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(*Hemileia spp.*)

Bibliografía

Compilada por:

Laura Coto Royo

Centro Interamericano de Documentación e Información Agrícola – CIDIA
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TABLA DE CONTENIDO

PRESENTACION

El Instituto Interamericano de Cooperación para la Agricultura ha estado alerta ante la roya del cafeto, enfermedad, identificada por primera vez en el Continente en 1970 en Bahía, Brasil. Una de las contribuciones del IICA ha sido la publicación de bibliografías sobre roya para dar cumplimiento a solicitudes de instituciones involucradas en el combate de la enfermedad.

La primera edición de esta bibliografía se realizó en cooperación con la Oficina del Café y el Ministerio de Agricultura y Ganadería de Costa Rica para atender una solicitud del organismo ejecutivo del Comité Internacional Regional de Sanidad Agropecuaria (CIRSA).

En 1973, el Centro Interamericano de Documentación e Información Agrícola (IICA-CIDIA), compiló la segunda edición de la bibliografía con el interés de proporcionar a los programas y especialistas en café del Continente información que les permitiera enfrentarse a esta enfermedad.

El Programa de la Roya del Cafeto del IICA publicó en 1977 la tercera edición de la bibliografía para poner a disposición del usuario información reciente sobre la roya del cafeto.

El Programa de Sanidad Vegetal del IICA y el Programa Cooperativo para la Protección y Modernización de la Caficultura (PROMECAFE), hicieron llegar en 1980 a los técnicos cafetaleros un Suplemento de esta bibliografía.

PROMECAFE, atento a esta enfermedad promovió la compilación del segundo Suplemento, en el cual se registran 684 referencias bibliográficas sobre la roya del cafeto, actualizando hasta 1985 la información que se ha podido identificar en fuentes primarias y secundarias existentes en la Biblioteca Conmemorativa Orton del IICA-CIDIA en Turrialba, Costa Rica

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ROYAS DEL CAFETO

(*Hemileia* spp.)

GENERAL

* AGUILAR, R. y MORA, B. La roya del café (*Hemileia vastatrix* Berk. & Br.) en Costa Rica. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 112-115. (001

** AGUIRRE, J.A. y CARO C., J. Impacto económico de la roya del cafeto en Costa Rica. Instituto Interamericano de Cooperación para la Agricultura. Publicaciones Misceláneas no. 482. 1984. 99 p. (002

* ANDRADE M., E., ed. Informe sobre enfoque y actualización de los países miembros del "PROMECAFE", en relación a la roya del cafeto. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 272. 1982. 145 p. (003

* ASOCIACION NACIONAL DEL CAFE, CIUDAD DE GUATEMALA (GUATEMALA). Detección, prevención y combate de la roya del cafeto. In _____. Memoria de Labores 1980-1981. Guatemala, 1982? pp. 31-32. (004

* BERGAMIN FILHO, A. y PAIVA, S.B. A ferrugem do cafeeiro; uma revisão. Summa Phytopathologica (Brasil) 9(3-4):155-178. 1983. (005

> A ferrugem do café, causada por *Hemileia vastatrix* Berk. & Br. é a mais importante doença dessa cultura. Nestre tmabalho, aspectos da doença são revisados. Ênfase é dada na extensão geográfica da doença, sintomatologia, prejuízos causados, epidemiologia (fâtores da planta hospedeira, do patógeno, do ambiente e periodicidade estacional), técnicas de amostragem e avaliação de sintomas.

BOLIVIA REPLACES rust-infected coffee plantations. Reuter Coffee Newsletter no. 202/80. 1980. (006

> In view of poor results in controlling *Hemileia* on existing plantations Bolivian growers, with technical help from the Bolivian agricultural technology institute, have already replanted 40,000 trees and plan to replant a further 350,000 this year, mainly with the caturra variety.

* BONILLA DE OBALDIA, A. Identifique la roya del cafeto. Panamá, Ministerio de Desarrollo Agropecuario, 1984. 2 p. (desplegable) (007

* BRETON, L. Good weather, imports, help increase yields of Venezuelan coffee. World Coffee and Tea 24(9):82-83. 1984. (008

> Venezuela's coffee production is forecast at 1.1m bags in 1983/84, 203,000 bags more than in 1982/83, due to good weather and new plantings. Quality is said to be good. Acreage over the past few years has increased from 272,000 to 277,000 hectares, with current planting density of 2,856 per hectare. Fertilizers are widely used. Domestic consumption is given as 3.67 kg per capita in 1982/83 (population of 16m.). Venezuela has 10 processing mills. Details are given of credit and leaf rust protection programmes.

CADENA GOMEZ, G. et al. Informe sobre la roya del cafeto (*Hemileia vastatrix* Berk. y Br.) en Nicaragua. Bogotá, Federación Nacional de Cafeteros de Colombia, 1977. 84 h. (009

* CAMPOS CAMPOS, E. Enfoques sobre el problema de roya en el país. Noticiero del Café (Costa Rica) 20(236):1-3. 1984. (010

* _____. La roya del cafeto. Noticiero del Café (Costa Rica) no. 234:1-2. 1984. (011

También en: XIV Congreso Nacional Cafetalero. San José, Costa Rica, s.e., 1985. s.p.

CANNELL, M.G.R. Coffee. Biologist 30(5):257-263. 1983. (012

A review of coffee, in the 'exploited plants' series, concentrating on breeding for disease resistance and new farming methods which are improving both yields and quality.

* CASTRO FRANCO, J. La roya del cafeto. Instituto Nacional de Investigaciones Agrícolas (México). Folleto Técnico no. 43. 1982. 80 p. (013

* CAUTIOUS OPTIMISM in 1984. World Coffee and Tea 24(9):73-75. 1984. (014

Jorge Cárdenas - General Manager of the Federación Nacional de Cafeteros, has said that the Federation will seek government and World Bank finance in its 5-year US$238m. diversification programme to reduce Colombian coffee areas by 140,500 hectares (14%). Coffee production forecasts are estimated by the Federation at 12.6m. bags in 1983/84, 11.9 in 1984/85, 11.4m in 1985/86 and 1986/87, 11.1m. in 1987/88, and 10.9m. in 1988/89 and 1989/90. The decline will be due to the incidence of leaf rust and the diversification programme. This season rust control will cost US$2.4m. in the 17,750 hectare affected area, but by 1989/90 it may be as high as US$123m. or more.

* CHALFOUN, S.M. y ZAMBOLIM, L. Ferrugem do cafeeiro. Informe Agropecuário (Brasil) 11(126): 42-46. 1985. (015

* CHEREGUINO V., R.S. Situación actual de la roya. Carta Informativa ISIC (El Salvador) 2(5):2. 1980. (016

COFFEE RESEARCH FOUNDATION (KENYA). Annual report 1978-1979. Ruiru, Kenya, 1978. 200 p. (017

Plant Path. Sect. pp. 146-172.

COFFEE RUST. Commonwealth Agricultural Bureaux. Annotated Bibliographies. Plant Series 0141-5921, no. M.1. 1980. 37 p. (018

COFFEE RUST still not stopped (En alemán). Kaffee und Tee Markt. 31(8):16-18. 1981. (019

A general account of coffee rust and its impact on coffee leaf rust and its impact on coffee growing.

* COLOMBIA COFFEE production drop in Colombian crop estimates for '84-'85; coffee rust main cause. World Coffee and Tea 25(11):40. 1985. (020

COLOMBIAN COFFEE producers worried about coffee rust. Reuter Coffee Newsletter no. 239/84. 1984. s.p. (021

> In a speech to the Colombian Coffee Growers' Congress, its President Maclovio Alvira estimated that coffee rust would affect 250,000 hectares, or 25% of Colombia's coffee growing area by the end of 1985. At the end of 1984 7% of the coffee area was affected. He predicted that production costs, which had risen by 5.4% in 1984 compared to real internal coffee price increases of 2.7%, would continue to rise. The 1984/85 harvest is expected to suffer a loss of 15% or 2 million bags as a result of rain damage. (ICO. Library Monthly Entries no. 54:11. 1984).

* COOPERATIVA DE CAFICULTORES Y DE SERVICIOS MULTIPLES, LA SUIZA (COSTA RICA). La roya del cafeto. La Suiza, Turrialba, 1984. 6 p. (Boletín Informativo). (022

* COSTA RICA. OFICINA DEL CAFE. Informe de gira realizada a El Salvador, Guatemala y México. San José, Costa Rica, 1984. 25 p. (023

> A causa de la presencia de la roya del cafeto (*Hemileia vastatrix*) en Costa Rica, se consideró de gran importancia para el país, que una misión de técnicos y cafetaleros, viajaran a El Salvador, Guatemala y México, teniendo como objetivo fundamental estudiar los métodos de combate desarrollados en el campo y obtener experiencias aplicables a las condiciones de nuestro país.

** _____. Informe sobre la actividad cafetalera de Costa Rica. San José, Costa Rica, 1985. 133 p. (024

Preparado para los delegados al XIV Congreso Nacional Cafetalero.

COSTA RICAN 1983/84 coffee output seen lower. Reuter Coffee Newsletter no. 21/84. 1984. s.p. (025

> Costa Rica's 1983/84 coffee production was estimated, by a former director of the Oficina del Café, at 1.8 million bags, lower than the previous year's 2.1 million, as a result of the normal bearing cycle. The 1983/84 crop is expected to earn 10% more in foreign exchange than 1982/83, due to higher world prices. Domestic consumption would be 280,000 bags, compared to 276,000 in 1982/83. Coffee rust, which had spread from the Nicaraguan border to the central valley, was expected to hit 1984/85 plants.

* CRUICKSHANK, I.A.M. Recommendations for L.I.Q.C. Project. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. p. 213. (026

* ECHEVERRI RODRIGUEZ, J.H. Comentarios sobre el viaje a Brasil; situación de la investigación brasileña con respecto a la resistencia genética a la roya del cafeto (*Hemileia vastatrix* Berk. and Br.). Boletín de PROMECAFE (Costa Rica) no. 16:7-8. 1982. (027

* ECHEVERRI RODRIGUEZ, J.H. La roya del cafeto y el manejo integrado de los problemas fitosanitarios del café. Agro (Rep. Dominicana) 12(107):22-24. 1983. (028

Presentado en: XIII Convención Internacional de Zamoranos.

