

# **ABSTRACTS OF PAPERS**

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## Caribbean Division

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#### ABSTRACTS

RESISTANCE SOURCES AND ORIGIN OF SUSCEPTIBILITY TO EYESPOT OF RICE. S-W Ahn - Rice Program - CIAT Cali A.A. 6713, Cali, S.A.

Eyespot of rice is a newly recognized disease. It is being observed in Colombia, Peru, Panama, Mexico, Guyana, Honduras and Guatemala. Using artificial inoculation, several cultivars such as CICA 9, IR 8, IR 22, CR 1113, Tikal 2 and Dawn etc. have been identified to be resistant. The susceptibility was found to be inherited from Mong Chin Vang A, through IR12 and then IR930, which is a common parent of many susceptible cultivars. It appears that susceptibility to this disease is dominant to resistance.

UTILIZATION OF SLOW-BLASTING PROPERTY IN RICE PLANT. S.W. Ahn. Rice Program - CIAT, Cali A. A. 6713, Colombia S. A.

Slow-blasting ability of rice plant could keep the damage due to blast below the economic threshold, either alone or with the use of fungicides at a relatively low amount. Thus shifting from one variety into another is possible without significant yield loss or high cost of chemicals during the shifting period. Evaluation criteria and schemes were proposed for pedigree and modified bulk method. Slow rate of infection on panicle, and stability of performance under various agroecosystems with high input modern management appear to be key factors for the success of slow-blasting varieties. Using simple evaluation method of single plant, segregating populations were evaluated. The progenies of Tapuripa, Camponi and IR 11-452-1-1, known as slow blasters, performed better than CICA 4, a common susceptible parent. Slow-blasting resistance will be an important component for future varieties for upland areas in Latin America.

A TECHNIQUE TO EVALUATE FUNGICIDE TENACITY AND DETERMINE RATES OF APPLICATION FOR THE CONTROL OF BLACK SIGATOKA ON BANANAS.

J. Cruz and L. T. Palmer, United Fruit Co., La Lima, Honduras and R. H. Fulton, Rohm and Haas Co., Philadelphia, PA., USA.

A technique was devised to study the tenacity of fungicides on banana leaves. Using compressed air, fungicides were applied to the upper leaf surface by a pipette attached to a Paasche Air Brush placed at the top of a spray tower 78 cm high. After 2-3 hrs drying, various amounts of rainfall are simulated using water from a can placed 0.5 m above the sprayed leaves. Banana leaves bearing perithecia of *Mycosphaerella fijiensis* var. *difformis* are used as the source of ascospores. Dry infected leaf tissue is cut 20x20 cm and placed in 100% RH for 24 hrs. The tissue is then suspended in the tower 25 cm above the leaf. Spore discharge occurs within 30 min. Sprayed leaf pieces, with ascospores are cut into 5 cm sq and placed in moist chambers. After 48 hrs incubation at 25 C. the ascospores are stained with Rose Bengal and % germination counted.

Development of disease resistant populations of maize for the tropics: De León, Carlos, Londres 40, México 6, D.F. México.

Several diseases have been identified attacking maize in the tropical humid areas of the Americas. Of major concern are corn stunt and sorghum downy mildew. Other important diseases decreasing yields are leaf blights (*Helminthosporium turcicum* and *H. maydis*), rust (*Puccinia polysora*) stalk rots (*Fusarium Cephalosporium* complex), ear rots (*Fusarium* spp), and brown spot (*Physoderma maydis*). Incidence of tar spot (*Phyllachora maydis*) and *Phaeosphaeria maydis* has increased in later years. Three populations of maize have been selected in CIMMYT with resistance to stunt or downy mildew. Experimental varieties with resistance to these particular diseases are available for use in national programs.

EFFECTO DE DIFERENTES CULTIVOS EN LA PROLIFERACION DE *Pyrenochaeta terrestris* (Hans.) GÖPFF, WALKER Y LARSON. Adolfo Delgado Avila. Facultad de Agronomía, Universidad Zulia, Maracaibo, Venezuela.

