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ABSTRACTS

Alphabetized by first author's last name.

VARIACION PATOGENICA DE *Colletotricum lindemuthianum* EN COSTA RICA. Araya, C.M. y Pastor, M.A. Escuela de Ciencias Agrarias, Universidad Nacional. Ap. 86-3000. Heredia, Costa Rica y CIAT, Ap. 6713, Cali, Colombia.

Fue evaluada en invernadero, la reacción de 21 cultivares diferenciales de frijol a seis aislamientos monospóricos de *C. lindemuthianum* región central (Alajuela, Grecia y Quepos) de Costa Rica; otros dos aislamientos fueron las razas cepa y delta, previamente identificadas, que actuaron como testigos. Las semillas de los diferenciales fueron sembradas en bandejas plásticas que contienen una mezcla 1:1 de arena y suelo estériles; siete días después se inocularon con una suspensión de $1,2 \times 10^6$ conidios por ml., y evaluadas luego de un período de incubación de seis días en cámara húmeda. Con base en la reacción de los principales diferenciadores, los aislamientos de la región norte pertenecen al grupo alfa-Brasil y los de la región ncentral, dos de ellos al grupo Brasileiro I y el aislamiento de Quepos a la raza cepa.

DISPERSAL PATTERN OF CONIDIA OF *Moniliophthora foreri* IN A COCOA PLANTATION. L.F. Campos¹, A. Ram² and J.J. Galindo³ 1 UCR, San José, 2 CEPEC/CEPLAC, Brasil and 3 CATIE, Turrialba, Costa Rica.

A study was conducted at CATIE's "La Lola" farm, Limon Province, Costa Rica (40 masl; 30.1 C average maximum T, 20.5 C average minimum T, 3,573 mm annual precip) within the canopy of seven year old cocoa hybrids (*Theobroma cacao* L.). Sixty cylindrical spore trap with adhesive tape were placed 2 m above ground, every 3 m as far as 45 m in 4 different directions from an inoculum source consisting of a cocoa tree with 70 infected and sporulating fruits. Spore traps were set for 4 hours from 9-13 hr. The number of spores decreased radially from the source of inoculum to the farthest trap at 45 m. The number of spores in the air, as determined by the numbers trapped was influenced by air T, relative humidity and precipitation. Infected fruits laid on the ground were a source of inoculum but not as important as the aerial dissemination from sporulating fruits on the trees.

POPULATION DYNAMICS OF *Thanatephorus cucumeris* ON TWO BEAN VARIETIES UNDER MULCHING AND RIDGING. M. Cárdenas-Alonso, G.S. Ahawi and M.A. Pastor-Corrales. Centro Internacional de Agricultura Tropical CIAT, A.A. 6713, Cali, Colombia and Cornell University Department of Plant Pathology Geneva, NY. 14456, U.S.A. NYSAES.

Thanatephorus cucumeris was sampled biweekly from soil exposed to four mulches (sugarcane residue, plantain leaves, weeds and bare soil), two ridging treatments and two bean varieties (BAT-1155 and BAT 1297) in Darien, Colombia. A low fungal

population was present at planting time which increased with time up to a maximum during flowering time and then dropped abruptly to low levels as the crop reached maturity. Populations of *T. cucumeris* were higher in the upper (2 cm) than in the lower soil layers (8 cm). Differences in fungal populations were observed between mulches and bare soil but no differences were observed between varieties and ridging.

EFECTO DE FUNGICIDAS TRIAZOLES EN EL COMEBATE DE LA ROYA DEL CAFETO (*Hemileia vastatrix*) EN COSTA RICA. O. Chaves. Depto. de Fitopatología, MAG. Apartado 10094-1000, San José, Costa Rica.

En Turrialba, provincia de Cartago, en plantaciones del cultivar Caturra, con una densidad de 5000 plantas por hectárea, una altura de 600 msnm con temperatura y precipitación promedio de 23,5 y 250 mm respectivamente, durante los años de estudio; se evaluaron los fungicidas triazoles SAN 619 F 100 SL (Cyproconazole); PP 523 5% SC (Hexaconazole) y DPX H 6573 20% DF (Flusilazole) en varias dosis, sobre la incidencia de *Hemileia vastatrix*. Todos los fungicidas mostraron un buen efecto preventivo y curativo sobre las uredosporas del hongo, a la dosis de 50-80 g ia/ha, 50 g ia/a y 200 g ia/ha respectivamente, al igual que los fungicidas de uso convencional Bayletón 250 EC (Triadimefón) y Tilt 250 EC (Propiconazole) en dosis de 250 g ia/ha y el Hidróxido de cobre (Kocide) 101).

PATHOGENICITY OF TWO *MACROPHOMINA* ISOLATES BEAN PLANTS WITH ASHY STEM BLIGHT. R. Echávez-Badel, F. Perdomo, and J.S. Beaver, Departments of Crop Protection and Agronomy and Soils, AES, CAS, University of Puerto Rico, Mayagüez, Puerto Rico, 00709

Macrophomina phaseolina was isolated from stems of dry beans with ashy stem blight grown in Isabela and Fortuna Substation in Puerto Rico. The in vitro radial growth rates and microsclerotia sizes obtained at 28°C were not significantly different between the isolates. In the greenhouse pathogenicity tests, significant differences in virulence between both isolates occurred. The Isabela isolate caused significantly higher disease severity on beans than the Fortuna isolate. Both isolates of *M. phaseolina* developed symptoms typical of ashy stem blight. The research was supported in part by the Title XII Bean/Cowpea CRSP of the U.S. Agency for International Development.