** FERNANDEZ, C.E. Central American coffee rust project. In Fulton, R.H., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 84-92. (029

* FINANCING, ALLOCATIONS major problems facing Latin America coffee men. World Coffee and Tea 25(2):12-15. 1984. (030

A survey of current problems in the coffee industry in Latin America. Allocation of individual export quotas in Brazil, finance for coffee growers in Guatemala and labour shortage in Costa Rica were among problems mentioned by local coffee men. Various comments on the effects of coffee rust, the quality of production, the functioning of the International Coffee Agreement and the balance between consumption and production are also recorded (ICO. Library Monthly Entries no. 49:8. 1984).

* FONDO NACIONAL DEL CAFE (VENEZUELA). La roya del café. Caracas, Comisión Nacional de Prevención de la Roya del Cafeto, 1984. 20 p. (031

This short booklet is intended to help the Venezuelan coffee farmer first identify and then combat coffee rust. With the aid of colour photographs, it instructs farmers on how the disease spreads, exactly how to detect it and what the farmer himself can do to prevent the transference of rust from one plant to another or to neighboring farms. In addition, the brochure demonstrates how to safely apply pesticides to fight the disease (ICO. Library Monthly Entries no. 53:19. 1984).

** FULTON, R.H., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. 120 p. (032

* GONZALEZ, D.C. Información general y política sectorial. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 119-121. (033

* GUTIERREZ JIMENEZ, M. y CARREON ZUÑIGA, M.A. Ante la roya del cafeto. México. Secretaría de Agricultura y Recursos Hidráulicos. Folleto Técnico no. 79. 1982. 45 p. (034

HONDURAN ANTI-RUST programme at a standstill. Latin America Commodities Report no. CR-81-10:6. 1981. (035

According to the Comité Nacional de Emergencia contra la Roya de Café its work has been halted by the refusal of the Finance Minister to release funds worth around US$560,000. According to the Comité, rust is now affecting some 1,750 hectares, with the most serious situation in the Santa Barbara area. A bill has been tabled by a number of deputies declaring a national emergency in the coffee sector.

HONDURAS: COFFEE rust gets out of control for lack of funds. Coffee and Cocoa International 9(4): 1982. (036

Coffee rust, endemic in Central America, has spread from El Salvador to Honduras, where the authorities have insufficient funds to control and fight the disease. The rust has affected some 4,000 hectares of Honduran coffee farms, mainly in the west. Coffee is Honduras' main export crop, earning about US$200 million in foreign exchange a year. The 1981/82 crop has been estimated at 1.2 million bags, compared to the previous year's record of 1.38 million.

* INDIA.COFFEE BOARD. RESEARCH DEPARTMENT. Forty-second annual report, 1981-82. Karnataka, India, 1982? 339 p. (037

* _____. Forty-third annual report, 1982-83. Karnataka, India, 1983. 359 p. (038

* _____. Thirty-sixth annual detailed technical report, 1982-83. Karnataka, India, 1984. 192 p. (039

Studies on the economic control of leaf rust (*Hemileia vastatrix*), black rot, root disease (*Fusarium [oxysporum* f. sp. *coffeae]*) and brown eyespot (*Cercospora coffeicola*) and the aggravation of leaf disease by simultaneous or consecutive action of *H. vastatrix* and *C. coffeicola* were the main lines of investigation reported in the Plant Path. section (82-94). (Review of Plant Pathology 64(3): 1127. 1985).

* INSTITUTO BRASILEIRO DO CAFE. GRUPO EXECUTIVO DE RACIONALIZAÇÃO DA CAFEICULTURA. Cultura de café no Brasil. 4 ed. Río de Janeiro, Brasil, 1981. 503 p. (040

Incluye roya del café.

** INSTITUTO HONDUREÑO DEL CAFE. DEPARTAMENTO DE INVESTIGACION AGRICOLA. Informe técnico anual de labores 1979-1980. Tegucigalpa, 1980. 85 p. (041

Incluye roya del café.

** _____. Plan operativo anual 1985-1986. San Pedro Sula, Honduras, 1984. s.p. (042

Incluye roya del café.

** INSTITUTO MEXICANO DEL CAFE. DIRECCION ADJUNTA DE PRODUCCION Y MEJORAMIENTO DE LA CAFICULTURA. Roya del cafeto, *Hemileia vastatrix* Berk. y Br. In _____. Guía para el manejo de plaguicidas y combate de plagas y enfermedades del cafeto. s.l., 1980. pp. 58-61. (043

* ISWANTO, A. Influence of the berry borer and the leaf rust disease on coffee yields (En indonesio). Menara Perkebunan 51(3):66-69. 1983. (044

The coffee berry borer and the leaf rust disease were respectively the main constraints of robusta and arabica coffee in Indonesia. The leaf rust disease will decrease the production to 60%. The

coffee berry borer will decrease 40-50% of the production, 30-50% of the weight of raw coffee beans and will decrease the quality of yield. This study estimated that the coffee berry borer was negatively correlated to the outturn (r =-0,59**) and it gave a direct effect (P =-0,60). The leaf rust disease was negatively correlated to the weight of raw coffee beans (r =-0,40*) and it gave a direct effect (P =-0,35). From those estimations, controlling and improving new varieties resistant to the main constraints can increase the productivity and the quality of coffee.

* JACOME HERNANDEZ, F. Acciones de la Delegación Córdoba contra la roya del cafeto. Boletín Técnico de Café (México) 2(20):3. 1983. (045

* KUSHALAPPA, A.C. y LAGESSE, R.M. Leafal, um sistema de programas de computador para quantificar e analisar a queda das folhas de cafeeiro principalmente devido a ferrugem. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Ribeirão Preto/SP, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 16-17. (046

También en: Phytopathologische Zeitschrift 101(2):97-105. 1981.

'LEAFAL' is a computer program designed to reduce labour and error in manual processing of leaf fall data in coffee rust epidemiology. An example of its application is given.

LAPPER, R. Central America. The coffee is mild but the politics aren't. Coffee and Cocoa International 10(5):43, 46. 1983. (047

A report on the effects of the political crisis and associated guerilla activity in the coffee-growing regions of Central America. Coffee exports have become of even greater importance in earning foreign exchange since the late 1970s, as the region's economic base has narrowed. Production has fallen, mainly due to lower productivity. In Guatemala, coffee growers are replanting only 5% of their acreage a year, instead of 10%; and in Honduras, El Salvador and Guatemala production has been lost because of coffee rust, which many farmers cannot afford to treat adequately. Exporters are actively seeking markets in non-ICO countries, despite prices being up to 50% lower. In 1981/82, Guatemala sold 600,000 bags, 25% of its crop, to Arab buyers, while in the same year, Costa Rica sold 295,000 bags to non-Members.

LEGUIZAMON CAYCEDO, J. Informe del viaje de estudios sobre la roya del cafeto, *Hemileia vastatrix* Berk. et Br. en el Brasil. Chinchiná, Colombia, CENICAFE, 1974. 54 p. (048

* LLEGO LA roya pero estábamos preparados para recibirla. Café (Honduras) no. 43:42-43. 1983. (049

Tomado de: Revista Guión (Colombia).

* LOPEZ ALZATE, R. Aspectos económicos a nivel del productor derivados de la eventual presencia de la roya del cafeto (*Hemileia vastatrix* Berk. et Br.) en Colombia. In Taller sobre Roya del Cafeto, *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-3. (Trabajo 11). (050

* _____. Aspectos económicos de la industria cafetera colombiana y posible impacto de la roya del cafeto (*Hemileia vastatrix* Berk, et Br.) en nuestro medio. In Taller sobre Roya del Cafeto, *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-4. (Trabajo 1). (051

* MATUS PORTOCARRERO, H. y MURILLO C., J. Algunos aspectos sobre la caficultura de Nicaragua y situación de la investigación sobre la epidemiología de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). In Taller Regional del PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 95-108. (052

MELO, H. Problems with rust and stocks. Coffee and Cocoa International 11(4):16, 21. 1984. (053

> Statistics released by the Federación Nacional de Cafeteros on 31 March 1984 show that the area of Colombia worst hit by coffee rust was Antioquia, where 232,741 trees were affected. In Caldas 177,366 trees were affected, in Risaralda 38,326 and in Quindío 1,753. The disease is not expected to affect supply seriously, since production in unaffected areas is high, and stocks are at record levels. Estimates of production in 1984/85 vary between 9.5 and 11.5 million bags; the full effect of the rust is still to be determined. The government has not fully satisfied growers' demands for increases in the support price, which was raised to P15,200 per 125 kg load on 11 May 1984, despite increases in production costs and rural wages of as much as 28%. The coffee retention tax was also raised to 68%. According to industry sources, private exporters are paying the equivalent of P16,070 - P16,290 per 125 kg load. The effective minimum export price (reintegro cafetero) was US$209 per 70 kg on 11 May 1984, equivalent to US$1.45 a pound (ICO. Library Monthly Entries no. 49:6. 1984).

* MENDEZ LOPEZ, I., CASTILLO PONCE, G. y HOLGUIN MELENDEZ, F. Desarrollo y comportamiento de la roya del cafeto en la región Costa de Chiapas, México. In Taller Regional del PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 53-66. (054

MEXICAN 1983/84 coffee production estimated at 4.26 million bags. Reuter Coffee Newsletter no. 105/84. 1984. s.p. (055

> The Director of the Mexican Coffee Institute, Antonio Gazol Sánchez, estimated Mexico's 1983/84 coffee production at 4.26 million bags, of which 1.9 million will be exported to ICO-member countries, 1.6 million will go for domestic consumption and 700,000 be exported to non-member countries. Mexico will spend $11 million in 1984 to fight coffee rust, which currently affects 93,000 hectares. By 1988 it is hoped that 40% of the 500,000 hectares planted to coffee will have rust-resistant plants.