Se desarrolló una técnica de análisis para raíz roja. Esto incluyó el crecimiento de cebolla en suelos y luego se evaluaron el porcentaje de infección de las raíces. La evaluación de la enfermedad fue hecha diez semanas después de sembrar el cultivar susceptible "Texas Grano 502" en una mezcla de suelo-arena en una proporción de 1:1. Esta técnica sucesivamente diferenció a los diferentes suelos de acuerdo al nivel de infección de raíz roja que tenían. Se usaron dos métodos diferentes para cuantificar la raíz roja. El conteo visual de raíz roja fue menos preciso pero más práctico que la técnica del medio de Watson. De los cinco suelos seleccionados, dos tenían niveles bajos de infección, uno tenía niveles altos de infección y los otros dos no se les detectó por la técnica de análisis usado. El crecimiento del patógeno de raíz roja fue más grande en cebolla, tomate, pimentón y maíz que en sorgo, algodón y sin cultivar (Testigo).

EVIDENCIAS EN MICROSCOPIA ELECTRONICA DE CONTAMINACION MICOPLASMATICA en Vinca rosea y Phaseolus aureus. A. Farro y R. Colina.

La sintomatología de infecciones micoplasmáticas en *Vinca rosea* se presenta con acortamiento de los entrenudos y una marcada proliferación de yemas laterales. Las hojas jóvenes son poco desarrolladas y cloróticas. Las inferiores tienden al color marcadamente amarillo. Las flores no alcanzan un tamaño normal y los pétalos toman un aspecto foliar (filodia). En una misma planta pueden coexistir ramas sintomáticas y asintomáticas. Al final del período vegetativo la planta tiende a defoliarse y en muchos casos termina con un desecamiento apical. La enfermedad es transmisible por injerto y especies de salta hojas. Cortes ultrafinos de hojas tiernas poco cloróticas mostraron en el tejido conductor invasión de microorganismos de diferentes formas y tamaños, ausentes de pared celular en los cuales la membrana citoplasmática fue claramente evidenciada. Muestras de *Phaseolus aureus* con una proliferación de ramas secundarias en la zona apical, flores y vainas atrofiadas fueron diagnosticadas como infecciones micoplasmáticas. Cortes ultrafinos de sépalos florales con una incipiente necrosis en las nervaduras, fueron analizados en Microscopía Electrónica y confirmaron el diagnóstico.

DISTRIBUTION AND SEVERITY OF PLUM LEAF SCALD DISEASE IN BRAZIL. William J. French University of Florida IFAS Agricultural Research Center, Monticello, 32344. USA Alberto Feliciano EMBRAPA, UEPAE de Cascata Pelotas R. S. Brazil.

For over 30 years a decline of unknown etiology has caused severe damage to Japanese plum trees (*Prunus salicina*) in the south of Brazil. The disease caused marginal necrosis of leaves, dieback of branches, reduced fruit production and death of trees. In 1980 this study determined that plum leaf scald disease (PLS) was the primary cause of decline in 30 orchards in the States of Paraná, Santa Catarina and Rio Grande do Sul. PLS bacteria (rickettsialike bacteria) were isolated on selective medium and identified serologically. The disease was recorded on 31 Japanese cultivars and 6 European (*P. domestica*) cultivars. Several species of leafhoppers, which are considered potential vectors of PLS, were collected in plum orchards.

RECIPROCAL TRANSMISSION OF PLUM LEAF SCALD AND PHONY DISEASE OF PEACH. William J. French University of Florida IFAS Agricultural Research Center Monticello 32344. USA.

Typical symptoms of phony disease (PDP) were observed in peach trees (*Prunus persica*) 18 months after they were graft-inoculated with plum scions (*P. salicina*) infected with plum leaf scald disease (PLS). Likewise, PLS symptoms appeared on plum trees 6-8 months after they were graft-inoculated with peach roots infected with PDP. The rickettsialike bacteria associated with PDP and PLS are indistinguishable by present cultural and serological methods and appear to be identical or very closely related. Feeding studies demonstrated for the first time that the leaf hopper *Homalodisca coagulata*, an important vector of PDP, is also a vector of PLS. This study extends the geographic range of PLS in the U.S. to include South Carolina, Texas and Arizona.

