

**Abstracts of the 1973 Annual Meeting of the Caribbean Division
of The American Phytopathological Society**

Planting time and pathogen incidence in rice leaves and rachis in the western plains of Venezuela. M. ALFONZO and C. NAVA. (Center for Agricultural Research, Araure, Venezuela). Three tests were run in the midwestern region of Venezuela in 1970 and 1971, with rice cultivars 'Blue-Bonnet' and 'Llanero 501' planted every 7 days from the 2nd wk in April. The results indicated that percent infection of blast (caused by *Pyricularia oryzae*) at the rachis increased, and grain yield decreased, with delay in planting. Also observed was an increase in percent leaf area affected by *P. oryzae*, *Helminthosporium oryzae* and *Cercospora oryzae*. The effect of this on yield was measured in the last test alone. There was a significant negative correlation between percent rachis infection and grain yield, which indicates that fungus attack at the rachis is responsible for a large share of yield reduction. This could also be associated with damage related to leaf pathogens and climatic conditions.

Determination of minimum and optimum inoculation periods of the corn stunt pathogen in corn with the vector Dalbulus maidis. M. ANAYA, A. DIAZ, and C. R. GRANILLO. (National Center of Agricultural Technology, and Faculty of Agronomy Sciences, Univ. El Salvador). Corn leaves showing symptoms of corn stunt were used as inoculum sources. The leafhoppers utilized in this experiment were obtained from a pathogen-free colony. An underdetermined number of leafhoppers were placed on infected leaves for an acquisition period of five days. Then the leafhoppers were transferred to disease-free plants for an incubation period of 22 days. Twelve-day-old plants of the hybrid H-3 and the line 528 were utilized as test plants. The vectors were exposed individually to each one of the test plants. The results showed that the severity of the disease was less in H-3 than in the line 528. The minimum inoculation period for hybrid H-3 and line 528 was 30 and 5 min, respectively, and the optimum period was 12 and 72 h, respectively.

Organic pesticides for controlling Meloidogyne incognita on Impomoea batatas. C. W. AVERRE, L. W. NIELSEN, and K. R. BARKER. (N.C. State Univ., Raleigh). Root knot of sweetpotato, caused by *Meloidogyne incognita*, is a common and serious disease that adversely affects root quality and yield. To avoid the 2- to 3-wk delay between treating soils with fumigant nematicides and planting, tests were conducted for four growing seasons in infested fields to evaluate nonfumigant pesticides that require no waiting period. The following organophosphate and carbamate pesticides were incorporated in the soil before transplanting, at rates suggested by the manufacturers: aldicarb (Temik); carbofuran (Furadan); ethoprop (Mocap); methomyl (Lannate); oxamyl (Vydate); fensulfothion (Dasanit); and phenamiphos (Nemacur). All showed activity against the nematode. Only aldicarb, which caused a transitory leafspotting, injured plants. However, except for the standard fumigants, 1,2-dichloropropane-1,3-dichloropropene mixture or 1-3 dichloropropene, aldicarb was the most effective in reducing injury caused by *M. incognita*.

Prediction of amount of Helminthosporium turcicum at harvest in Florida sweet corn. R. D. BERGER. (Univ. Fla., Belle Glade). The amount of *Helminthosporium turcicum* at harvest in sweet corn was predicted using date and amount of initial disease (x) and average infection rates (r) modified by plant growth, projected weather, and anticipated control from aerial fungicide sprays. The date of appearance and amount of initial disease were the most important factors influencing final disease. Average r values were obtained from weekly disease ratings over 10 growing seasons. The r values were usually high (.20 - .40) when x was 0.001 - 1.0%. Intermediate r values (.10 - .20) were found prior to tasseling, and low r values (.04 - .09) were obtained after tasseling on sprayed corn. Weather and control effectiveness influenced infection rates. Numerous sprays were

avoided when low final disease was satisfactorily predicted based on lateness and sparseness of initial disease. Severe final disease was sometimes predicted up to 50 days before harvest, based on early and heavy initial disease incidence, but yield losses were avoided when r was reduced sufficiently by the advised increase of aerial sprays.