* MIRANDA, E.A. Actividades que se realizan en Panamá, con miras al manejo de la roya del cafeto. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 116-118. (056

* MORA, B. y RODRIGUEZ R., J.F. Informe de Costa Rica. In Taller Regional del PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 68-94. (057

MORAES, S.A. A ferrugem do cafeeiro: importância, condições predisponentes, evolução e situação no Brasil. Piracicaba, Brasil, Escola de Agricultura Luiz de Queiroz, Departamento de Fitopatología, 1980. 38 p. (058

* MORAES, W.B.C. Comments and recommendation on the research project presented by LIQC. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 263-265. (059

* _____. Análise retrospectiva da cafeicultura no Brasil è da pesquisa sobre bioquímica da ferrugem do cafeeiro. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 181-203. (060

* MULLER, R.A. Contribution a la connaissance de la phytomycocénase (*Coffea arabica* L., *Colletotrichum coffeanum* Noack sensu Hindorf, *Hemileia vastatrix* B. et Br., *Hemileia coffeicola* Maublanc et Roger. Thesis Dr. París, Université Pierre et Marie Curie, 1978. 174 p. (061

* _____. *Hemileia coffeicola* Maublanc et Roger, danger potentiel pour la caféiculture mondiale. In Institut Français du Café et du Cacao. IFCC, 25e anniversaire 1958-1982. París, 1983. pp. 49-50. (062

NICARAGUA: NEAR-record coffee output expected this season. Latin America Commodities Report no. CR-83-03:4. 1983. (063

> The 1982/83 harvest of coffee in Nicaragua is likely to total 1.4 quintals of 46 kg. A planting programme to establish coffee varieties resistant to leaf rust is proceeding at the rate of nearly 59% of the current planted area of 140,000 (1 manzana = 0.7 ha) p.a. It is also hoped to raise traditional growers' yields from less than 7 quintals per manzana to 10.

* ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA. La roya del cafeto en la República de El Salvador. Informe preliminar. s.l., Departamento de Sanidad Vegetal, 1980. 29 p. (064

* ORME, B. Coffee rust: blessing in disguise? RYD México 2(5):16-17. 1982. (065

* OSORIO, F.O. IHCAFE inició programa de investigación sobre la roya del cafeto. Boletín Técnico Comunicafé (Honduras) 1(1):3. 1981. (066

* OTERO, G. R. Resumen del trabajo presentado por OIRSA de antecedentes de la enfermedad roya del cafeto (*Hemileia vastatrix*) en el área del OIRSA. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 206-208. (067

PERU COFFEE exports seen --- USDA report. Reuter Coffee Newsletter no. 38/84. 1984. s.p. (068

The USDA report published on 14 February 1984 forecast Peru's coffee exports in 1984/85 at 950,000 bags, a drop from 1983/84 at an estimated 950,000 bags but still above 1982/83 at 693,000. The 1984/85 crop is forecast at 1.15 million bags, a drop of 50,000 bags compared to the previous year, as a result of severe coffee rust damage.

* PLAGAS Y enfermedades. Carta Informativa ISIC (El Salvador) 3(5):4-6. 1981. (069

Incluye roya del café.

POWELL, R. Venezuelan 1983/84 coffee production forecast higher at 1.1 million bags. Reuter Coffee Newsletter no. 95/84. 1984. (070

In an interview, the Commercial Manager of Venezuela's National Coffee Fund (FONCAFE) estimated 1983/84 production at 1,115,000 bags, up from 997,000 bags in 1983/84. However, Venezuela will have a large exportable surplus which it is hoped will be sold to non-members of the International Coffee Organization at a minimum price of 70 cents per lb. There are no plans to increase the area under coffee, 250,000 hectares, but FONCAFE hopes to boost yields from the poor 185 kilos per hectare to up to 550 kilos per hectare. Producer prices have remained unchanged since 1981 at $1.21 per kilo for top grade beans, $1.12 for medium grade and $0.91 for ordinary grade. Coffee rust has been found near the Colombian border, and resistant trees will be used for re-planting.

* PROGRAMA COOPERATIVO PARA LA PROTECCION Y MODERNIZACION DE LA CAFICULTURA EN MEXICO, CENTRO AMERICA Y PANAMA. Proyecto regional sobre roya del cafeto ROCAP-PROMECAFE. s.l., IICA, 1981. 24 p. (Resumen del "Project Identification Document"). (071

* _____. Informe sobre enfoque y actuación de los países miembros del "PROMECAFE" en relación a la roya del cafeto. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 272. 1982. 142 p. (072

QUIJANO RICO, M. Un nuevo programa de investigación científica dentro del marco de las actividades del LIQC, con énfasis sobre los aspectos bioquímicos y biofísicoquímicos de la immunidad y la patogénesis del cafeto en la infección por el hongo *H. vastatrix*. Bogotá, Federación Nacional de Cafeteros de Colombia, Laboratorio de Investigaciones sobre la Química del Café y de los Productos Naturales, 1975. s.p. (LIQC-C-003). (073

_____. La realización del proyecto de investigación científica del LIQC sobre la denominada roya del cafeto. Bogotá, Federación Nacional de Cafeteros de Colombia, Laboratorio de Investigaciones sobre la Química del Café y de los Productos Naturales, 1977. s.p. (LIQC-C-006). (074

* QUIROS, I.M. La roya del cafeto. Noticiero del Café (Costa Rica) 6(191):1-4. 1980. (075

REGALADO ORTIZ, A. Líneas de investigación en relación con la roya del cafeto. s.n.t. (076

Presentado en: Congreso Nacional de Fitopatología, 11°, San Luis, Potosí, 1984.

* RESUMENES DE investigación sobre el problema de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. 111 p. (077

RIVILLAS OSORIO, C.A. Estudio económico y técnico de aspersiones fitosanitarias en cafetales comerciales. Tesis Ing. Agr. Manizales, Colombia, Universidad de Caldas, Facultad de Agronomía, 1977. 225 h. (078

* RODRIGUES JUNIOR, C.J. Algunos aspectos sobre la roya anaranjada del cafeto. Garnica, México, Instituto Mexicano del Café, 1978. 21 p. (079

_____. Coffee leaf rust. Rome, FAO, Agricultural Operations Div., 1982. 19 p. (FAO-AGO-SRL/77/009). (080

_____. Communication from the Coffee Rust Research Centre, Portugal. London, International Coffee Organization, 1983. 1 p. (Promotion Committee 298/83). (081

Requests financial support for a scientific meeting on leaf rust.

LA ROYA del café puede controlarse. Quito, Programa Nacional del Café, 1984. 15 p. (082

This colour illustrated booklet is designed to instruct the coffee farmer in Ecuador on the hazards of coffee leaf rust. It provides information on recognizing the disease, preventing its spread and methods of combating it, including fumigation and planting resistant strains (ICO. Library Monthly Entries no. 55:17. 1985).

RUST NOW affects 20% of plantations. Latin America Commodities Report CR-84-09. 1984. (083

According to the Director of the Instituto Mexicano del Café, Antonio Gazal, rust had affected 90,000 hectares by May 1984, of the 460,000 hectares planted to coffee in Mexico. Fungicides had been applied in 85,000 hectares and 40,000 new coffee trees were to be planted in the current year. He also stated that in 118,000 hectares output had been increased from 6.5 to 14 quintals per hectare. (ICO. Library Monthly Entries no. 48:10. 1984).

RUST WILL cut Bolivian coffee output this year. Reuter Coffee Newsletter no. 151/81. 1981. s.p. (084

Leaf rust will reduce coffee yields by about 15% in 1981, giving a harvest of 169,000 bags of parchment coffee, compared with 185,500 in 1980, according to Jaime Soria Preado, general manager of the Bolivian Coffee Committee, Cobolca. Output in 1982 should

rise to 185,000 bags because of an increase in production area. The Bolivian harvest was from March to August. Domestic consumption, currently between 35,000 to 40,000 bags, is increasing at an annual rate of 5%. Cobolca has started a programme to provide farmers with new varieties, higher yielding and more rust-resistant.

SAYAGO A., M., PEREZ NIETO, E. y FARRERA P., R. La roya del cafeto *Hemileia vastatrix* Berk and Br. Centro de Investigaciones Agropecuarias de la Región de los Andes (Venezuela). Boletín Técnico no. 2. 1980. 56 p. (085

* SCHIEBER, E. The coffee rust in Latin America; analysis of its economic consequences. In Seminario de Estudios sobre la Lucha Contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 11-17. (086

SERNAS MADERA, V.M. Perspectivas de la caficultura mexicana ante la presencia de la roya del cafeto, *Hemileia vastatrix* Berk. et Br. s.n.t. (087

Trabajo presentado en: Congreso Nacional de Fitopatología, 11°, San Luis Potosí, 1984.

* SILVA, L. Conviviendo con la roya. El Surco (México) 86(3):13-14. 1981. (088

* SIMULACION DE perfil de incidencia de la roya en México. Boletín Técnico de Café (México) 2(19):1-2. 1983. (089

* SITUACION DE la roya del cafeto en México. Boletín Técnico de Café (México) 2(21):2. 1983. (090

TERDRE, N. Special report; México. Record harvests are all very well, but... Coffee and Cocoa International 10(5):11. 1983. (091

In 1982/83, Mexico acheived a record coffee harvestof 4.52 million bags, an increase of 320,000 bags over the previous year, with no increase in the acreage under coffee of 420,000 hectares. However, coffee growers are unhappy with the domestic support price of 21 pesos a kilogramme, which they unsuccessfully petitioned Inmecafe to increase to 40 pesos a kilogramme. Carryover stocks at the beginning of the 1982/83 year were 1.68 million bags, a situation which forced Mexico to rethink its policy on sales to non-members of the International Coffee Organization. Barter deals with communist countries have been arranged. Private Mexican firms are able to exchange coffee supplied by INMECAFE for goods they require; this was done for example by Volkswagen in Mexico, who bartered 400,000 bags. The shortage of funds is expected to affect Mexico's investment in future coffee crops, and particularly in plant protection. Coffee leaf rust now affects 75,000 hectares, including 67,000 in Chiapas. The coffee berry borer (la broca) also affects 42,000 hectares in Chiapas.