IDENTIFICATION OF SIGATOKA PATHOGENS AND MONITORING FOR BENZIMIDAZOLE RESISTANCE. Carlos Joya, E.I. Du Pont, San Pedro Sula, Honduras.

Both yellow (*Mycosphaerella musicola*) and black Sigatoka (*M. fijiensis* var *difformis*) are present in the Caribbean and Tropical America. The pathogens are distinguishable on the basis of symptomology and cultural characteristics, but confirmation depends on the morphology of the conidia. Resistance to benzimidazole fungicides has occurred more frequently with the more virulent Black Sigatoka. Resistance monitoring is necessary where benzimidazole fungicides are part of the control program. Ascospores from mass-spotted leaf tissue are discharged onto agar amended with MBC at various concentrations and germination is recorded. This technique provides critical information on fungal variation in the field and acts as an early warning system.

A REVIEW OF THE PERFORMANCE OF CHLOROTHALONIL AND OTHER FUNGICIDES FOR CONTROL OF COFFEE DISEASES. Lewis K. Kamiri, Diamond Shamrock Corporation, 1100 Superior Avenue, Cleveland, Ohio 44114, U. S. A. Trials were conducted in Brazil, Guatemala, Kenya and Tanzania on chemical control of American leaf spot (*Mycena citricolor*), brown spot (*Cercospora coffeicola*), coffee berry disease (*Colletotrichum coffeanum*), thread blight (*Pellicularia koleroga*), and leaf rust (*Hemileia vastatrix*) on arabica coffee. Chlorothalonil (Daconil 2787, Bravo 500) applied at 4.4 Kg/ha in 1100 liters of water was as effective against *C. coffeanum* as Captafol (Difolatan) and better than Dithianon (Delan). Data from leaf rust and a combined American leaf spot and thread blight trials indicated that combination products containing chlorothalonil plus 50% copper (Dacobre) enhanced and broadened the activity of each product individually, against all the pathogens. Bayleton and Sicarol applied more than once during the growing season may be phytotoxic. Continued application of anti-leaf rust copper fungicides may increase susceptibility of coffee to coffee berry disease by shifting *Colletotrichum* balance in favor of the pathogenic *C. coffeanum*. Chlorothalonil and/or its products containing 50% copper provide excellent control of major coffee diseases and give higher yields.

EFFECTS OF SEED TREATMENTS ON RATES OF EMERGENCE OF PINUS TAEDA L. W. D. Kelley, Dept. of Botany, Plant Pathology and Microbiology, Auburn University, AL 36849.

Effects of some seed treatments on rates of emergence of stratified *Pinus taeda* L. seeds were determined over an 18-day period. Treatments were: a) non-treated control; b) latex sticker (1:9 v/v Dow latex:water), 60 ml/kg of seed; c) anthraquinone, 37.5 g a.i./kg of seed; d) triadimenol, 2.0 g a.i./kg of seed + latex sticker; e) triadimenol + anthraquinone + latex sticker; and f) triadimefon, seeds soaked in an aqueous solution of triadimefon (800 mg a.i./liter for 24 h) + anthraquinone + latex sticker. Each treatment had four replicate trays sown with 4 g of seed; the test was repeated once. Emergence was determined 7, 11, 13, 15 and 18 days after sowing. On all dates, emergence was greatest for the non-treated control; however, significant differences among treatments were observed only for the 7-, 11-, and 13-day counts. Results indicated that the seed treatments delayed germination, but no detrimental interactions were observed among the combinations tested.

INFLUENCE OF GROWTH MEDIUM ON THE SENSITIVITY OF CYLINDROCLADIUM CROTALARIAE MICROSCLEROTIA TO SOIL FUNGISTATIS. D.T. Krigsvold and G.J. Griffin.