ALTERNARIA: PATHOGENICITY AND CONTROL ON CARNATION, MARIGOLD AND DUSTY MILLER. Arthur W. Engelhard, Univ. of Florida, IFAS, Gulf Coast Research & Education Center, Bradenton, FL 34203.

Alternaria tagetes causes seedling and flower blights and leaf and stem spots on marigold plants (*Tagetes erecta*). *Alternaria* sp. (probably *A. cinnerea*) causes leaf spots and blight on dusty miller (*Senecio cineraria*) and also petal spots and blight on marigold flowers. *A. dianthi* causes leaf spots, branch rot and flower blight of carnation (*Dianthus caryophyllus*), but does not

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cause infection on the foliage and flowers of baby's-breath (*Gypsophila paniculata* cv Bristol Fairy). In two tests, good disease control was obtained on carnation and dusty miller with chlorothalonil, iprodione, mancozeb and benomyl tank-mixed with either chlorothalonil, iprodione or mancozeb. On marigold, consistently good control was obtained only with chlorothalonil and intermediate control with iprodione and tank-mixes of benomyl plus iprodione or chlorothalonil. Benomyl and vinclozalin alone did not give good control of the *Alternaria* diseases on carnation, dusty miller or marigold.

NEW FUNGICIDES THAT PROVIDE CONTROL OF ASCOCHYTA BLIGHT OF CHRYSANTHEMUM. A. W. Engelhard, Gulf Coast Research and Education Center, University of Florida, IFAS, 5007 60th St. E., Bradenton, FL 34203.

Ascochyta blight of chrysanthemum, (*Didymella chrysanthemi*) (conidial stage *Ascochyta chrysanthemi*) is a serious pathogen on the foliage, flowers and stems of commercially produced plants. The standard treatment, benomyl 50W tank-mixed at 0.25 lb/100 gal with either chlorothalonil 75W at 0.75 lb/100 gal or mancozeb 80W at 0.75 lb/100 gal, gives good disease control. Iprodione 26019 has given excellent Ascochyta blight control when tank-mixed with other fungicides in field experiments the past 3 years. It controls not only Ascochyta blight but also diseases caused by *Botrytis* and *Alternaria*. Iprodione 26019 50W at 0.5 lb/100 gal tank-mixed with chlorothalonil 2787 75W at 0.75 lb/100 gal or mancozeb 80W at 0.75 lb/100 gal or benomyl disease control equal to or better than the established standard tank mixes of benomyl previously mentioned. Iprodione tank-mixes of benomyl previously mentioned. Iprodione tank-mixes also show promise for effective disease control at 10-day spray intervals.

STUDIES ON THE GERMINATION OF CONIDIA OF *Moniliophthora roreri* ON CACAO PODS. D. Flores and J.J. Galindo. CATIE, Turrialba, Costa Rica.

Sixty day-old cacao (*Theobroma cacao* L.) pods of cv 'Pound 7' and 'UF-296', susceptible and moderately resistant to *M. roreri*, respectively, were inoculated with 200,000 conidia/ml. Samples were observed under the scanning electron microscope. The surface of the pods showed an alveolar structure and protuberances running across. Stomata were in groups of 2-10. Glandular trichomes were evenly distributed on the epidermis. Conidia were generally found at the base of the trichomes. Conidia had ornamented walls and a distal germination pore. Penetration occurred directly through epidermis with formation of an appressorium.

EVALUATION OF RESISTANCE TO WITCHES BROOM DISEASE IN CACAO SEEDLINGS AND TREES IN ECUADOR. G.A. Frías-Treviño, L.H. Purdy and R.A. Schmidt. CIAT-IICA, Apdo. 55, 2200, San José, Costa Rica. Plant Pathology and Forest Resources and Conservation Department, University of Florida, Gainesville, FL, USA.

Suspensions of *Crinipellis pernicioso* basidiospores were sprayed on cacao plants with young vegetative flushes and incubated for 24 hr in a mist or humidity chamber. Significant differences in resistance among cacao families were detected with inoculum concentrations of 25,000-150,000 basidiospores/ml. The hybrid between two clones reported as resistant (Silecia 1 and ICS 6) had the lowest percentage of disease. Intermediate or high percentages of disease were observed in hybrids between susceptible X resistant (Tenguel 33 X Silecia 1) and susceptible X moderately resistant (Tenguel 15 X IMC 67), respectively. Differences in resistance among 4-year-old trees inoculated in the field were also detected.

THE INFECTION PROCESS OF *Crinipellis pernicioso* ON VEGETATIVE FLUSHES OF CACAO. G.A. Frías-Treviño, L.H. Purdy and R.A. Schmidt. CIAT-IICA, Apdo. 55, 2200, San José, Costa Rica. Plant Pathology and Forest Resources and Conservation Department, University of Florida, Gainesville, FL, USA.