Wild hosts of cowpea mosaic virus. A. DIAZ. (National Center of Agricultural Technology, El Salvador). The presence of the cowpea mosaic virus has been established in El Salvador. The virus is not transmitted by seed but by different species of Chrisomelidae; therefore, it is thought that infections originate under natural conditions from wild hosts of the pathogen. A total of 14 wild legumes were mechanically inoculated with extracts from virus-infected plants. The legumes *Centrosema pubescens*, *Phaseolus lunatus*, and *Rhynchosia pyramidalis* were found to be hosts of the virus.

Combate del chancro bacteriano del tomate con fungicidas a base de cobre. E. ECHANDI. (N.C. State University, Raleigh). El chancro bacteriano del tomate causado por *Corynebacterium michiganense*, es una enfermedad de importancia economica en las siembras de tomate en espalderas en el Oeste del Estado de Carolina del Norte E.E.U.U. En vista de que las medidas preventivas utilizadas hasta el momento, no han sido suficientes para controlar dicha enfermedad; se realizaron pruebas de laboratorio, invernadero y campo con productos quimicos recomendados para el control de las enfermedades del tomate. En dichas pruebas se determino que fungicidas a base de cobre reducian la incidencia del chancro. Sin embargo se noto en las pruebas de campo realizadas en 1970, 1971 y 1972, que algunos, aun aplicados a concentraciones relativamente bajas, producian fitotoxicidad. El Sulfato de cobre tribasico (SCT) 50% polvo mojabable (complejo de sulfato basico de cobre 53% de Cu) aplicado con bombas de espalda de bajo galonaje cada 5 dias a la concentracion de 2 lbs (3X) del producto comercial en 100 gal. de agua, fue el mas efectivo y el menos fitotoxico; logrando reducir aproximadamente en un 30-50% la incidencia del chancro en ensayos de campo. Aplicaciones de SCT en 1972 y 1973, aparentemente han reducido la incidencia del chancro en las plantaciones de tomate del Oeste del Estado de Carolina del Norte.

Crown rot and wilt of baby's breath incited by Phytophthora parasitica. A. W. ENGELHARD. (Univ. Fla., Bradenton). *Phytophthora parasitica* incited a serious new crown rot and wilt disease of baby's breath, *Gypsophila paniculata*, in Florida. Plant losses of 30% were recorded in the field under commercial conditions during the first month after transplanting. Initial symptoms were a wilting of the foliage, followed by a soft, wet decay of stem tissue in the crown. Potted plants began to wilt 4 days after inoculation in the greenhouse. The disease was most severe during the warmer, wet part of the growing season from August through November and again in May. Maximum in vitro growth of the pathogen was at 32 C (90 F). The pathogen also killed tomato plants (*Lycopersicon esculentum* 'Tropic') but was not pathogenic on chrysanthemum (*Chrysanthemum morifolium* 'Hurricane', 'Iceberg', 'Puritan', and 'Torch'), or the Poinsettia (*Euphorbia pulcherrima* 'Annette Hegg'). Good disease control in pot experiments in the greenhouse was obtained with ethazol; intermediate control with captan, chloroneb, and experimental S-1805 (Dow Chemical Co., Midland, Mich.); and poor or no control with benomyl and zinc ion plus maneb.

Infection and symptom induction in rice plants by the nematode, Hypsoperine n. sp. (?). A. FIGUEROA and M. F. JIMENEZ. (Ministry of Agriculture, Costa Rica). Inoculations on rice seedlings roots, using second-stage larvae of the

nematode, have shown it to be an endoparasite that positions itself parallel to the vascular cylinder, where it inserts its head just inside the meristematic and elongation area, the front part of its body pointing toward the root apex. There it reaches the adult stage through body thickening and successive molts. The roots show apical thickening and their growth is paralyzed, resulting in terminal malformations of distorted shapes that look like the letter "J", omega, or circles. Aboveground symptoms, similar to nutritional deficiencies, consist of leaf chlorosis and necrosis, poor tillering, and stunted plants with scant vigor. Foliar analysis, performed on nematode-inoculated and noninoculated plants, showed that nutrient uptake was deficient in the inoculated ones.