** TORIJANO CHACON, A. La roya: consuelo o aflicción. La Nación, San José, Costa Rica; Enero 10, 1984:7C. (092

* VARGAS GONZALEZ, E. y MORA ACEDO, D. La roya del café en Costa Rica; revisión bibliográfica, comentarios y recomendaciones generales. San José, Universidad de Costa Rica, Vicerrectoría de Acción Social, Escuela de Fitotecnia, 1984. 40 p. (093

VELASQUEZ A., J.A. y VELEZ L., J.A. La roya del cafeto (*Hemileia vastatrix* Berk y Br). Medellín, Universidad Nacional de Colombia, Facultad de Agronomía, 1982. 90 p. (094

* VILLASEÑOR LUQUE, A. La cafeticultura mexicana ante la roya del cafeto. México, D.F., Instituto Mexicano del Café, 1979. 40 p. (095

* VILLEGAS, C., comp. Royas del cafeto (*Hemileia* spp.); bibliografía - Suplemento. IICA. Documentación e Información Agrícola no. 60. 1980. 41 p. (096

* VISHVESHWARA, S. y HACOB, V.J. Coffee management with special reference to shade nutrition and plant training. Indian Coffee 47(2):9-12. 1983. (097

Incluye *Hemileia vastatrix*.

Informe sobre las condiciones de crecimiento del café en Sri Lanka.

* WALLER, J.M. The recent spread of some tropical plant diseases. Tropical Pest Management 27(3):360-362. 1981. (098

The recent spread of coffee rust, sugarcane rust, black leaf streak of banana and *Alternaria* blight of wheat are recorded and the implications of new disease records are discussed.

CONFERENCIAS, CURSOS Y REUNIONES

* BONILLA G., J.C. Resúmenes sobre trabajos presentados en la primera reunión regional de PROMECAFE, sobre la roya del cafeto, celebrada en el Hotel Presidente, El Salvador, C.A. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 179-200B. (099

** CONGRESO NACIONAL CAFETERO, 13°, SAN JOSE, COSTA RICA, 1984. Actas. San José, Costa Rica, Oficina del Café, 1984. 83 p. (100

Incluye roya del café.

CURSO NACIONAL SOBRE CUARENTENA VEGETAL Y ROYA DEL CAFETO, LA PAZ, 1980. Memoria final. La Paz, Instituto Boliviano de Tecnología Agropecuaria, 1980. 230 p. (101

* DISCUSSION. In Seminario de Estudios sobre la Lucha Contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 39-54, 74-111, 142-158, 231-244, 279-310. (102

* FARAGO, M.E. Comments. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 133-134. (103

* 1982 ANNUAL coffee conference. Kenya Coffee 47(554):116-135. 1982. (104

The Annual Coffee Conference of Elected District Delegates from coffee growing areas in Kenya was held in Nairobi on 25 May 1982. The conference was opened by the Minister of Agriculture, Dr. Munyua Waiyaka, who presented a special cup for the highest increase in imports of Kenya coffee during 1980/81 to the representative of the United States, whose imports had increased by 16%. The country importing the greatest amount of Kenyan coffee is, however, West Germany. Matters discussed by the delegates included, inter alia, the problem of stocks, better control of imported farm chemicals, production costs, prices and export taxes, marketing, research into plant diseases, breeding, soil and leaf chemistry, planting density, pruning, the current and future operations of the Coffee Research Foundation, electrification of coffee factories, conservation and promotion.

* PROGRAMA COOPERATIVO PARA LA PROTECCION Y MODERNIZACION DE LA CAFICULTURA EN MEXICO, CENTRO AMERICA Y PANAMA. IX Reunión del Consejo Asesor. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 361. 1985. 235 p. (105

Incluye roya del café.

* RECOMENDACIONES AL plenario. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 209-212. (106

REUNIÃO ANUAL DE AVALIAÇÃO, REVISÃO E REPROGRAMAÇÃO DO PLANO SOBRE *HEMILEIA VASTATRIX* BERK. et BR., RIO DE JANEIRO, 1971. Relatório das pesquisas sobre *Hemileia vastatrix* Berk. et Br. Río de Janeiro, Instituto Brasileiro do Café, 1971. 3 v. (107

* REUNION DEL CONSEJO ASESOR DEL PROGRAMA COOPERATIVO PARA LA PROTECCION Y MODERNIZACION DE LA CAFICULTURA, 8a., VERACRUZ, 1984. Memoria. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 339. 1984? 122 p. (108

Incluye roya del cafeto.

* RODRIGUES JUNIOR, C.J. Comments. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. p. 159. (109

* _____. Palavras de introdução ao simpósio sobre ferrugens do cafeeiro. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicaçoes. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 37-43. (110

* SEMINARIO SOBRE LA LUCHA CONTRA LA ROYA DEL CAFE, PAIPA, COLOMBIA, 1977. Informe. Eschborn, GTZ, 1979. 310 p. (111

* SEMINARIO SOBRE la roya del cafeto. Revista Cafetalera (Guatemala) no. 197:17, 18, 21. 1980. (112

* SIMPOSIO SOBRE FERRUGENS DO CAFEEIRO, OEIRAS, PORTUGAL, 1983. Comunicaçoes. Oeiras, Centro de Investigaçao das Ferrugens do Cafeeiro, 1984. 649 p. (113

* STAHMANN, M.A. Comments. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. p. 125. (114

* TALLER REGIONAL DEL PROMECAFE SOBRE EPIDEMIOLOGIA DE LA ROYA DEL CAFETO, ANTIGUA, GUATEMALA, 1985. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. 141 p. (115

* TALLER SOBRE ROYA DEL CAFETO, *Hemileia vastatrix* Berk. y Br., MANIZALES, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. p. irr. (116

DISTRIBUCION GEOGRAFICA

ACUERDO DE CARTAGENA. JUNTA. Programa andino de la roya del cafeto; documentación. Lima, 1979-1980. 4 v. (117

Detailed progress reports on the situation of leaf rust in the Andean countries together with details of the joint project to fight the disease, with country-by-country accounts of specific actions and programme budgets. The project is designed to enable the affected countries to live with the disease with attenuated harmful effects.

APHON THAMMAKHET y NIYOM CHEWCHIN. Coffee rust in Thailand (En tailandés). Kasikorn 52(5):305-311. 1980. (118

* BATES, K. Producers battling rust infections in Central America. World Coffee and Tea 22(12):28-29. 1982. (119

Coffee rust (roya), a fast-spreading fungus which has been endemic to Central America's coffee growing farms for the last five years, has persisted despite anti-rust measures.

BECKER-RATERINK, S. The distribution of coffee leaf rust (*Hemileia vastatrix*) in Latin America (En alemán). Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz 89(10): 619-635. 1982. (120

A survey of the spread of coffee leaf rust in Latin America since its appearance in Brazil in 1980, with comments on economic implications.

* CADENA-GOMEZ, G. Distribución geográfica de la roya del cafeto. Avances Técnicos Cenicafé (Colombia) no. 104:1-4. 1982. (121

* CAMPOS CAMPOS, E. La roya del cafeto en Guatemala. Noticiero del Café (Costa Rica) 20(242):2-3. 1984. (122

* _____. Diseminación de la roya del cafeto en Costa Rica. Noticiero del Café (Costa Rica) 21(246):2-3. 1985. (123

* CASTRO, J.M. Ante la roya del cafeto; Perú en el colimador. Noticiero Agropecuario. Centro de Información y Documentación Agropecuario (Cuba) 1979:1-6. Mar. 1979. (124

COFFEE RUST affects Honduran plantations. Reuter Coffee Newsletter no. 48/82. 1982. s.p. (125

About 34,000 acres of coffee plantations in Honduras are affected by coffee rust disease, which unless it is controlled, can reduce production for the crop year 1982/83 by about 60,000 bags. Production for the 1981/82 crop year is estimated at about 1.2 million bags.

COFFEE RUST detected in Honduras. Reuter Coffee Newsletter no. 247/80. 1980. s.p. (126

On 16 December the Minister of natural resources said that coffee rust has been detected by Honduras near the El Salvador border. The government has approved a US$100,000 project to isolate and combat the disease. In the previous week Guatemalan authorities reported a small outbreak of rust, also near the El Salvador border.

COFFEE RUST detected in Venezuela for first time. Reuter Coffee Newsletter no. 218/84. 1984. s.p. (127

An outbreak of coffee rust was detected for the first time in Venezuela near the Colombian border. The government had anticipated this outbreak and has implemented preventive measures as well as breeding programmes for rust-resistant strains of coffee. Venezuela produced 1.07 million bags in 1983/84 and is expected to produce 1.15 million bags in 1984/85. (ICO. Library Monthly Entries 53:10. 1984).

COFFEE RUST discovered in Ecuador but outbreak isolated, government officials say. Reuter Coffee Newsletter no. 32/84. 1984. s.p. (128

An outbreak of coffee rust has affected 100 hectares in El Oro province, Ecuador. The important coffee growing region in the north of Ecuador has not been affected and precautions against spread of the rust have been planned. In 1983 Ecuador produced 1.2 million bags of coffee from about 300,000 hectares.

COFFEE RUST disease detected in Mexico. Reuter Coffee Newsletter no. 136/81. 1981. s.p. (129

A spokesman for the Instituto Mexicano del Café has said that leaf rust has been found on two coffee trees in Tapachula, 6 kms from the frontier with Guatemala, in Chiapas state. 2,700 hectares of coffee in the area have been declared a quarantine zone.

COFFEE RUST found in north Nicaragua. Reuter Coffee Newsletter no. 24/82. 1982. s.p. (130

Two outbreaks of coffee rust have been found in northern Nicaragua near the Honduran frontier, but they are under control and production will not be affected.