Germination of *Crinipellis pernicioso* basidiospores and host infection occurred when spores were deposited on wet cacao flushes and wetness was maintained for a minimum of 4-6 hr. Basidiospores deposited on dry plant surfaces plasmolyzed. Basidiospore germ tube tropism towards stomata and the base of fallen or collapsed multicellular trichomes was observed. Host penetration and subsequent formation of subepidermal

vesicles occurred within 12 hrs after inoculation. Intercellular hyphae developed from subepidermal vesicles in some infection sites while in others the pathogen failed to colonize host tissue. This failure was associated with a change in fluorescence of host cells at and around the infection site.

AN INOCULATION METHOD TO EVALUATE RESISTANCE TO WITCHES' BROOM DISEASE OF CACAO. G.A. Frías-Treviño, L.H. Purdy and R.A. Schmidt. CIAT-IICA, Apdo. 55, 2200, San José, Costa Rica. Plant Pathology and Forest Resources and Conservation Department, University of Florida, Gainesville, FL, USA.

Suspensions of *Crinipellis pernicioso* basidiospores were sprayed on cacao plants with young vegetative flushes and incubated for 24 hr in a dew chamber at 25°C. Significant differences in resistance among progeny from putative resistant and susceptible clones were detected with suspensions containing 10,000-12,500 basidiospores/ml, higher spore concentrations resulted in similar disease incidence on resistant and susceptible families. Basidiospores collected overnight in 15-16% glycerol solutions and stored for 0 (fresh) and 18 months in liquid nitrogen produced similar percentages of disease on inoculated seedlings.

UN BIOENSAYO CON HOJAS DE FRIJOL PARA CUANTIFICAR LA POBLACION DE *Rhizoctonia solani* EN EL SUELO. G.A. Frías-Treviño, M.R. Rojas-Jiménez, J.M. Dessert. CIAT/IICA, Apdo. 55-2200 Coronado, San José, C.R.

Se desarrolló un método para cuantificar, en el suelo, la población de *Rhizoctonia solani* con capacidad para causar la mustia hilachosa del frijol. Muestras de suelo se colocaron en recipientes de vidrio rectangulares y se les agregó el medio de ko y Hora, en estado líquido (50°C). La suspensión de suelo se homogenizó con una espátula y se dejó solidificar. El gel resultante se dividió en 10 submuestras que se colocaron sobre hojas de frijol en cámara húmeda. Las hojas inoculadas se examinaron a los 3-5 días. El número de propágulos de *R. solani*, por gramo de suelo, se calculó dividiendo el número de submuestras que produjeron lesiones típicas de mustia hilachosa entre el peso de la muestra de suelo o usando el método del número más probable. El bioensayo detecta solamente la población de *R. solani* que produce mustia hilachosa del frijol.

BEHAVIOUR OF CAPTAFOI RESIDUES AFTER PROLONGED APPLICATION IN A WHEAT MONOCULTURE. García G., J.E. Universidad Estatal a Distancia, Apdo 474-2050 San José, Costa Rica; Kirchhoff, J. and Grossmann, F. Universität Hohenheim, Postfach 700562, 7000 Stuttgart 70, West Germany.

In a 4-year study, the behaviour of the residues of the fungicide captafol in different plant parts of winter wheat and in the soil was investigated. The fungicide Bayleton DF (captafol + triadimefon) was applied at the beginning of earing. Captafol residues clearly showed a high dependence on weather conditions. After a 9-year application (earlier applied as Cercobin Super) there was no evidence of an enrichment of residues in the soil. Residues (detection limit 0.02 mg/kg) were found only in amounts below the lower maximum residue limits of 0.5 mg/kg established earlier in West Germany, in grains at the stage of milk, wax, and dead-ripeness.

GROWTH AND SPORULATION OF *Moniliophthora roreri* UNDER DIFFERENT INCUBATION TEMPERATURES, PHOTOPERIODS AND pH OF THE MEDIA. F. Herrera, J.J. Galindo and C. Ramirez, CATIE, Turrialba, Costa Rica.

Growth and sporulation of *M. roreri* was evaluated under different T (20, 22, 24, 26, 28, 32°C), initial pH (4.9, 5.3, 5.7, 6.7, 6.5, 6.9, 7.3) buffered and not buffered, light exposures of (5 min, 0, 4, 8, 12, 16, 20 and 24 hr) followed by a dark period to complete 24 hr in a malt extract, maltose, asparagine, agar (10.0-2.0-1.5-0.1%) medium. Temperatures of 24 or 26°C and a light exposures of 4 or 8 hr were optimum for vegetative growth and sporulation. Maximum production of conidia occurred under a 12 hr light exposure. Maximum growth occurred at pH 5.7, and maximum sporulation at pH 6.5. Growth of the fungus in a unbuffered medium increase the pH by a unit in 2 weeks.

RESPUESTA DE LINEAS DE TOMATE A MARCHITEZ BACTERIAL EN CONDICIONES DEL TROPICO HUMEDO, Costa Rica. J. M. Jiménez, E. Bustamante, W. Bermúdez y A. Gamboa. Proyecto MIP/CATIE. Turrialba, Costa Rica.