Biocontrol of Cephaleuros virescens on Tahiti lime in Florida. FRAN. E. FISHER. (Univ. Fla., Agricultural Research and Education Center, Lake Alfred). Parasitic red alga, *Cephaleuros virescens*, is frequently involved in severe twig and bark damage of *Citrus* spp., particularly under conditions of high moisture in coastal lowlands. Outbreaks of *C. virescens* may also occur in nonsprayed groves in the interior areas of Florida. Copper compounds, ferbam, and Difolatan have been used successfully as means of control. In laboratory studies, the recently introduced snail, *Bradybaena similaris* fed voraciously on the red alga. Field counts of snails on lime trees (*C. aurantifolia* 'Tahiti') in southern Florida have shown that an average of 22 snails per tree reduced the alga on outside limbs and twigs from an almost total infection to no visible infection from 11 June to 13 August 1973. From the standpoint of disease control, the snail could effectively reduce the algal infection and thereby serve as a useful biological agent. Excessive snail populations that might develop and feed on the foliage could be reduced in late summer and/or fall by applying a snailicide.

Field tests for simultaneous resistance of potato to bacterial wilt and late blight. L. C. GONZALEZ and R. BIANCHINI. (Univ. Costa Rica; Ministry of Agriculture, Costa Rica). Progenies from crosses made at the University of Wisconsin, between hybrid clones resistant to bacterial wilt (B.W., incited by *Pseudomonas solanacearum*) and varieties resistant to late blight (L.B., incited by *Phytophthora infestans*), were screened under field conditions. Tests run in the potato area of Cartago, Costa Rica, included plantings for maintenance and L.B. exposure at high elevations (3,200 m); specific sampling for *P. solanacearum* at medium elevations (1,400 m); exposure of clones to B.W. and L.B. in these mid areas (with measurements of wilt in the field as well as tuber rot at harvest and during storage); and greenhouse tests with naturally infested soil. Field tests at medium elevations allowed the best selection, with the highest LB levels and considerable BW levels in spite of a population decline of *P. solanacearum* in the soil as a result of a 5-mo-long drought. Three clones, MS 1E-7, MS 18-4, and MS 35-22, showed adequate simultaneous resistance to L.B. and B.W., good tuber type and acceptable yields. These, and several others, are being increased at high elevations for additional tests.

Virus diseases of sweet pepper in El Salvador. C. R. GRANILLO, M. ANAYA and A. DIAZ. (National Center of Agricultural Technology and Faculty of Agronomy Sciences, Univ. El Salvador). Sweet pepper plants, *Capsicum annuum* 'California Wonder', showing severe virus-like symptoms, were collected at the National Agricultural School in the Valley of San Andres. A group of differential plants were inoculated mechanically with sap extract from the virus-infected plants diluted 1:50 with a phosphate buffer, 0.05 M, pH 7.1. After inoculation, the plants were observed daily for 30 days, for appearance of virus symptoms. The virus was transmitted by the aphid *Myzus persicae* after an acquisition period of 30 to 60 s; negative transmission results were obtained with an acquisition period of 24 h. No transmission was obtained with the white fly,

Bemisia tabaci. These results, together with the reactions of differential plants, provide evidence that potato virus Y (PVY) and tobacco etch virus (TEV) are present in *C. annuum* in El Salvador.

The mosaic virus of kenaf (Hibiscus cannabinus) in El Salvador. C. R. GRANILLO, A. DIAZ, and M. ANAYA. (National Center of Agricultural Technology and Faculty of Agronomy Sciences, Univ. El Salvador). A virus transmitted by the white fly *Bemisia tabaci*, was isolated from kenaf plants (*Hibiscus cannabinus*) showing virus symptoms in San Salvador. The virus was not transmitted mechanically to differential host plants inoculated with a sap extract from virus-infected plants. The vector succeeded in transmitting the virus to cotton, *Gossypium hirsutum* 'Stoneville 7A' and to *Datura stramonium*. The symptoms obtained in cotton were identical to those observed in virus-diseased plants of that species in commercial plantings. Kenaf plants ('Guatemala 51') inoculated with Abutilon mosaic virus showed symptoms different from the kenaf mosaic. The kenaf mosaic virus and the Abutilon mosaic virus appear to be two separate viruses.