Sensitivity of *Cylindrocladium crotalariae* microsclerotia to soil fungistats was dependent upon the medium on which microsclerotia were grown. Germination of microsclerotia produced on high C:N ratio, glucose-casein-hydrolysate broth (HCN) was stimulated by two of three soils, whereas microsclerotia produced on peanut-stem broth (PSB) were sensitive to soil fungistats in all soils. More germ tubes per germinating microsclerotia in soil, and a greater frequency of mycosphere organisms (actinomycetes and fungi) were associated with PSB microsclerotia than with HCN microsclerotia in soil. In all test soils, most PSB and HCN microsclerotia with mycosphere organisms were ungerminated.

AUSENCIA DE TRANSMISION DEL VIRUS DE LA CLOROSIS INFECCIOSA ENTRE PLANTAS ADYACENTES DE ALGODONERO BAJO CONDICIONES DE CAMPO. J.F. Larios, CATIE, Apartado Postal (01) 78, San Salvador, El Salvador. Se estudió la transmisión del virus de la clorosis infecciosa (VCI) entre plantas sanas de algodónero adyacentes a plantas infectadas en forma natural en parcelas delimitadas dentro de un campo de 4,5 Ha manejadas sin control del vector *Bemisia tabaci* Genn. Los métodos de análisis fueron el de "doublets" de vander Plank y el grado de ajuste. El método de doublets aplicado demostró que no hubo transmisión del virus entre plantas adyacentes excepto en las 2 últimas semanas de la epidemia. Los resultados concuerdan con las pruebas de invernadero reportadas. Estas características y la cantidad de inóculo inicial constante de VCI, a través de la estación de cultivo proveniente de la maleza silvestre *Sida* spp., permitieron clasificar a esta enfermedad como de ciclo simple. El uso de los 2 tipos de transformación mostró con alta consistencia el mejor ajuste de Logey/1-y (Superior R<sup>2</sup>), sugiriendo la clasificación de la CI como de ciclo múltiple debido a la población creciente del vector. Esta información indica que es necesario agrupar a la CI en una nueva clase: enfermedades de ciclo mixto.

YAM ANTHRACNOSE: DISEASE ASSESSMENT, YIELD LOSS AND CHEMICAL CONTROL. Mignucci, Julia S., J. Green, and P. R. Hepperly. Agricultural Expt. Sta., Univ. of Puerto Rico, Mayaguez, P. R. 00708.

An experiment for yield loss assessment and chemical control of yam (*Dioscorea alata*) anthracnose (caused by *Collectotrichum gloeosporioides*) was conducted at Corozal in 1980. Treatments were replicated four times in a completely randomized block design and included: benomyl sprays at 3 wk. intervals using 0.125, 0.25, 0.5, and 1.0 kg a.i./ha; chlorothalonil every two wks. at 0.425, 0.85, and 1.7 kg. a.i./ha. Six, 21.8, and 67% disease severities were recorded on June 20, July 18, and Aug. 19, respectively. Mean yields were 30.2, 32.8, 45.9, and 49.6 kg/plot for the above benomyl rates respectively; 13.0, 17.6, and 20.4 kg/plot for the above chlorothalonil rates, respectively; 10.1 kg/plot for the check. Yield loss was greater in marketable tuber and tuber size than in number of tuber per plant. Disease ratings at the end of the season were highly correlated ( $p=0.01$ ) with yield loss.

EFFECTO DE FACTORES BIOLÓGICOS Y CLIMÁTICOS SOBRE EL DESARROLLO DE LA ROYA DEL CAFÉ (*Hemileia vastatrix* Berk & Br.) Salvador H. Osegueira y Ajjamada Kushalappa. IHCAFF, Dpto. de Investigación, Tegucigalpa, Honduras.