En condiciones de la zona atlántica (Turrialba, 605 msnm, 2600 mm) se evaluó la respuesta de 21 líneas de tomate (*Lycopersicon esculentum*) originarias de Panamá y Taiwán, seleccionadas por su resistencia hacia *Pseudomonas solanacearum*. Se sembraron entre 50 a 140 plantas por línea, inoculándose la bacteria a los 25 días después del trasplante. El testigo (UF-14J) presentó 75% de incidencia de marchitez bacterial, mientras los materiales resistentes mostraron una incidencia menor al 10%. Los 14 materiales panameños se comportaron como resistentes mientras que solo uno de los siete materiales taiwaneses se comportó como susceptible. Los materiales panameños evaluados presentaron buenas características para ser utilizados como tomate industrial, encontrándose cuatro líneas con características de doble propósito (uso industrial y de mesa). De los seis materiales taiwaneses resistentes, solo dos líneas reúnen condiciones de tomate de mesa.

IDENTIFICACION DEL AGENTE CAUSAL DE LA PUDRICION APICAL DE CAMINADORA EN ESCUINTLA, GUATEMALA. J.M. Jiménez, E. Bustamante, M. Pareja y R. Gómez. Proyecto MIP, CATIE, Costa Rica. Ingenio Pantaleón, Escuintla, Guatemala.

En fincas del Ingenio Pantaleón, ubicado en la costa pacífica de Guatemala, se encontró en 1986, una podredumbre apical en caminadora (*Rottboellia cochinchinensis*). Los síntomas de la enfermedad es una clorosis y necrosis de las inflorescencias y hojas jóvenes que avanza hacia el origen de estas estructuras, produciendo una deformación de la hoja y panoja que por lo general impide la producción de semillas. En 1987, el Proyecto MIP efectuó un reconocimiento para identificar el agente causal de las muestras procesadas en la Univ. del Valle, Ciudad de Guatemala, se logró aislar los siguientes microorganismos: *Fusarium moniliforme*, *Curvularia* sp., *Cladosporium* sp., *Helminthosporium* sp., *Xanthomonas* spp. y *Pseudomonas* spp. Las pruebas de patogenicidad mostraron que los seis microorganismos aislados son patógenos en diferentes grados en caminadora. Sin embargo, los síntomas típicos de la pudrición apical se desarrollaron cuando se inoculó *F. moniliforme* a plantas de 30 días de edad.

CITRUS TRISTEZA VIRUS IN COSTA RICA. R. Lastra,¹ G. Leandro², and R. Meneses. MIP, CATIE, Turrialba¹ and Depto. Fitopatología, Min. Agric. y Ganad., San José, Costa Rica.

A survey of Citrus Tristeza Virus (CTV) in Costa Rica was carried out by ELISA using conjugated IgG provided by S.M. Garnsey (U. Florida). Samples were collected in areas where this crop is rapidly expanding. Trees to be indexed were selected at random from several orchards. Most of the trees looked normal, however, some of the sampled trees showed growth reduction and poor general aspect. The areas and number of samples were as follows: Acosta (San Jose, 13); Estación Experimental UCR (Alajuela, 50), Atenas (Alajuela, 44); El Muelle (San Carlos, 112); Sarapiquí (San Carlos, 3); Santa Clara (San Carlos, 1); Guatuso (San Carlos, 1); Pococí (Limón, 6); Liberia, Daisa, Filadelfia, Cañas (Guanacaste, 78); Buenos Aires, Pejibaye, Chiriquí (Punta Arenas, 24). A total of 282 samples from the six provinces of Costa Rica were tested for CTV. Of these samples 74 tested positive to CTV distributed as follows: El Muelle, 71; Guatuso 1 y Atenas 2. The aphid *Toxoptera citricudus* Kirk vector of the disease was identified from the samples.

ESTROGENIC ACTIVITY IN SPHACELOMA SCAB INFECTED *Zornia latifolia*. J.M. Lenné, E. Zamorano and A. Vargas de Alvarez, Tropical Pastures Program, CIAT, A.A. 6713, Cali, Colombia.

Forages containing estrogenic compounds can cause infertility in female animals and high weight gains in castrated males. Estrogenic activity has been recorded in various forage legumes infected by a range of foliar fungal pathogens. High weight gains (800 gr/day) in steers grazing severely scab (*Sphaceloma zorniae*) affected pastures of the tropical forage legume *Zornia latifolia* in Carimagua suggested that an estrogenic compound may be involved. A mouse bioassay was conducted with diets containing various proportions of healthy and scab infected forage. Immature female mice were fed specialized diets for three weeks following weaning, then sacrificed on excised uteri were weighed. Uterine weights of mice fed on diseased forage were significantly heavier than those fed on healthy forage thus indicating that infection of *Z. latifolia* by *S. zorniae* stimulates estrogen activity.