Effects of dasheen mosaic virus on yields of caladium, dieffenbachia, and philodendron. R. D. HARTMAN, and F. W. ZETTLER (Dept. of Plant Pathology, Univ. Fla., Gainesville). The deleterious effects of dasheen mosaic virus (DMV) on yields of *Caladium hortulanum*, *Dieffenbachia picta*, and *Philodendron sellowii* were assessed 4, 5, and 9 mo after inoculation, respectively. All test plants used in this study were propagated from seed, maintained in isolation, and determined not to be DMV-infected. Corms, cane pieces, and plants of each species, respectively, were planted singly in 15-cm diam clay pots. The first leaves to emerge after potting were mechanically inoculated with DMV using 600-mesh Carborundum as an abrasive. All infected plants and the same number of noninoculated controls were maintained together under greenhouse conditions and fertilized routinely. Fresh corm weights and leaf areas (max. length \times max. width) of 69 infected caladium plants were 40 and 53% less than healthy plants, respectively. Similarly, fresh shoot weights and leaf areas of 27 infected dieffenbachia plants were 63 and 66% less than those of controls; and total fresh plant weights and leaf areas of 36 infected philodendron plants were 30 and 30% less than controls. All these results were highly significant at the 1% level. This and accompanying data for symptom expression support conclusively that DMV can be a serious pathogen of cultivated aroids.

Dowco 269, a new and effective systemic fungicide for control of Phytophthora palmivora. J. F. KNAUSS. (Ridge Ornamental Laboratory, Univ. of Florida, Apopka). Five commercial and three experimental fungicides were evaluated over a 2-yr period under greenhouse conditions for the control of *Phytophthora palmivora* on *Dieffenbachia picta* 'Perfection'. One of these, Dowco 269 [2-chloro-6-methoxy-4-(trichloromethyl)pyridine], was found to provide superior control when applied as a drench or foliar spray. In the latter case, the compound appears to be systemic, and is apparently translocated to the roots where it provides protection from infection. There was, however, no carry-over protection in propagative cuttings and cane sections taken from stock plants previously sprayed with Dowco 269. Active root development appears to be necessary for translocation and localization of the compound from the foliage.

A leaf spot of Aechmea fasciata. ROBERT B. MARLATT and JAMES F. KNAUSS. (Agric. Res. and Educ. Center, University of Florida, Belle Glade). The genus *Aechmea*, in the family *Bromeliaceae*, includes species which are used as ornamentals. A new leaf spot of *Aechmea fasciata* was found in a nursery in southern Florida. Pathogenicity tests proved that the

disease was caused by the fungus, *Helminthosporium rostratum*. The fungus invaded the plants without their being injured mechanically. Ultraviolet radiation enhanced growth of the fungus in vitro. Several control experiments showed that the two fungicides which best controlled the disease were chlorothalonil and zinc ion plus maneb.

Effective fungicides for control of yam anthracnose. R. T. MC MILLAN, JR. (Agric. Res. and Educ. Center, Univ. Fla., Homestead). Dithane M45 [zinc ion and manganese ethylene-bisdithiocarbamate] (1.8 g/liter) and benomyl [methyl 1-(butyl-carbamoyl)-2-benzimidazole carbamate] (1.2 g/liter) were compared alone and in combination with Nu-Film-17 (Di-1-p-Menthene) (0.103 per cent) and Triton B-1956 (modified phthalic glycerol alkyl resin) (0.015 per cent) for control of anthracnose (caused by *Colletotrichum gloeosporioides*) on yams (*Dioscorea alata*). Sprays, applied at 2.81 kg-force/cm² (40 psi) with a hand-operated wand, were started when vines were 0.61 m (2 ft) long and applied both weekly and bi-weekly for 5 wk, after which sprays were applied monthly until harvest for a total of 14 applications. Foliage was rated for disease severity on a scale ranging from 1 to 10. Roots were harvested, rated for size and weighed. All fungicidal treatments gave good disease control and high yields. Benomyl alone, or alternated with Dithane M45 combined with Nu-Film-17, was significantly superior to benomyl or Dithane M45 alone or combined with Triton B-1956.