COFFEE RUST in Peru spreads closer to Ecuador. Reuter Coffee Newsletter no. 123/80. 1980. s.p. (131

COFFEE RUST outbreak in Colombia confirmed, USDA says. Reuter Coffee Newsletter no. 203/83. 1983. s.p. (132

The U.S. Department of Agriculture confirmed a report of an outbreak of coffee rust on a farm in Caldas. The affected farm is being isolated and sprayed in an attempt to confine and control the rust.

COFFEE RUST reported in Colombia, coffee official says. Reuter Coffee Newsletter no. 192/83. 1983. s.p. (133

Coffee rust has been reported in Colombia, on a plantation in Caldas. A new rust resistant variety of arabica, called 'Colombia', which is already grown in some areas, is to be cultivated more widely.

COFFEE RUST spreading in Colombia, growers say. Reuter Coffee Newsletter no. 225/83. 1983. s.p. (134

Coffee rust is reported to have spread to 58 plantations in Caldas and Antioquia, Colombia. The affected areas have been isolated, and 1,500 hectares sprayed.

COFFEE RUST spreading in Guatemala. Reuter Coffee Newsletter no. 9/81. 1981. s.p. (135

Coffee rust disease has been confirmed in Guatemala in the area of Jutiapa, near the Mexican border, and in the south-eastern coffee zone of Suchitepequez in the Pacific Coast. An official of the Asociación Nacional del Café said that the area affected is about 70 hectares but the fungus is now out of control and continuing to spread.

COLOMBIAN COFFEE plantations affected by coffee rust, agriculture ministry says. Reuter Coffee Newsletter no. 208/83. 1983. s.p. (136

A statement from the Colombian Ministry of Agriculture confirmed that about 3,000 hectares near Chinchiná in Caldas had been affected by coffee rust and would be sprayed by fungicide from helicopters. The disease was first detected on 28 September 1983.

COSTA RICA discovers coffee rust on 15 hectares of plantations. Reuter Coffee Newsletter no. 249/83. 1983. s.p. (137

Coffee leaf rust was discovered on 15 hectares of coffee plantations in Costa Rica.

* DUARTE, M. DE L.R., ALBUQUERQUE, F.C.DE. y MARUOKA, T. Ocorrência da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. & Br.) no estado do Pará. Fitopatología Brasileira 8(2): 347-348. 1983. (138

Relata-se a ocorrência da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. & Br.) em áreas cultivadas com *Coffea canephora* cultivar

Conilon, no Município de Santo Antônio do Tauá. A identificação do agente causal foi baseada em exames microscópicos das estruturas reprodutivas. E a primeira vez que esta doença é constatada no Estado do Pará.

* DURON AVILES, E. Situación de la roya del cafeto en la República de El Salvador. s.l., OIRSA, 1980? 11 p. (139

Presentado en: Seminario sobre la Roya del Cafeto, Guatemala, 1980.

ECUADOR SAYS rust detected in coffee crop. Reuter Coffee Newsletter no. 149/81. 1981. s.p. (140

According to the Minister of Agriculture, Carlos Vallejo, leaf rust has been detected in the province of Zamora Chinchipe near the Peruvian frontier. The affected area has been declared an emergency zone and quarantine has been imposed.

* EL SALVADOR convive con la roya. Carta Informativa ISIC (El Salvador) 2(3):1. 1980. (141

FEDERACION NACIONAL DE CAFETEROS DE COLOMBIA. DEPARTAMENTO DE COMUNICACIONES Y ADIESTRAMIENTO. La roya puede llegar a Colombia pero se puede controlar, prepárese. Ibagué, Colombia, Atlas, 1978. 12 p. (142

* INSTITUTO MEXICANO DEL CAFE y COLEGIO DE POSTGRADUADOS (CHAPINGO, MEXICO). CENTRO DE ESTADISTICA Y CALCULO. Evaluación de la cafeticultura en el área limítrofe a Guatemala. Café Mexicano 1(4):44-45; 1(5):40-41. 1974. (143

Se realizó un estudio para detectar la broca y la roya del cafeto en la zona chiapaneca que colinda con Guatemala. No se detectó broca y roya en la zona de estudio. Sin embargo, la investigación aportó información sobre: 1) tamaño de la finca; 2) rendimiento; 3) precios por quintal pergamino; 4) rendimientos entre 250 y 1000 msnm; 5) problemas de inclinación del terreno en las labores de cultivo y cosecha; 6) profundidad del suelo entre 60 cm y 30 cm; 7) aplicación de fertilizantes y fungicidas; 8) combate de malezas; 9) crédito agrícola; 10) variedades cultivadas; 11) plantas de sombra; 12) productividad.

JAIME DE LA CERDA, L. Dispersión de la roya del cafeto. s.n.t. (144

Presentado en: Congreso Nacional de Fitopatología, 11°, San Luis, Potosí, 1984.

** JAVED, Z.U.R. Leaf rust in Africa and what it means to American programs. In Fulton, R.H., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 15-34. (145

* _____. Spread and control of coffee rust in Africa. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 523-540. (146

Coffee rust first recorded in 1861 in East Africa has since spread to different coffee growing countries of the world. Defoliation

induced by coffee rust could have serious effect on the next season's yields. Research work conducted over the last three decades has shown that 50% copper formulations give excellent control of coffee rust. Spray volumes of 101 litres to 1682 litres per hectare have been found effective against coffee rust.

Systemic fungicides, Bayleton 25% WP, Sicarol 15% O.D. and Plantvax 20% E.C. could provide good protection against coffee rust even in the advanced stage of epidemic. Few well-timed sprays of 50% copper formulations based on rainfall pattern gave better control of coffee rust compared to the anti-rust spray program based on a fixed calendar schedule. This paper in brief gives some details of development of chemical control measures against coffee rust in East Africa.

* MIRANDA, E.A. El avance de la roya del café es inevitable. Panamá, Ministerio de Desarrollo Agropecuario, 1984. 2 p. (desplegable). (147

NEERGAARD, E. De. A successful development project; impressions from coffee growing areas of Ethiopia (En danés). Ugeskrift for Jordbrug 129(9):237-239. 1984. (148

* RAMIREZ ROJAS, J.E. La roya del cafeto en la zona cafetalera de la península de Nicoya. Noticiero del Café (Costa Rica) 20(237):3-4. 1984. (149

* _____. La roya del cafeto en Pérez Zeledón. Noticiero del Café (Costa Rica) 20(249):3. 1985. (150

RESULTADOS DE la actividad agrícola, ganadera y forestal en 1981. Mercado de Valores (México) 42(1):1-9. 1982. (151

In a speech commenting on achievements in agriculture, forestry, livestock rearing during 1981, the President of Mexico, Sr. José López Portillo, mentioned that coffee leaf rust disease had spread to 370 hectares in the state of Chiapas since June 1981. Fungicides had been applied, but the disease was an acceptable risk. Coffee production had been similar to 1980, at 4.1 million bags, of which 50% was exported.

* LA ROYA del cafeto en El Salvador. Carta Informativa ISIC (El Salvador) 2(3):2. 1980. (152

* ROYA RAMPANT. World Coffee and Tea 23(9):69. 1983. (153

About 112,000 hectares in El Salvador are thought to be infected with coffee leaf rust. A USDA report estimated that incidence of rust had increased in 1982 by 380% since 1981. A spraying programme to combat the disease had halted during government reorganization.

* SANCHEZ DE LEON, A. La roya del cafeto en Guatemala. Revista Cafetalera (Guatemala) no. 225:5-19. 1982. (154

Describe la diseminación de la roya del café en Guatemala y otros países de América Central.

* SCHIEBER, E. y SANCHEZ DE LEON, A. First report of coffee rust in Guatemala. Plant Disease 66(9):855-856. 1982. (155

Coffee rust has been present in Central America since 1976 but was confined to the region of Carazo in Nicaragua. In 1979, the rust spread into El Salvador. By the fall of 1980, the rust was detected in Honduras, and late in 1980 in Guatemala. This constitutes the first report of coffee rust in Guatemala, in the Chiquimulilia region close to the El Salvador border.

_____. Some aspects of the coffee rust disease situation in Latin America. Garcia de Orta (Série Estudos Agronómicos) 9(1-2):83-88. 1982. (156

Since coffee rust caused by *H. vastatrix* was detected in Brazil, in 1970, eleven countries in Latin America have today the disease. Very recently (1981) Ecuador and Mexico have also been invaded by the rust. This paper covers aspects on the dissemination of the uredospores under the conditions prevailing in Latin America, the eradication attempt in Nicaragua, and the use of fire in an eradication program. Also the present status of races of *H. vastatrix* in the Western Hemisphere is presented, and some remarks on chemical control are given. The impact of the Hibrido de Timor in the development of resistant varieties for the Americas is emphasized.

* _____. y ZENTMYER, G.A. Coffee rust in the Western Hemisphere. Plant Disease 68(2): 89-93. 1984. (157

A survey of the geographical and historical distribution of the coffee rust fungus, *Hemileia vastatrix*, with emphasis on its introduction to Latin America. The ecology and epidemiology of coffee rust are described, and chemical control and development of plant resistance are discussed. (ICO. Library Monthly Entries no. 49:17-18. 1984).

** _____. y ZENTMYER, G.A. Distribution and spread of coffee rust in Latin America. In Fulton, R., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 1-14. (158

* _____. y ZENTMYER, G.A. Spread of coffee rust in the Americas. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 163-179. (159

Since the first detection of coffee rust (caused by *Hemileia vastatrix*) in the Americas, in Brazil in 1970, the disease has spread widely and presently it is found in 12 countries. Seven of these countries are in South America: Brazil, Paraguay, Argentina, Bolivia, Peru, Ecuador and Colombia; four are in Central America: Nicaragua, El Salvador, Honduras and Guatemala. Recently, it has spread into Mexico. Recent detections in the Western Hemisphere were in Bolivia (1978), Peru (1979), El Salvador (1979), Honduras (1980), Guatemala (1980), Ecuador (1981), Mexico (1981) and very recently Colombia (Sept. 1983) and Costa Rica (Dec. 1983).