FUNGICIDE CONTROL OF ANTHRACNOSE ON ATEMOYA, R.T. McMillan, Jr., University of Florida, IFAS, TREC, 18905 S.W. 280 St., Homestead, FL 33031

Anthracnose caused by *Colletotrichum gloeosporioides* Penz. is the most serious pre-harvest and post-harvest disease of Atemoya (*Annona cherimola* x *A. squamosa*). Commencing in the spring of 1987 thru to summer harvest flowers and young fruits on 6-year old trees, were sprayed with benomyl 1.0% a.i., copper hydroxide 1.6% a.i., mancozeb 1.6% a.i., prochloraz 1.0% a.i., and their combinations in 400 l. of water/hectare. Benomyl, copper hydroxide, and prochloraz alone or in combinations were applied every two weeks while mancozeb alone or in combinations were applied weekly. Benomyl and prochloraz alone increased marketable fruit by 30 percent. Combinations of benomyl and prochloraz with copper and mancozebs were equally as effective. Mancozeb and copper hydroxide alone failed to control anthracnose.

THE OPTIMIZATION OF CHEMICAL PLANT DISEASE CONTROL THROUGH THE USE OF PINOLENE. R.T. McMillan, Jr., U. Fla. Tropical Research Ed. Center, 18905 S.W. 280th St., Homestead, FL 33031. P. Vanderlaan, Miller Chem. & Fert. Corp., 8603 S. Dixie Hwy., #408, Miami, FL 33134, USA.

Fungicidal disease control is greatly influenced by the initial deposition of the active ingredient on the plant surface and its subsequent retention. Fungicides lose their activity as a result of wash-off by rain, dew or irrigation water, or wind erosion. Decomposition losses occur from environmental factors such as heat, volatilization, photodecomposition or hydrolysis. The use of Pinolene (di-1-p-Menthene) has been documented as an effective, non-toxic way to increase initial fungicide deposit and to minimize erosion or decomposition losses following the application. Increased efficacy of systemic fungicides may occur as pinolene improves tissue uptake through the leaf cuticle.

ISOZYME VARIATION BETWEEN AND WITHIN SPECIES OF THE GENUS *Rhizoctonia*. G. Olaya H. and J.M. Lenné, Tropical Pastures program, CIAT, A.A. 6713, Cali, Colombia.

Gel electrophoretic investigations of soluble protein and enzyme patterns are providing useful additional information in the classification of fungal pathogens. Soluble proteins extracted from mycelium of at least six different species of *Rhizoctonia* were subjected to starch gel electrophoresis and resultant isozyme banding patterns compared. Assays included malate dehydrogenase (MDH), alkaline phosphatase (AP) and phosphoglucumutase (PGM) on histidine gels; glucose-6-phosphoglucose dehydrogenase (G6PDH), acid phosphatase (ACP) and malic enzyme (ME) on citrate gels and glutamate-oxaloacetate transaminase (GOT), hexokinase (HK) and peptidase (PEP) on lithium gels. Isozyme patterns obtained for the various species showed considerable differentiation both between and within species. Possible reasons for this are proposed.

BIOCONTROL OF BEAN RUST WITH AN AVIRULENT ISOLATE OF *Uromyces appendiculatus* UNDER FIELD CONDITIONS. M.A. Pastor Corrales and G. Castellanos. CIAT A.A. 6713, Cali, Colombia.

The dry bean cultivar Ex Rico 23 is susceptible to the prevalent isolates of the rust pathogen, *Uromyces appendiculatus*, under field conditions in Palmira, Colombia. However, resistance to these isolates can be induced under greenhouse conditions if it is first inoculated with an isolate obtained from the snap bean variety Blue Lake, to which Ex Rico 23 is resistant. Blue Lake is susceptible to both the dry bean and snap bean rust isolates present in this area. Simultaneous inoculations of Ex Rico 23 and Blue Lake with both isolates did not induce rust resistance in Ex Rico 23 and resulted in considerable amount of rust on both bean cultivars. A field test was also conducted with the objective of studying the possibility of biocontrol of bean rust using the avirulent isolate of the pathogen. Ex Rico 23 was inoculated singly with both isolate in different treatments. Bean rust severity of Ex Rico 23 was greatly reduced when it was first inoculated with the avirulent isolate. Yield of Ex Rico 23 inoculated with the virulent isolate was also significantly lower than the treatment protected with avirulent one.

EFFECT OF TEMPERATURE AND TYPE OF INOCULUM ON ZOOSPORE PRODUCTION BY *Phytophthora palmivora* in vitro. W. Phillips and J.J. Galindo. CATIE, Turrialba, Costa Rica.

The production of zoospores of *P. palmivora* was investigated in vitro. Cocoa isolates of the fungus were grown on V8-CaCo agar (20-0.3-1.8%) for 10 days. Then 20 ml of water at 20 C were added and the plates were incubated at 5 C for 20 and 30 min followed by incubations at 25 C for 20 and 30 min. The maximum spore production was obtained with an incubation at both temperatures for a period of 30 min. As sources of inocula corebore discs of mycelia from the middle of the plate and a zoospore suspension transferred either at the center of the plate or on all the surface were equally effective.

PRUEBA DE PRODUCTOS CUBRECORTES EN TALLOS DE *Dracaena marginata* LAM. J. Ramírez; Programa Nacional de Horticultura Ornamental. CAAP-UCR. Estación Exp. Fabio Baudrit, Costa Rica.