Se estudio en condiciones de campo el desarrollo de la roya del café y su correlación con factores biológicos y climáticos, en el Municipio de Ponte Nova, Minas Gerais, Brasil. Se emplearon dos tipos de muestreo para analizar el desarrollo de la enfermedad: Ramos marcados y hojas al azar. Los factores biológicos y climáticos: % de hojas con roya, % área foliar con roya, esporos capturados, hojas nuevas, hojas sin roya, temperatura máxima, temperatura mínima, humedad relativa, precipitación, días de agua líquida (DAL) y días favorables a la infección fueron relacionados con la intensidad de la enfermedad evaluada como % HR y % AFR a 28,42 y 56 días después de la fecha de prevención, por regresión múltiple, seleccionándose así la combinación de factores que explicó significativamente el desarrollo de la enfermedad. La intensidad de la enfermedad fue baja de septiembre a diciembre y alcanzó su nivel máximo en los dos tipos de muestreo en mayo.

EFFECTO DE BRAVO 500 Y DACONIL 2787 EN EL DESARROLLO DE CUATRO ENFERMEDADES FOLIARES DEL CULTIVO DE ARROZ EN AMERICA LATINA. A. Pelaez. Nopco Colombiano, S.A., Cali, Colombia.

Pruebas de campo y ensayos semicomerciales realizados durante los últimos seis años con arroz han demostrado la eficiencia de clorota-



lonil Bravo 500 y Daconil 2787 W-75 en el control de las siguientes enfermedades: escaldado de la hoja (*Rhynchosporium oryzae*) en dosis de 1.5 Kg i.a./ha y aplicaciones en la aparición de los primeros síntomas y 15 días después. Mancha café (*Helminthosporium oryzae*), mancha lineal (*Cercospora oryzae*) y complejo de mancha de grano (varias especies patógenas) en dosis de 1.0 Kg i.a./ha y 2 aplicaciones la primera en la época de emergencia de espigas y la segunda 15 días después. Las investigaciones han mostrado mejor control de manchas foliares, un grano menos manchado y diferencia apreciable en rendimiento cuando se comparó el efecto de clorotalonil con el control logrado con aplicaciones de fungicida de uso común en las zonas estudiadas. Clorotalonil en mezclas con fungicidas específicos para el control de *Pyricularia oryzae* contribuyeron a la disminución de ataque en el cuello de la espiga y en los granos.

ESTUDIO SOBRE RANGO DE HOSPEDEROS DE LA ROYA DE LA CAÑA DE AZÚCAR EN LA REGION CENTRO OCCIDENTAL VENEZOLANA. Martín E. Pino G., Carlos Zambrano y Omar Tortolero. Postgrado de Fitopatología UCLA. Barquisimeto-Venezuela.

Muestras de hojas de gramíneas frecuentes en plantaciones de Caña de Azúcar (*Saccharum aff. officinarum*) en dos zonas diferentes de la Región Centro Occidental de Venezuela que mostraban síntomas de Roya, fueron colectadas y procesadas, anotando sus características de sintomatología, morfología y tamaño de las estructuras del hongo. Estas características fueron comparadas con las descritas en las claves de LAUNTON y CUMMINS para Uredinales y *Puccinia* respectivamente. Se montó un ensayo inoculando plántulas de las gramíneas muestreadas en campo, así como otras gramíneas afines a la Caña de Azúcar, dos variedades de Maíz, un híbrido de Sorgo, seis variedades comerciales de Caña de Azúcar y un Clon de *S. spontaneum*. Los resultados obtenidos sugieren que la Roya aislada de la gramínea *Sorghum bicolor* subsp. *arundinaceum*, en campo, así como la reaislada de las plántulas inoculadas tanto de esta gramínea como del híbrido Chaguaramos de *Sorghum vulgare* se corresponde con la descrita en la clave de CUMMINS como *Puccinia melanocephala* Sydow sugiriéndose la acometida de estudios más conclusivos al respecto.