In South America, coffee rust was confined for several years to the north-western region of Brazil (Acre) and then finally spread to the

Andean countries of Bolivia, Peru and Ecuador. In Central America, the rust was confined for several years to Nicaragua (Carazo area) and then spread rapidly northward to El Salvador, Honduras, Guatemala and Mexico. In both cases it is apparent that "man" and "wind currents" were involved in the spread of the fungus.

Despite the presence of formidable "natural geographical barriers" (the extensive Amazon region, the Andean mountain range and the Darien region) the rust has succeeded in breaking these barriers. Race II of the pathogen, the most wide-spread race in the world, is now found in all countries in Latin America invaded by the rust.

SERNAS MADERA, V.E. La roya del cafeto en Brasil y su control químico. México, D.F., Instituto Mexicano del Café, 1979. 53 p. (160

* TORRES F., J. y CASTRO, F.E. Ocorrência da ferrugem do cafeeiro (*Coffea arabica* L.) no estado de Alagoas (Brasil). Fitopatología Brasileira 5(3):462. 1980. (161

Sólo sumario.

Presentado en: Congresso da Sociedade Brasileira de Fitopatología, 13°, Río de Janeiro, 1980.

Nesta nota, registra-se pela primeira vez a ocorrência da ferrugem do cafeeiro, *Hemileia vastatrix* Berk & Br, no Estado de Alagoas, Brasil, em pequenos plantios nos municípios de Chã Preta e Atalaia. As folhas das plantas atacadas, apresentavam-se recobertas de lesões amarelas, tipicas da enfermidade. O registro desta doença contribui para o conhecimento de sua distribuição geográfica no nosso país.

* VAZQUEZ, G.F. Coffee rust in Mexico. Plant Disease 67(4):450. 1983. (162

Coffee rust was found in Mexico for the first time in July 1981. It is currently known in 180 different locations in the state of Chiapas.

* WELLMAN, F.L. y ECHANDI, E. The coffee rust situation in Latin America in 1980. Phytopathology 71(9):968-971. 1981. (163

An account of the occurrence of *Hemileia vastatrix* in Brazil and its spread in Latin America, its impact on coffee growers, spraying problems and breeding for resistance. (Review of Plant Pathology 61(5):2090. 1982).

WONDIMU, M. y MEXIA, J.T. The incidence of coffee leaf rust (*Hemileia vastatrix* B.Br.) in two sub-districts of Ethiopia. In International Scientific Colloquium on Coffee, 10th, Salvador, Brazil, 1982. Proceedings. s.n.t. pp. 583-588. (164

The incidence of coffee leaf rust was studied in the two sub-districts of Gerra and Daro Lebu. In the first one, coffee is grown in semi-wild conditions and at higher altitudes while in the second one small plantations predominate. The influence of altitude, topography, shade, agro-climate conditions and genetic variability were studied for both

sub-districts. Our results point to the beneficial effects of natural conditions: higher altitude, heavier shade and greater variation in genotype, on low rust incidence.

* WONDIMU, M. y RODRIGUES JUNIOR, C.J. The occurrence and distribution of races of *Hemileia vastatrix* and of physiologic resistance groups of *Coffea arabica* in Ethiopia. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicaçoes. Oeiras, Centro de Investigaçao das Ferrugens do Cafeeiro, 1984. pp. 107-118. (165

To know the geographical distribution and prevalence of races of *Hemileia vastatrix* B. & Br. and of their possible host genotypes, 9 coffee growing administrative regions with 40 sub-districts ("Coffee Worda") were hierarchically sampled for rusted leaves and germplasm under different ecological, agro-climatic conditions and systems of coffee management. The presence of rust was detected in 8 administrative regions and in 36 "Coffee Wordas". Five races, namely I, II, III, X and XV, and 8 coffee physiologic resistance groups α, β, E, C, D, J, L and W were determined.

The occurrence and distribution of coffee reaction groups were dependent upon the system of coffee management (forest mixed and plantation (cottage)) and the distribution and prevalence of some races was according to their specific hosts found in certain coffee management systems. It is suggested that the available diversification of coffee genotypes could account for the little importance of the rust in the ethiopian forest zones.

ETIOLOGIA

BENAC, R. La rouille commune du caféier (*Coffea* sp.): étude du champignon *Hemileia vastatrix* Berk. et Br. dans les tissus foliaires. Caryologia 34(2):141-177. 1981. (166

The development of intercellular mycelium of the fungus, its localization in the mesophyll, branching, and its wall and dikaryotic structure were studied after penetration of urediospore germ tubes through the stomata. The relations between hyphae and leaf cells are described. Differentiation of intercellular hyphae into fruiting hyphae producing urediospores, and their clustered discharge through stomata were observed. (Review of Plant Pathology 61(6): 2887. 1982).

* BENTRUP, F.W. Plant cell membrane biology applied to pathogen cell development and pathogen-host cell interactions; a tentative outline. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 267-270. (167

* BIOLOGIA Y epidemiología de la roya. In Reunión del Consejo Asesor del Programa Cooperativo para la Protección y Modernización de la Caficultura, 8a, Veracruz, México, 1984. Memoria. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 339. 1984. pp. 4-11. (168

* BURITICA C., P. Receptición de fenómenos de *Hemileia* con el uso de géneros y/o especies relacionadas. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 161-162. (169

* CADENA GOMEZ, G. Biología de *Hemileia vastatrix* Berk. y Br. In Taller sobre Roya del Cafeto *Hemileia vastatrix* Berk. y Br., Manizales, Colombia, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-26. (170

La infección de *Hemileia vastatrix* está afectada por los mismos factores que actúan sobre el proceso de germinación. Sin embargo, el éxito de la infección también se ve influído por la cantidad de inóculo, su viabilidad y especialmente por las características genéticas del hospedante. En variedades susceptibles es mayor el número de lesiones producidas que en variedades con resistencia. Bajo condiciones óptimas, el proceso desde la germinación hasta la infección parece completarse en 24 horas dependiendo de los factores ambientales predominantes. El estado de desarrollo de las hojas también influye sobre la infección, la cual solo puede ocurrir por el envés ya que el hongo penetra por los estomas y éstos se encuentran únicamente en la parte inferior de las hojas de café.

CARNEIRO, M.F.N. Chemical induced mutation of race 1 of *Hemileia vastatrix* Berk. and Br. into race XXIV. In International Scientific Colloquium on Coffee, 9th, London, 1980. Proceedings. Paris, ASIC, 1981. pp. 659-662. (171

Four 10 mg uredospore samples of the single spore isolate 1285 (race 1 of *H. vastatrix*) were submitted to ethyl methane sulphonate (EMS) treatment during 2 hours at the following concentrations: A - 0.5 x 10-2M, B - 1.0 x 10-2M, C - 1.25 x 10-2M and D - 1.5 x 10-2M. After the treatment, the uredospores were inoculated on susceptible coffee plants. Inoculum submitted to EMS concentrations A, B, and C produced susceptible reaction types similar to those of the controls, whereas inoculum from concentration D produced both resistant reaction types and some susceptible ones characterized by pustules of smaller size. From these pustules a new isolate was obtained which, after the inoculation on the differentials, proved to be different from the original and belong to race XXIV of *H. vastatrix*.

* _____. Isolamento e caracterização duma nova raça de *Hemileia vastatrix* obtida por irradiação com raios gama. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 97-106. (172

Uredósporos de três raças monospóricas III, VII e XXII de *Hemileia vastatrix* foram irradiados numa fonte de Co 60 com doses correspondentes a 7,5 e 10 Krad a um débito de 56,254 Krad/h, durante respectivamente 7,99 e 10,66 minutos. Após multiplicação em 849/1 (Matari-universal susceptível), foram inoculados em 12 hospedeiros diferencidores. Apresentamos e discutimos os resultados obtidos nomeadamente no que diz respeito às variações de patogenicidade observadas ao longo de sucessivas gerações ou passagens pelos referidos diferenciadores. Também referimos o isolamento e caracterização duma nova raça de *Hemileia vastatrix* com os factores de

virulência $v_3v_4v_5$, a partir de 2 subculturas isoladas na 2ª geração de pústulas 0^+1^- provocadas pela raça VII irradiada, nos diferenciadores 110/5 (S. 4 Agaro - grupo J) e 849/1 x 635/2 (Matari x S.12 Kaffa - grupo γ).

* CHAVES, G.M. y ABREU, M.S. Identificação de parâmetros para avaliação de resistência inespecífica contra *Hemileia vastatrix* Berk et Br. em mudas de café. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Riberão Preto/SP, Brasil, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 18-19. (173

The reactions of Catimor seedlings in the F_4, segregating for susceptibility, i.e. those that lost resistance due to hypersensitivity when inoculated with race II of the pathogen, were compared with those of Mundo Novo inoculated under the same conditions. Period of generating spores/pustule and latent period were the most consistent parameters for identifying possible sources of resistance. (Review of Plant Pathology 61(1):248. 1982).

* _____. y PEREIRA, A.A. Identificação de raças fisiológicas de *Hemileia vastatrix* Berk. et Br. In Sistema Estadual de Pesquisa Agropecuaria, Belo Horizonte/MG, Brasil. Projeto café; resumos de trabalhos. Belo Horizonte/MG, Brasil, EPAMIG, 1980. pp. 190-192. (174

* _____. y FERREIRA, A.A. Presença de nova raça de *Hemileia vastatrix* em Minas Gerais. Fitopatología Brasileira 5(3):393-394. 1980. (175

Sólo sumario.

Presentado en: Congresso da Sociedade Brasileira de Fitopatología, 13a., Río de Janeiro, 1980.