Dracaena marginata Lam; es una de las principales plantas ornamentales para exportación, la producción de *marginata* se ve seriamente afectada por una pudrición de tallo y raíz causada por la bacteria *Erwinia chrysanthemi*. La infección del tallo se presenta posterior a las podas de formación y preparación de la planta y puede alcanzar pérdidas hasta de un 70% de la plantación. Se efectuaron 4 pruebas de productos cubrecortes en plantas madres en el campo, plantas en macetero y puntas en enraizador. Los mejores tratamientos fueron: Pancil-T, Agrofíxer y la mezcla de Manzate + Captan.

DOT HYBRIDIZATION ASSAY FOR DETECTION OF MAIZE RAYADO FINO VIRUS (MRFV) IN PLANT EXTRACT USING BIOTINYLATED PROBES. Pilar Ramírez, James Karkashian, Ma de los Angeles Mora & Rosemarie Hammond. Centro de Investigación en Biología Celular y Molecular, Universidad de Costa Rica and Beltsville Agricultural Research Center. Maryland 20705, U.S.A.

Detailed knowledge of the molecular biology of MRFV and its replication in maize hosts is missing. We have begun a preliminary study of the molecular biology of MRFV by cloning a part of its genome and using the cDNA clones as molecular probes. Non-radioactive labels such as biotine have several advantages including reduced hazards, decreased cost and longer shelf life. A 11-d UTP analog was used in a nick translation reaction to label the cDNA-MRFV probes and the presence of hybrids was revealed using alkaline phosphatase system. Further analysis was done on the different hybridization conditions under which these probes were capable to specifically detect MRFV in infected plant samples.

ELECTROPHORETIC CHARACTERIZATION OF PROTEINS AN DOUBLE STRANDED RNA OF CUCUMBER MOSAIC VIRUS (CMV) AND WATERMELON MOSAIC VIRUS I (WMV-I) ISOLATED IN COSTA RICA. Pilar Ramírez, Carmen Rivera. Centro de Investigación en Biología Celular y Molecular, Universidad de Costa Rica.

Virus-related disease problems are a major cause of economic losses in commercial cucurbit production in Costa Rica. Several species of viral specific double stranded RNA (dsRNA) were isolated from plant tissue and analyzed by polyacrylamide gel electrophoresis. The pattern of migration of different dsRNA were useful characteristic for differentiating CMV and WMV-I. Proteins from infected tissue were examined by SDS-PAGE or immunoblotting test. The results suggest that these techniques can be successfully used for the identification and diagnostic of different viruses and strains from mixed infection.

IDENTIFICATION ON MAIZE STRIPE VIRUS INFECTING CORN IN COSTA RICA. Carmen Rivera, Pilar Ramírez, and Rodrigo Gámez. Centro de Investigación en Biología Celular y Molecular.

Maize stripe virus (MSTpV) is widespread in many tropical regions where the distribution of maize and its vector *Peregrinus maidis* overlaps. MSTpV has been found infecting corn (*Zea mays*) samples from different regions in Costa Rica. Maize plants with chlorotic stripes and yellow band symptoms have been analyzed by cytoplasmic inclusions, serology and

double stranded RNA. Light micrographs of epidermal stripes and mesophyll cells evidence the presence of needle-shaped inclusions and bundles of filamentous material stained only with 0-g stain, similar to those reported by other authors for MSTpV. Crude extracts from symptomatic plants analyzed by SDS-immuno-diffusion test reacted with MSTpV-antiserum. Several double stranded RNAs were found in tissue extracts under non-denaturing electrophoretic separation, with similar molecular weight to those described for MSTpV.

WATERMELON MOSAIC VIRUS I AND CUCUMBER MOSAIC VIRUS ASSOCIATED WITH SEVERE MOSAIC DISEASES OF MELONS AND WATERMELONS IN COSTA RICA. C. Rivera, C.M. Rodríguez and R. Pereira. Centro de Investigación en Biología Celular y Molecular. Universidad de Costa Rica.

A severe mosaic disease has affected melon and watermelon production in certain fields in Guanacaste, Costa Rica during 1986-1988. Incidence of the disease has increased annually since 1986 reaching a 40% during the present year. Two virus, watermelon mosaic virus I (WMV-I) and cucumber mosaic virus (CMV) were associated with the disease on the basis of cytoplasmic inclusions, electron microscopy and serology. This is the first report of WMV-I and CMV occurring on cucurbits in Costa Rica.

UN METODO DE INOCULACION PARA EVALUAR LA RESISTENCIA DEL FRIJOL COMUN A LA MUSTIA HILACHOSA (*Thanatephorus cucumeris*). M.R. Rojas-Jiménez, G.A. Frías-Treviño, S. Saborfo, J.M. Dessert. CIAT/ICA, Apdo. 55-2200 Coronado, San José, C.R.