IDENTIFICACION DE LA ESPECIE *Puccinia* QUE CAUSA LA ROYA DE LA CAÑA DE AZÚCAR EN VENEZUELA. Martín E. Pino G., Carlos Zambrano y Omar Tortolero. Post-Grado Fitopatología. UCLA. Barquisimeto, Venezuela

Muestras de hojas de Caña de Azúcar (*Saccharum aff. officinarum*) variedad B4362 de dos meses de edad y con síntomas típicos de Roya, fueron colectadas en diferentes zonas del país. Las muestras fueron procesadas anotándose en forma individual sus características en la sintomatología, distribución en la superficie foliar, morfología y tamaño de las estructuras del hongo presente, reacción de patogenicidad, germinación de las esporas a diferentes temperaturas y evaluación de la reacción en plantas inoculadas bajo condiciones controladas. Las características observadas fueron comparadas entre sí y con las descritas en la clave de LAUNTON para Uredinales y la de CUMMINS para el género *Puccinia*, así como con las descritas por otros autores latinoamericanos. Los resultados indicaron que tales características eran similares en todos los aislamientos y se corresponden con las descritas por CUMMINS y otros autores para *Puccinia melanocephala* Sydow.

INCIDENCIA Y SEVERIDAD DE LA ROYA DE LA CAÑA DE AZÚCAR EN DOS ZONAS CLIMATICAMENTE DIFERENTES DE LA REGION CENTRO OCCIDENTAL VENEZOLANA. Martín A. Pino G., Carlos Zambrano y Omar Tortolero. Post-grado de Fitopatología UCLA, Barquisimeto, Venezuela.

En la región Centro Occidental Venezolana, existen zonas donde se cultiva la caña de Azúcar (*Saccharum aff. officinarum*) con condiciones climáticas diferentes. Se seleccionaron dos zonas con régimen de lluvias y de evaporación diferentes a fin de medir el % de Incidencia y el grado de Severidad de la Roya de la Caña de Azúcar en dichas zonas. Los resultados obtenidos indican que en ambas zonas estudiadas existen condiciones favorables para el desarrollo de la enfermedad, así como la existencia de diferencia significativa entre el % de Incidencia en ambas zonas, no así en cuanto al grado de Severidad. Se discute la posibilidad del efecto de la presencia de un mayor porcentaje de variedades susceptibles y el de variedades resistentes o tolerantes en una zona sobre la otra recomendándose estudios conclusivos al respecto.

Sugar cane rust: infection processes. L. H. Purdy, Plant Pathology Dept., University of Florida, Gainesville, FL 32611

Uredospores of *Puccinia melanocephala* collected from plants in the field were applied to adaxial and abaxial surfaces of sugar cane leaf pieces placed on water agar at 25 C. Leaf pieces were cleared in lactophenol, treated with 0.1% calcofluor in water, and observed with a fluorescence microscope. Percentages of germinated uredospores that produced appressoria were similar after 6 or 24 hrs, with 57% on adaxial leaf surfaces and 82% on abaxial surfaces; 99% of all appressoria were over stomata. Appressorium and infection peg formation was followed by a substomatal vesicle that usually produced two infection hyphae and haustorial mother cells. Haustoria were not observed. Germ tubes grow mostly perpendicular to the long axis of epidermal cells until they contact guard cells that stimulate appressorium formation. Penetration usually occurs, rarely infection structures develop on leaf surfaces. All infection structures observed in or on leaves developed on plastic replicas of leaf surfaces. But 47% of appressoria on adaxial replicas and 17% on abaxial replicas were not over stomatal replicas.

IMPORTANCE OF FIELD SURVEY SYSTEMS AS TOOLS FOR CONTROL OF BLACK SIGATOKA. C. F. Robert, A. López, R. H. Fulton, Rohm and Haas Company.

The standard field survey system employs "unshot" plants using the number of the youngest leaf spotted (YLS) as the major parameter. However, there can be a rapid build-up of black Sigatoka between "shooting and harvest". Therefore, field studies were undertaken surveying both "shot" and non-fruited plants. The survey data will be described, and the use of the surveys as guides in control.