Relationship of density of Phytophthora palmivora chlamydospores in soil to infection of papaya. B. N. RAMIREZ and D. J. MITCHELL. (Univ. of Fla., Gainesville). The relationship of inoculum density (ID) of *Phytophthora palmivora* to infection of papaya (*Carica papaya*) was investigated by transplanting 15- or 45-day-old seedlings to autoclaved, sandy soil containing known levels of chlamydospores (Cs). After 7 days of growth at 25 C in V8-CaCO₃ broth medium, cultures of *P. palmivora* were submerged in water for 3 wk at 18 C to induce Cs formation. Soil was infested with suspensions of cultures that had been sonicated to leave only Cs as viable propagules, and soil samples were plated on a selective medium to check the calculated ID. At 0, 1, and 10 Cs/g of soil, 0, 55, and 78% of the 15-day-old seedlings were infected after 30 days, respectively. All of the seedlings were infected with the higher ID of 25, 50, 100, and 250 Cs/g of soil. Fresh weights of roots decreased with increased ID, and at 250 Cs/g of soil roots of surviving plants averaged 47% of the control. Mortality increased with increased ID, but 35% of the seedlings survived at 250 Cs/g of soil. When 45-day-old seedlings were tested, all of them were infected at ID greater than 1 Cs/g of soil but 95% survived at the 250 Cs/g level. The fresh root weight of the older plants was severely reduced and at 250 Cs/g of soil had only 24% of the controls.

Effect of fungicide treatment on the quality of coffee. C. A. SOTO and R. A. RODRIGUEZ (Ministry of Agriculture, Costa Rica; Kennecott Copper Corp., Houston, Texas). In 1971, work was started to evaluate the influence of fungicide applications, alone and in combination with foliar nutrients, on the quality of coffee liquor. Based on taste evaluations, a correlation was found between taste and the fungicide treatment which is presently recommended in Costa Rica for the control of iron spot disease (caused by *Cercospora coffeicola*). Work continued in 1972,

when Kocide 101 (cupric hydroxide 83%) was used, alone and in combination with several mineral nutrient sources, using the same plots and experimental methods. Even though the incidence of disease was relatively low due to drought conditions, results obtained indicated the same tendency. It was shown that quality of coffee is directly linked to the effective control of the disease. In an additional experiment, to compare similar mixtures of fungicides and nutrients based on Kocide 101, Benlate, and lead arsenate, it was clearly indicated that treatments allowing the lowest infection resulted in the highest quality values. The reverse situation was observed from the untreated. Improvement in quality in other treatments was generally in accordance with their protective effect of infections on the fruit.

Diseases of potato in the humid tropics of Peru. J. C. VESSEY. (International Potato Center, Lima, Peru). In Peru, potatoes are not grown commercially on the eastern side of the Andes below 1,400 m elevation. Potential phytopathological problems were evaluated as part of a program to develop varieties for the humid tropics, using five Peruvian cultivars planted at an altitude of 800 m. The varieties responded well to the growing conditions, producing yields of between 10 and 23 metric tons per hectare, but became severely diseased before harvest. Depending on the variety, 9% to 36% of the plants showed wilt symptoms due to infection by *Rhizoctonia solani*. Three weeks after emergence, a *Leptosphaerulina* sp. leaf spot appeared and rapidly increased in severity to the extent that some plants were completely defoliated. Only a few *Phytophthora infestans* leaf lesions were observed. *Erwinia carotovora*, *Phytophthora erythroseptica*, and *Fusarium* sp. infected less than 1% of the tubers. Some premature sprouting, secondary tuber growth, and abnormal rhizome thickening was observed.

Collecting Persea from Mexico to Colombia in search for resistance to Phytophthora root rot. G. A. ZENTMYER, and EUGENIO SCHIEBER. (Univ. California, Riverside). *Phytophthora* root rot of avocado, caused by *P. cinnamomi*, has caused severe losses in California and other areas of avocado production. The major emphasis on control in California in the past 15 yr has been on rootstock resistance, with the search for resistance centered in the area of native origin of avocado (*Persea americana*), from Mexico to Colombia. High resistance was found in early collections in several species of *Persea* that are nongraft-compatible with avocado. Recently, the collecting program of the Univ. California has expanded greatly, with 530 collections made in Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama in 1971-73. These include many types of avocado as well as other species and varieties of *Persea*: *P. americana* v. *drymifolia*, *P. americana* v. *nubigena*, *P. americana* v. *gigantea*, *P. schiedeana*, *P. caerulea*, *P. steyermarkii*, *P. Donnell-Smithii*, *P. rigens* (?), and also a closely related genus, *Beilschmedia*. Locations for collections were obtained from previous botanical explorations in the area, and from many herbarium collections. Seeds and/or budwood of collections are sent to California for propagation and testing for *Phytophthora* resistance. Moderate resistance has been found in some *P. americana* and *P. americana drymifolia* types.