El método consistió en inocular hojas de frijol en cámara húmeda con esclerocios de *Rhizoctonia solani*, colectados de plantaciones de frijol con alta incidencia de la enfermedad. Hojas de 102 líneas, de frijol del Vivero Internacional de Mustia, fueron inoculadas con una suspensión de 100 esclerocios por ml de H₂O con tween 0.01%. El número y tamaño de lesiones se evaluó a las 48 horas y el porcentaje de tejido afectado por la enfermedad a las 84 horas después de la inoculación. Se observaron diferencias marcadas entre las líneas, en el número y tamaño de las lesiones como también en el porcentaje de tejido afectado. Muchas de las líneas que mostraron resistencia en las pruebas de inoculación presentaron también buen grado de resistencia en el campo. Este método de inoculación, permite en un corto período, evaluar un gran número de materiales sin la interferencia que en el campo presentan la arquitectura y hábito de la planta.

CHARACTERIZATION OF THE 3' END OF MAIZE RAYADO FINO VIRUS-RNA, Sandra Silva. Centro de Investigación en Biología Celular y Molecular, Universidad de Costa Rica.

Analysis of MRFV-ARN in agarose-formamide denaturing gels suggested that the genome of this virus is a single RNA molecule. Its behavior in oligo d(T)-cellulose columns demonstrated that it does not contain a large poly(A) tail at the 3' end, although it may have a short internal adenine sequence that produces a retention of 10-20% of the RNA loaded on the column. This was supported by reverse transcription experiments, where oligo d(T) was the most efficient primer to obtain high molecular weight products. This RNA does not exhibit an aminoacylatable structure in its 3' end or if it does, there is no access to the C-C-A-OH sequence; this is supported by the fact that the RNA is not efficiently labelled with (³²P) cp with T4-RNA ligase. It is proposed that MRFV-RNA has a complex structure at its 3' end, like a pseudoknot. In conclusion, a complex non aminoacylatable pseudoknot structure, preceded by a short polyadenylate sequence, is proposed for the 3' end.

SURVIVAL OF *Bradyrhizobium* IN CONTACT WITH CHEMICAL PROTECTANTS ON SEED OF *Centrosema acutifolium*. C. Torres, R.S. Bradley, J.M. Lenné and M. Chaveerra, Tropical Pastures Program, CIAT, A.A. 6713, Cali, Colombia.

Centrosema acutifolium cv. Vichada, a promising forage legume for acid infertile soils requires inoculation with effective strains of *Bradyrhizobium*. This legume is also affected by various seed borne diseases which are controlled by chemical protectants. To determine if seed protectants affected

survival of Bradyrhizobium was therefore necessary. Recommended rates of five chemicals: benomyl, carboxin, captafol, copper hydroxide and carbofuran were applied to seed of C. acutifolium. The seed was then washed or not washed before pelleting with Bradyrhizobium. Seeds were sampled at 3, 7 and 10 days after pelleting for assessment of survival of Bradyrhizobium. After 3 days, high levels of Bradyrhizobium were measured only on treated seed washed before pelleting. Chemical protectants may therefore be used successfully on pelleted seed provided residual chemical is washed off and seed is sown within a few days of pelleting.

EL METODO DE MICROPARCELAS Y SU USO PARA LA EVALUACION DE LA EFICACIA DE UN FUNGICIDA PARA EL COMBATE QUIMICO DE LA MONILIASIS. O. Trocmé*, E. Carvajal T.** y O. Vargas V.**. *CATIE-IRCC 7170 Turrialba, Costa Rica, **UCR, San José, C.R.

Este trabajo demostró que el método de microparcelas que se utiliza en Africa por el Instituto Francés de Investigación de Café y Cacao (IRCC) para el estudio de la eficacia de los fungicidas para el combate químico de la mazorca negra del cacao (Phytophthora palmivora y P. megacarya) puede también servir para probar fungicidas para el combate químico de la moniliasis (Moniliophthora roreri). Este método consiste en la comparación entre grupos similar de frutos del mismo tipo, de distribución parecida, en el mismo ambiente climático, pedológico y contaminante. Así se eliminan las varias heterogeneidades de cualquier cacaotal. Se necesitan solamente algunas modificaciones debido a que el modo de diseminación de las esporas de Moniliophthora es diferente al de Phytophthora y también a que la susceptibilidad de las mazorcas a Moniliophthora disminuye cuando aumenta la edad de la mazorca. Este método evalúa la eficacia de varias concentraciones de clorotalonil de 0,35% hasta 1%.

EFFECT OF VARIOUS FUNGICIDES ON MYCELIAL GROWTH OF Colletotrichum, Gloeosporioides and Rhizoctonia species in vitro. A. Vargas de Alvarez, C. Torres and J.M. Lenné, Tropical Pastures Program, CIAT, A.A. 6713, Cali, Colombia.

The efficacy of benomyl (Benlate), copper hydroxide (Kocide), carboxin (Vitavax), captafol (Difolatan), triforine (Saprol) and carbofuran (Furadan) on mycelial growth of nine isolates of C. gloeosporioides and six isolates of Rhizoctonia species pathogenic to various species of forage legumes was evaluated in vitro. Three concentrations of each fungicide were used: high, medium and low being twice, the same as and half the recommended commercial dose, respectively. Fungicides were either impregnated in filter paper discs or incorporated into agar media. Benomyl (40 gr/100 l) and Carboxin (100 gr/100 l) were the most effective fungicides in reducing mycelial growth of the 15 fungi. These fungicides are presently being evaluated in the field in various methodological trials.