Como suporte ao programa de melhoramento genético do cafeeiro visando a obtenção de cultivares resistentes a *Hemileia vastatrix*, o Depto. de Fitopatología da Universidade Federal de Viçosa (FV), realiza periodicamente o levantamento de raças fisiológicas do patógeno, a partir de inóculo coletado em várias regiões cafeeiras do Estado de Minas Gerais. Para identificação das raças são utilizados clones diferenciadores originários do Centro de Investigação das Ferrugens do Cafeeiro (CIFC), de Oeiras, Portugal.

A partir de mistura de inóculo coletado em cafeeiros do cultivar "Bourbon Vermelho", no município de Ponte Nova, conseguiu-se infectar o clone CIFC H. 152/3, portador dos fatores de resistencia SH_2 - SH_4 - SH_6 (Grupo Y). A raça envolvida é, provavelmente, a XXIV, pois, possui pelo menos os fatores de virulência V_2, V_4 e V_5. Como parte da amostra inoculada infectou o clone 87/1 (Grupo C), poderá tratar-se da raça XXIII, que possui os fatores de virulência V_1, V_2 , V_4 e V_5. Estão sendo realizadas inoculações em uma série de clones a fim de verificar-se se a cultura que atacou o clone 87/1 é a mesma que atacou o H. 152/3, pois, não se dispõe do clone H.W. 17/12 (Grupo O).

Desde 1972, foi constatada no Brasil a raça XV, pela primeira vez de mistura de inóculo coletado em cafeeiros "Conilon", no Estado do Espírito Santo, de amostra enviada ao CIFC pelo primeiro autor deste trabahlo. Posteriormente, as raças XV e III foram identificadas

pelo Departamento de Fitopatología da UFV a partir de inóculo coletado em viveiros de introduções resistentes a *H. vastatrix*, artificialmente inoculadas com mistura de uredosporos coletados em cafeeiros dos cultivares 'Bourbon Vermelho' e 'Conilon'. Em 1975, foram reportadas no Estado de São Paulo, as raças XV, I e III (2) (Ribeiro, I. et alii - Summa Phytopatologica 1(1):19-22. 1975) e, em 1979, a raça XVII (1) (Eskes, A. et alii. 7°Cong. P.C. IBC, Araxá, Resumo pag. 122. 1979). Assim sendo, além da raça II, já ocorre no Brasil pelo menos as raças I, III, XV, XVII e XXIII.

* CHEREGUINO V., R.S. Etiología de una nueva enfermedad reportada en el cultivo del cafeto (Roya Bolaño) en El Salvador. Resúmenes de Investigaciones en Café (El Salvador) 4: 45-46. 1981. (176

* DELGADO SANCHEZ, S. y ESQUIVEL HUESCA, C. Elementos fundamentales para considerar una enfermedad y su patógeno de primordial importancia económica: el caso de la roya del cafeto. México, D.F., Dirección General de Sanidad Vegetal, 1980. 19 p. (177

* ESKES, A.B. Avaliação do uso de discos de folhas para medir o nivel de resistência do cafeeiro a *Hemileia vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Ribeirão Preto, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 114-115. (178

A satisfactory correlation was found between the parameters studied on leaf disks and field resistance. On testing individuals of a population of C. *canephora* the rates of infection and sporulation seemed to be the most important parameters. In a population of C. *canephora* x C. *arabica* resistance was more closely related to percentage of sporulating lesions and incubation period (generally much longer in winter than in summer). Disks from older leaves, developed under strong illumination in the field, were more susceptible. Results were consistent on varying the inoculum conc. Differences in infection rate did not seem to be related to germination or appressoria formation. Sporulation was measured using a method based on capturing urediospores in fixed quantities of water. Spore counting with a haemocytometer gave good results only at concs. >150 mg/1. At 2-150 mg/1 drop counting of spores was more accurate and practical. (Review of Plant Pathology 61(1): 249. 1982).

* _____. et al. Detecção da raça de *H. vastatrix* com os genes de virulência V_1, V_4, V_5 no Estado de São Paulo. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, Brasil, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 91-92. (179

* _____. Indicações de raças novas de *H. vastatrix* em relação a genes de resistência do híbrido de Timor, de ICATU e do cultivar Kouillou de C. *canephora*. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, Brasil, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 78-80. (180

* ESKES, A.B. Ocorrência de um isolado da raça V_3, V_5 de *H. vastatrix* pouco virulenta em condições de laboratório. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, Brasil, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 81-82. (181

* _____., BRAGHINI, M.T. y CARVALHO, A. Testes com raças novas de *H. vastatrix* diferenciadas em *C. canephora* cv. Kouillou e nas populações de Icatu e Catimor. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, Brasil, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 195-198. (182

* _____. Characterization of incomplete resistance to *Hemileia vastatrix* in *Coffea canephora* cv. Kouillou. Euphytica 32(2):639-648. 1983. (183

Incomplete resistance to coffee leaf rust (*Hemileia vastatrix*) varied among genotypes of *Coffea canephora* cv. Kouillou from near 'immunity' to a higher susceptibility than that of *C. arabica* cv. Mundo Novo. In 4 series of laboratory tests resistance components and reaction type (RT) were observed. Low disease levels in the field were mainly associated with low, or heterogeneous, RT and/or a low lesion density (LD). Among the components of resistance sporulating lesion density (SLD) showed the highest coefficient of correlation with disease level in the field (r = 0.83). Components of resistance were intercorrelated and were also correlated with RT. Interactions between inoculation series and genotypes were significant for all parameters of resistance, but especially so for LD. A small part of the Kouillou population showed complete resistance to race II of *H. vastatrix*. Two rust genotypes isolated from 'Kouillou' interacted with some genotypes with complete or incomplete resistance. The complete and race-specific resistance of one genotype appeared to be governed by a dominant gene. High levels of incomplete resistance appeared to inherit either monogenically or in a more complex way. Five genotypes with high levels of incomplete resistence, expressed by a low LD and a relatively high RT were crossed with *C. arabica* cv. Catuai. The triploid F1 plants showed a variable but susceptible RT. These crosses may have value for obtaining coffee cultivars with durable resistance to coffee leaf rust.

* _____. y COSTA, W.M. DA. Characterization of incomplete resistance to *Hemileia vastatrix* in the Icatu coffee population. Euphytica 32(2):649-657. 1983. (184

Incomplete resistance of the hybrid coffee population Icatu to race II of coffee leaf rust (*Hemileia vastatrix*) was studied in the field, greenhouse and laboratory. The resistance components observed were: latency period (LP), lesion density (LD), sporulating lesion density (LSD) and relative sporulation lesion efficiency (RSLE = 100.SLD/LD). RSLE is an indicator for the heterogeneity of the reaction. Disease score in the field was highly correlated with RSLE, less with LP and SLD, and not with LD. LP was highly correlated with RSLE. A new rust race (1s. 2), isolated in the field from Icatu in 1979, was more virulent than race II on some resistant, moderately resistant or moderately susceptible genotypes. This indicates that incomplete resistance, at different levels, can be race specific. Resistance was affected by leaf age and light intensity. Inheritance studies suggest that incomplete

resistance in Icatu might be related to major genes, the effectiveness of which may depend on gene dose and genetic background. It is concluded that selection for incomplete resistance to coffee leaf rust in Icatu may not lead to durable resistance.

ESKES, A.B. Qualitative and quantitative variation in pathogenicity of races of coffee leaf rust (*Hemileia vastatrix*) detected in the state of Sao Paulo, Brazil. Netherlands Journal of Plant Pathology 89(1/2):31-46. 1983. (185

Between 1977 and 1981, seven qualitatively distinct new races of coffee leaf rust (*Hemileia vastatrix*) were detected in breeding plots in the state of Sao Paulo, Brazil. Four races carry complex virulence against the resistance genes SH1, SH2, SH4 and SH5 of *Coffea arabica*. Three races match unidentified resistance genes of *C. canephora*. Two of these were isolated from cv. Kouillou and one from the hybrid population Icatu. Pending further identification, these races were indicated by the number of their type cultures (Is, 2, 10 and 11) Is. 2 and Is. 10 showed extra virulence to some coffee genotypes and decreased virulence to other coffee genotypes, suggesting stabilizing selection. Three rust isolates were detected which differed quantitatively from the common rust race II. Is. I was moderately virulent to the coffee differential for SH3 in the laboratory but avirulent in the greenhouse, indicating a host x pathogen x environment interaction. Is. 3 and 12 showed levels of virulence intermediate between race II and Is. 2 and 10, respectively. The results show that incomplete resistance of coffee to *H. vastatrix*, at various levels, can be race-specific. The nature of race formation of coffee leaf rust in Brazil and breeding strategies for obtaining durable resistance are discussed.

* FANUCCHI, M. et al. Verificação da presença no estado São Paulo, da raça fisiológica de *Hemileia vastatrix* portadora dos genes de virulência V_2, V_4, V_5. Fitopatología Brasileira 5(3):398. 1980. (186

Presentado en: Congresso da Sociedade Brasileira de Fitopatología, 13a., Río de Janeiro, 1980.

Desde 1970, após a constatação da raça II da ferrugem do cafeeiro no Brasil, tem sido continuamente verificado o aparecimento de outras raças fisiológicas de *Hemileia vastatrix* Berk et Br, em nossos cafezaís; assim: em 1972 a raça XV, em 1973 a raça III, em 1974 a raça I, e em 1979 a raça XVII. No presente trabalho demonstramos a existência de mais uma raça em nossos cafezais, identificada como sendo raça XXIV.

Através de inoculações de urediniosporos, coletados no campo, em plantas de híbridos de *Coffea arabica* L. IAC 1122-7 enxertadas sobre *Coffea arabica* L. var. Mundo Novo, selecionamos uma amostra de urediniosporos coletados dos soros obtidos, os quais foram multiplicados através de inoculações sucessivas em plantas IAC 1122-7. Para identificação da raça fisiológica desses urediniosporos foram feitas inoculações em clones diferenciadores dos grupos fisiológicos E, D, J, Y, C, H e R.

