporum* associated with secondary dry rot symptoms was pathogenic when inoculated on tubers. Greenhouse-grown Renacimiento plants from corky tubers, and healthy Mentor (*S. tuberosum*) plants graft-inoculated with sprouts from these, showed mosaic, stem necrosis, and anthocyanosis on lower leaf surfaces; however, cork symptoms did not develop on the tubers. These plants were free of viruses X, Y, A, S, and M. Leaf sap inoculations to *Nicotiana tabacum* 'Samsun' and 'Xanthi' and *Phaseolus vulgaris* were negative, whereas *Chenopodium quinoa* and *C. amaranticolor* developed spreading local lesions. *Chenopodium quinoa* was the more sensitive indicator host, and more so at 15 C than at 10 or 20 C. Sap inoculum from fruit produced symptoms in 7 days, that from leaves in 13, and that from tubers produced no symptoms. Some symptoms induced by this virus and those described for potato mop-top virus are similar on both tubers and *Chenopodium* spp.

Curvularia leaf spot of corn in Venezuela. G. MALAGUTI & L. J. SUBERO (Centro Invest. Agron., Maracay, Venezuela). A leaf spot of corn has been observed for many years in Venezuela, sometimes causing severe blight of entire corn plantations. In 1970, an epiphytotic of *Curvularia* leaf spot occurred in most commercial corn fields throughout the country; it appeared in areas with widely different ecological conditions, and affected most corn cultivars. Leaf spots are round, 0.5-3 averaging 1.8 mm in diam, yellow to olive, and oily in appearance; as they increase in size, a necrotic, straw-colored area appears in the center. Isolations consistently yielded *Curvularia* sp. Pathogenicity of this fungus was established by using isolates collected in different parts of the country. The pathogen has been tentatively identified as *Curvularia maculans* (Bancroft) Boedjii.

Chemical control of Cercospora leaf spot of peanuts. C. R. MILLER & T. A. KUCHARREK (Univ. Fla., Gainesville). Fungicides were tested for the control of *Cercospora* leaf spot of peanuts under Florida conditions. The cultivar Florunner was grown in both irrigated and nonirrigated plots, and fungicides were applied at 2-week intervals except as noted. A total of five applications was made. All fungicides tested, except three, significantly reduced disease incidence based on an index of 1-10 (1 = 10% or less leaf spot and 10 = 100% infection or complete defoliation). Under our conditions, however, only those fungicides receiving an index of 5 or less were considered creditable. In both the presence and absence of irrigation, these included benomyl spray, benomyl applied at alternate dates only (three applications), benomyl dust, Duter, Daconil, Colloidox, Mertect, and copper-sulfur. In addition, under irrigation, two experimental materials, TC-904 and RH-176, provided adequate control. Disease incidence in plots treated with benomyl spray was significantly less than that of all other fungicides tested.

A species of Cylandrocladium associated with seed of Thea sinensis. E. K. SOBERS & S. A. ALFIERI, JR. (Univ. Ga., Tifton, Fla. Dep. Agr., Gainesville). A species of *Cylandrocladium* resembling *Cylandrocladium parvum* and *C. camelliae* was first isolated from imported seed of *Thea sinensis* in Florida in 1964. The same fungus was found associated with leaf lesions on *Cyclamen persicum* in 1966,

and late in 1969, it was again isolated from roots of diseased *Aglaonema simplex* and *Cupressus* sp. Leaves and roots of five cultivars of *Rhododendron obtusum*, six species of *Eucalyptus*, *Cyclamen persicum*, and *T. sinensis* were not susceptible to the tea or *Cyclamen* isolates. However, significant reduction in germination of tea seed was obtained when planted in soils (fumigated with methyl bromide and nonfumigated) infested with either isolate. The fungus is characterized by hyaline, one-septate conidia, 8.8-18.2 X 1.8-3.4 μ , and average 12.7 X 2.4 μ . Conidiophores are hyaline, septate, consisting of septate primary branches 17-42 X 2.0-3.4 μ , and phialides 12.2-44.9 X 2.0-4.1 μ that taper to an acute tip. Secondary branches are rarely observed, and tertiary branches have never been seen. Stipes are septate, hyaline, 102-231 X 2.0-5.4 μ , and terminate in a hyaline, hastate, vesicle 14.9-36.8 X 2.0-4.7 μ . Because of differences between this and existing species, the name *Cylandrocladium hastatum* will be proposed for this fungus.

Occurrence of heterothallic Calonectria (Fusarium) rigidiuscula perithecia and their function in nature. D. L. THOMAS & W. C. SNYDER (Univ. Calif., Berkeley). Laboratory tests show that although heterothallic clones of *Calonectria (Fusarium) rigidiuscula* from different flower cushion disease of *Theobroma cacao* have distinct pathogenic behaviors, they are interfertile and therefore of the same population. The distinctive pathogenicity shown by green point gall clones is inherited through the sexual cycle when these clones are mated with flowery gall clones. Heterothallic perithecia were collected from nature in Honduras, Nicaragua, Costa Rica, and Ecuador. Heterothallic clones of both mating types have been found in most of the areas visited in the Caribbean, Central America, and South America. Although homothallic *C. rigidiuscula* perithecia are frequently abundant on dead cacao twigs and pods, such clones represent a distinct, apparently saprophytic population. It is postulated that the perithecial stage of the heterothallic population has a significant function in the epidemiology of the disease syndrome.

Growth response of resistant and susceptible tomato plants inoculated with Verticillium albo-atrum under different environmental conditions. B. VILLALON (Univ. Fla., Homestead). Experiments were conducted to determine optimum conditions for development of uniform and intense symptoms of *Verticillium* wilt required for accurate determination of resistant and susceptible populations of tomatoes. Resistant VR Moscow and Tropi-Red, and susceptible Walter and Homestead cultivars were grown under 12 hr of light and dark and 25-30 C and 20-22 C, respectively. Relative humidity was held between 58-90%. Ten-day-old plants were inoculated by dipping roots for several minutes in a spore-mycelial suspension containing 1.5 to 3.0 million spores/ml. Plant height in cm was recorded weekly, and comparisons indicate that growth rate was significantly inhibited in all inoculated cultivars. VR Moscow had 33%; Tropi-Red, 59%; Walter, 89%; and Homestead, 97% growth reduction. VR Moscow has been used as the main source of resistance for most Florida tomato stocks.

Searching for the geographical origin of the pathogen Calonectria (Fusarium) rigidiuscula. A. G. WATSON, W. C. SNYDER, D. L. THOMAS, & J. A. SALAS (Univ. Calif., Berkeley). Diseases of *Theobroma cacao* in the New World caused by *Calonectria (Fusarium) rigidiuscula* have been recorded in all the cacao-growing areas of Central America, the Caribbean, and northern South America. There is considerable variation both in symptom types and in morphology and physiology of the fungus. In order to

determine the full range of expression of the fungus and locate the potential source of resistance in cacao populations, a search was directed toward finding the origin of the pathogen. The search was concentrated in the postulated gene center of cacao; namely, the river valleys flowing from the South Colombian and North Ecuadorian Andes into the Amazon Basin at around the 300-m elevation. A wide range of clones of the pathogen was isolated from what were judged to

be wild trees in areas remote from any agricultural or recent native land disturbances. Furthermore, the trees from which isolations of the pathogen were made appeared to be tolerant of infections, showing only slight symptoms. We believe that the pathogen is primarily parasitic on *Theobroma cacao*, and the gene centers of both host and parasite are coincident, in or close to the explored area.

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