RELATION OF FERTILIZER TREATMENTS AND CROPPING SEQUENCE TO SOIL POPULATIONS OF *MELOIDOGYNE INCOGNITA*. R. Rodríguez-Kábana, Department of Botany, Plant Pathology and Microbiology, Auburn University, Agricultural Experiment Station, Auburn, AL. 36849.

Larval populations in soil of *Meloidogyne incognita* (Kofoid & White) Chitwood in a continuing three-year rotation scheme were found to vary with season. The rotation scheme consisted of summer crops of corn, soybean, and cotton. These were followed respectively, by winter programs of wheat, fallow, and mixed common vetch (*Vicia sativa* L) and crimson clover (*Trifolium incarnatum* Gibelli and Belli). The rotation was superimposed on plots that received various combinations of N,P,K, minor elements and lime. Highest numbers of larvae occurred with corn and cotton and lowest with soybeans and the winter crops. Larval numbers in all crops were highest near harvest time. Elimination of a major nutrient or of the winter legume combination from the fertilization regime resulted in significant reductions in the number of larvae in soil. Highest numbers of larvae were found in plots that received all major elements and included the winter legume combination in the rotation scheme.

FUNGICIDE TREATMENT AND PROPER CROP MANAGEMENT FOR THE CONTROL OF MONILIA AND BLACK POD DISEASES OF CACAO. José Francisco Rodríguez Agricultural Research Division, Plant Pathology Department, Ministry of Agriculture and Livestock, San José, Costa Rica.

Work was done during the 1979-1980 period, in the area of Limón, Province Costa Rica, for the control of Monilia and black pod diseases of cacao. Four fungicide materials were tested on Matina type cacao using a randomized blocks experimental design. Treatments were as follows: Chlorothalonil (Bravo 500, 3.5 l/ha), Chlorothalonil + cuprous oxide 1+1, 25% p.v. (Dacobre 3 l/ha) polycarbamic-copper formulation (Trimiltox forte, 3.5 Kg/ha) and Didecyl (Sumilex 300 g/ha.). Applications were used, at an application volume of 200 l/ha. Best yields of 580 kg/dry/ha were obtained with chlorothalonil, with significant differences against the untreated, on the total number of healthy pods, ripe pods and total wet weight; disease incidence was markedly reduced. Adequate crop management is essential to help minimize losses due to disease.

INTEGRATED PROGRAMS FOR SIGATOKA CONTROL. C.A. Shillingford. 2121 Ponce de León Blvd. Coral Gables, FLA. 33134. U.S.A. Dupont Latin American.

This paper reviews some trends in the control of Sigatoka leaf spots in the Caribbean and Tropical America. Yellow Sigatoka (*Mycosphaerella musicola*) is present in the Caribbean and South America, while Black Sigatoka (*M. fijiensis* var *diformis*) has spread throughout Central America. *M. fijiensis* var *diformis* is reported to have developed resistance in Central America.

Resistance in *M. musicola* developed in Surinam and low levels were found in the French Antilles. Sigatoka control has become more complex. In many countries, chlorothalonil in water is the standard practice, but is very costly. Integrated programs using mixtures of systemic and protectant fungicides are used in other countries. Those programs are not as expensive because of lower cost of the fungicides and reduced number of spray cycles. Monitoring for resistance is required to confirm that reported breakdowns in control are not due to operational or epidemiological factors. Meantime, the search for new chemicals continues through the use of the Sigatoka microscreen technique.

PENETRATION OF BANANA POST-HARVEST FUNGI AND THE ACTION OF SYSTEMIC FUNGICIDES. Dr. C. A. Shillingford, 2121 Ponce de León Blvd. Coral Gables, FLA. 33134 U.S.A. Dupont Latin American.