EFFECTO DE LA TEMPERATURA EN EL DESARROLLO DE MICROORGANISMOS SOBRE BULBOS DE CEBOLLA (Allium cepa L.); Vargas, Roy; Araya, C.M.; Rivera, G. Escuela de Ciencias Agrarias. Universidad Nacional. Ap. 86-3000. Heredia, Costa Rica.

Se identificó y probó la patogenicidad de 16 hongos aislados de bulbos de cebolla. De acuerdo con el lugar de procedencia se encontró que Fusarium sulphureum, Penicillium (a.2) y Trichoderma aparecen sólo en muestras del campo. De mercado sólo se aisló Aspergillus (a.2), Cephalosporium, F. nivale, F. solani, Gonatotryps, Penicillium (a.3), Periconia, Sclerotium,

Asimismo, Alternaria, Aspergillus (a.1), Botrytis, Candida, Cladosporium, F. oxysporium, Geotrichum, Penicillium (a.1), Rhizopus, Trichotecium y Verticillium, se aislaron muestras de ambas procedencias. La prueba de patogenicidad se hizo sobre bulbos con la superficie herida o intacta e incubados 7 días a temperatura ambiente. Todos los organismos infectaron cuando hubo herida, mientras que sólo Cephalosporium y Trichotecium lograron penetrar directamente.

MICROFLORA ASOCIADA A BULBOS DE CEBOLLA (Allium cepa L.) PROCEDENTES DE CAMPO Y MERCADO DE COSTA RICA. Vargas, R; Araya, C.M. y Rivera, G. Escuela de Ciencias Agrarias, Universidad Nacional. Ap. 86-3000. Heredia, Costa Rica.

Se identificó y probó la patogenicidad de 16 hongos aislados de bulbos de cebolla. De acuerdo con el lugar de procedencia se encontró que Fusarium sulphureum, Penicillium (a.2) y Trichoderma aparecen sólo en muestras del campo. De mercado sólo se aisló Aspergillus (a.2), Cephalosporium, F. nivale, F. solani, Gonatotryps, Penicillium (a.3), Periconia, Sclerotium, Asimismo, Alternaria, Aspegillus (a.1), Botrytis, Candida, Cladosporium, F. oxysporium, Geotrichum, Penicillium (a.1), Rhizopus, Trichotecium y Verticillium, se aislaron muestras de ambas procedencias. La prueba de patogenicidad se hizo sobre bulbos con la superficie herida o intacta e incubados 7 días a temperatura ambiente. Todos los organismos infectaron cuando hubo herida, mientras que sólo Cephalosporium y Trichotecium lograron penetrar directamente.

VARIABILIDAD EN Mycena citricolor EN CAFE EN COSTA RICA. A. Wang* y J. P. Tewari**. * Escuela de Fitotecnia, Universidad de Costa Rica **Dept. of Plant Science, University of Alberta, Edmonton, Alberta T6G 2P5, Canada. Se estudió el comportamiento de 26 aislamientos de campo y siete monospóricos de Mycena citricolor para determinar diferencias en tamaño de la colonia y número de cabecitas en papa-dextrosa-agar, producción de ácido oxálico y peso seco del micelio desarrollado en medio líquido, tamaño de las lesiones cuando se inocularon en plantas de café bajo condiciones de campo, capacidad para formar la fase perfecta y grado de compatibilidad vegetativa. Los resultados sugieren la existencia de un mecanismo poligénico y/o multialélico que determina la compatibilidad del heterocarión. Mediante cluster analysis, se agruparon los aislamientos de acuerdo con sus características en dos grupos: uno constituido por los aislamientos monospóricos y el proveniente de Coffea liberica y otro por los aislamientos a partir de C. canephora; cada grupo estuvo formado por varios subgrupos.

CHARACTERISTICS WHICH DISTINGUISH PSEUDOMONAS SPECIES CAUSING SHEATH ROT AND GRAIN DISCOLORATION OF RICE. S. Zeigler and E. Alvarez. CIAT, A.A. 6713, Cali, Colombia.

Four Pseudomonas spp. have been shown to cause sheath rot and grain discoloration of rice. Two species P. glumae (Pg) and P. avenae (Pa) primarily cause spikelet sterility and grain discoloration, while the other two, P. fuscovaginae (Pf) and P. syringae pv. oryzicola (Pso), cause severe sheath rotting as well as sterility and grain discoloration. Since symptoms caused by the different pathogenic species are virtually indistinguishable in winnowed grain samples, as are sheath rotting symptoms of Pf and Pso, isolates must be characterized using standard bacteriological tests. 147 isolates from 26 countries were compared under quarantine conditions. Characteristics differentiating the species are: fluorescence (Pf, Pso +; Pa, Pg -); oxidase, arginine dihydrolase, lipase, arginine utilization (Pf+, Pso-); levan formation (Pf-, Pso+) utilization of adonitol, arginine, inositol, salicine, raffinose (Pa-, Pg+); all four species are pathogenic on rice seedlings.

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