Anthraxnose is caused by *Colletotrichum musae* (= *Gloeosporium musarum*), while crown rot is caused by a fungal complex. Penetration of banana peel epidermis by *C. musae* is facilitated by production of cell-wall degrading enzymes. Growth continues inter- and intracellularly in the ground parenchyma between the vascular strands, eventually entering phloem and fiber cells. Sections of crown tissues showed a dense cluster of vascular strands nearer to the adaxial surface. *Fusarium semitectum*, *C. musae* and probably other fungi enter vessels at the cut surface. Tissue decomposition was confined to those strands at the advancing edge of the rot. On the basis of minimum inhibitory concentration against these fungi, the benzimidazole fungicides were very effective. Uptake of systemic fungicides occurred through the pedicel and peel of banana fruit. This has important implications for control by dipping of fruit.

ETIOLOGIA E INCIDENCIA DE LA PUDRICION DE LA RAZA DEL FRIJOL CULTIVADO BAJO RIEGO EN EL SALVADOR. A. Solórzano y J.F. Larios

Durante noviembre de 1979 a enero 1980 (época seca) se recolectaron muestras de plantas con síntomas de pudrición del cuello y raíz del frijol en 15 fincas del Distrito de Riego de Zapotitán. Mediante técnicas estándar se efectuaron 279 aislamientos de los que 42.70% fue *Sclerotium rolfsii*, 4, 4% *Rhizoctonia solani* y el resto correspondió a *Rhizopus*, bacterias y otros microorganismos todos no patogénicos. Las 3 variedades de frijol cultivados en el Valle (Contender 86, 6% del área, rojo 70 y rojo de seda 6, 7% c/u), fueron igualmente susceptibles a *S. rolfsii* y *R. solani*, en pruebas de patogenidad en invernadero.

La incidencia de pudrición radical en Zapotitán, dio un promedio de 4, 6% de pérdidas (rango 2 a 8%). No se encontró correlación entre años de cultivar frijol e incidencia de la enfermedad.

EIGHT PERCENT COPPER AND COFFEE RUST (*Hemileia vastatrix*) J.C. Wells, Profesor Emeritus, Plant Pathology-N.C.State University. It is believed that all commercial varieties of arabicas are susceptible to rust especially, below altitudes of 1800 meters in Ethiopia. The three most important factors in the control of coffee rust are: time of spraying, type of chemical to be used, and whether or not spraying will be economical. Based on Rourke's work in Brazil, 4 or 5 applications of a fungicide per year appeared to be sufficient to control rust. However, it was decided to try seven applications with the first application being applied in September 1972 with a motorized knapsack sprayer. Subsequent applications were applied on a monthly basis. Four copper compounds Daconil, Cosanil, Benlate, and Difolatan were applied. The test was a randomized block design containing 9 treatments. Each plot consisted of 4 trees replicated 4 times. The % rusted leaves was obtained by collecting 25 leaves from each plant at the end of each month for a total of 100 leaves. The copper-based fungicides reduced the disease incidence more effectively than did other fungicides used. However, better crop production was noted where all fungicides were used.

CONTROL OF COFFEE RUST (*Hemileia vastatrix* Berk, et Br.) WITH BAYLETON IN BRAZIL. A. Wybou.

As the coffee tree has a distinct biennial cropping habit in Brazil, its susceptibility to rust varies from one year to another. Copper fungicides used to date for the control of coffee rust have increased coffee leaf miner (*Leucoptera coffeella*) and spider mites (*Oligonychus ilicis*). Bayleton was recommended as a highly promising fungicide for rust based on results obtained in Kenya and Brazil. Bayleton was evaluated for protective, curative and eradication activity. Bayleton displayed exceptionally good coffee crop compatibility and gave good leaf retention during the period critical for yield. The influence of varying initial disease levels on the final result of rust control was investigated. Treatments with copper fungicides must begin when 10-20% of the leaves are infected. With Bayleton the first treatment can be delayed until the disease has reached a critical threshold of 20-40%. Bayleton arrests the spread of rust pustules, it kills the uredospores, and inhibits further sporulation. Consequently, the majority of the infected leaves are retained. Since the disease level that can be accepted until it becomes necessary to initiate treatments is higher for Bayleton than for copper fungicides, the required number of applications can be reduced.