A avaliação da reação de resistência ou suscetibilidade dos clones diferenciadores foi feita 40 dias após a inoculação, obtendo-se

infecção apenas nos clones dos grupos fisiológicos E, D, J e Y e não nos clones dos grupos C, H e R, o que sugere tratar-se da raça fisiológica XXIV, portadora dos genes de virulência $V_2V_4V_5$.

* FIGUEIREDO, M.B. y COUTINHO, L.N. A germination chamber for obtaining pure basidiospores of rust fungi. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 61-65. (187

O presente trabalho descreve um pequeno aparelho denominado "germinatelio" que foi idealizado para o estudo dos ciclos vitais de certas ferrugens nas quais os teliosporos se manifestam misturados com os urediniosporos. O aparelho permite a obtenção de suspensoes puras de basidiosporos para ensaios de inoculações e pode ser utilizado para inoculação direta de plantas envasadas ou de folhas destacadas in vitro. O germinatelio foi empregado com sucesso em estudos sobre a biologia das ferrugens neotropicas *Puccinia psidii* e *Puccinia pampeana* que ocorrem respectivamente sobre Myrtaceae e Solanaceae. O método abre novas perspectivas para o desenvolvimento de estudos sobre o ciclo vital de *Hemileia vastatrix*.

* GOUJON, M. Un exemple d'interactions entre populations naturelles: les *Coffea* et les rouilles: *Hemileia vastatrix* Berk. et Br. et *H. coffeicola* Maubl. et Rog. Bulletin de la Société Botanique de France (Actualités Botaniques) 126(4):7-19. 1979. (188

* HENNEN, J.F. y FIGUEIREDO, M.B. The life cycle of *Hemileia vastatrix*? In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 47-56. (189

The hypothesis that *Hemileia vastatrix* is a long cycled autoecious rust with aecia that resemble uredinia and without recognizable spermogonia is presented. The anomalous teliospores reported from India and Portugal that resemble urediniospores are reinterpreted as endo-forms that are derived from the aecia of the long cycled parental form. Inoculation experiments using pure basidiospores and the subsequent monitoring of the infection process on *Coffea* spp. are necessary to substantiate the hypothesis.

* HESS, W. Electron microscopy X-ray microanalysis and species and races of fungal spores. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 215-226. (190

KOC, N.K. y DEFAGO, G. Studies on the host range of the hyperparasite *Aphanocladium album*. Phytopathologische Zeitschrift 107(3):214-218. 1983. (191

Urediospores of 14 rust spp. (*Puccinia* spp., *Uromyces* spp., *Phragmidium mucronatum*, *Hemileia vastatrix* and *Melampsora euphorbiae*) on their host plants were heavily parasitized by *A. album*. Teliospores of 3 *Ustilago* spp. were slightly parasitized. Of 16 other plant pathogens tested in dual culture with *A. album* only *Ascochyta* sp. became parasitized; 12 were inhibited without parasitization. (Review of Plant Pathology 63(4):1089. 1984).

LEAL, J.A. et al. Composición de las uredosporas de *Hemileia vastatrix*. García de Orta (Serie Estudos Agronômicos) 9(1-2):97-100. 1982. (192

The main components of *Hemileia vastatrix* Berk. et Br. uredospores are: carbohydrates (30%), lipids (29%), protein (11.5%) and glucosamine (6.5%). The residue after lipids and protein extraction represents a 20% and maintains the uredospore shape. It is considered as its wall, and it is composed by carbohydrates (40%) and glucosamine (60%). The glucosamine is found on the uredospore ornamentations. (ICO. Library Monthly Entries 55: 29. 1985).

_____., GOMEZ MIRANDA, B. y RUPEREZ, P. Polysaccharides from *Hemileia vastatrix* uredospores. Experimental Mycology 7(1):82-89. 1983. (193

The isolation and constitution of the carbohydrate polymers are described. Electron microscopy revealed that the alkali-insoluble residue consisted of cell wall spines connected by a thin layer of microfibrils. (Review of Plant Pathology 62(10):4171. 1983).

LIMA, P.C. Método de amostragem para a avaliação do índice de infecção do cafeeiro (*Hemileia vastatrix* Berk. e Br.). Tese de Mestrado. Piracicaba, Brasil, Universidade de São Paulo, 1979. 65 p. (194

* McCAIN, J.W. y HENNEN, J.F. Development of the uredinial thallus and sorus in the orange coffee rust fungus *Hemileia vastatrix*. Phytopathology 74(6):714-721. 1984. (195

Infection of coffee plants with urediospores of *H. vastatrix* resulted in radially expanding lesions containing numerous sori. Lesions were sorted into zones of pioneer hyphae, first haustoria, nutritive hyphae, protosori (unemerged incipient sori), and immature, mature and senescent sori. The zones or nutritive hyphae and protosori corresponded with a band of chlorosis on the leaf surface. Sori were formed in about one-third of host substomatal cavities. Protosori developed from a layer of isodiametric cells, distinct from the constituent hyphae. Some protosori, although developing in mesophyll cavities not beneath stomata, appeared to grow into the correct position for emergence. Two or 3, later 7 or more, sporogenous cells exited a stoma as a tight fascicle and bore spore buds spirally. Spines were only on the upper surfaces of the urediospores and appeared when the spores were 1/4-1/3 their full size. Developing sori were covered by a matrix that appeared to be mucilaginous. The pattern of expansion of the *H. vastatrix* mycelium through the leaf, with continual production of new sori, was the starting point for a new model of the continuum of thallus complexity levels in the rust fungi. (Review of Plant Pathology 63(12):5443. 1984).

** MAHLOW, M.F.P. y MORAES, W.B.C. Dinámica de infecção de folhas de café por *Hemileia vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, Brasil, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. p. 136. (196

Sólo sumario.

Procurando-se relacionar a idade das folhas de café com o grau de susceptibilidade e resistencia a infecção pelo patógeno *H. vastatrix*,

utilizou-se 21 lotes de plantas de café (*Coffea arabica* L.) cv. Mundo Novo, obtidas de uma mesma sementeira e mantidas em mesmas condiçoẽs para estudo da dinâmica de crescimento paralelamente a dinâmica de infecção. A intervalos de 3 días, procedeu-se a medida das folhas de café do par marcado (11 par) desde a fase de gema aplical até seu desenvolvimento ocupando a posição do 4° par na planta. Uma folha do par marcado foi inoculada com suspensão em freon, de urediniosporos de *H. vastatrix* (2 mg/ml), e a folha oposta foi submetida a extração em etanol 80%, a quente.

Nas nossas condições, o resultado das inoculações foliares demonstrou que as folhas mais novas (1° e 2° pares) se apresentam mais suscetiveis a infecção por *H. vastatrix*. Através da análise química do material, segundo a técnica de cromatografía bidimensional ascendente, em papel, pode-se sugerir que este fato seja decorrente de, entre outras, alterações quantitativas e qualitativas compostos fenólicos nas folhas de maior idade.

* MARTINS, E.M.F., MORAES, W.B.C. y TIBURZY, R. Estudos histológicos em combinações compatíveis e incompatíveis de *Coffea arabica* e *Hemileia vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 259-266. (197

MAXEMIUC-NACCACHE, V. y DIETRICH, S.M.C. Cell wall composition of spores of *Hemileia vastatrix*. Revista de Microbiología 12(2):61-64. 1981. (198

Cell walls isolated from urediospores contain lipids, polysaccharides, protein and phosphate. Lipids are the main constituents followed by proteins rich in acidic amino acids. Wall polysaccharides contain mannose, glucosamine, galactose, glucose and xylose. A mannan was isolated containing equal proportions of 1,3-β and 1,4-β-linked mannopyranose residues. (Review of Plant Pathology 61(1):255. 1982).

* MEUZELARR, H.L.C. Potential applications of pyrolysis mass spectrometry in coffee rust research. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 181-198. (199

* MULLER, R.A. y LOTODE, R. *Hemileia vastatrix* et *Hemileia coffeicola*: contribution à la connaissance du comportement de ces deux pathogènes. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 133-156. (200

* OLIVEIRA, A.R., SILVA, D.M. y FIGUEIREDO, P. Espectroscopía fotoacústica e microscopía electrónica da varredura no estudo de raças fisiológicas de *Hemileia vastatrix* Berk. et Br. Summa Phytopathologica 6(3/4):139-145. 1980. (201

This work shows scanning electrophotomicroscopies and analysis of the curves of the strains I, II and III of *Hemileia vastatrix* Berk. et Br. at photoacustic spectroscopy (PAS). The results for 240-280 nm, 315-350 nm and 320-400 nm of the curves obtained by linear regression, showed similarities between strains I and II and differences between these strains in relation to the strain III. The method used showed potential importance for future studies with other *H. vastatrix* strains of fungi in general.

* PELLEGRIN, F. et al. La rouille orange du cafeier arabica en Nouvelle-Caledonie. Café, Cacao, Thé 27(1):27-40. 1983. (202

Arabica coffee rust which has existed in New Caledonia since 1910 is now attacking the new varieties planted under the plan to give a new impetus to coffee culture. An epidemiological survey carried out in 1980 and 1981 on new plantations has shown that the epiphytic disease enters the exponential growth phase in February or March and culminates between mid-July and the end of August. The development of the epiphytic disease at the beginning of the cycle is subjected to the influence of temperature and rainfall, excesses of which can slow down the propagation of the disease. The maximum leaf infection percentages have a tendency to rise with the age of the plants and frequently exceed 90%. Shoot anthracnosis develops on weakened coffee trees, accentuating the damage due to rust.

* RAJASAB, A.H. y RAJENDRAN, C. Dispersal of *Hemileia vastatrix* uredospores and spread of coffee leaf rust. Journal of Coffee Research 13(4):120-124. 1983. (203

This is a brief report of a study on the dispersal of coffee leaf rust under field conditions.

* REGALADO ORTIZ, A. Biología de la roya del cafeto. I. Boletín Técnico de Café (México) 2(20):2. 1983. (204

* _____. Biología de la roya. II. Boletín Técnico de Café (México) 2(21):1-2. 1983. (205

* _____. Biología de la roya. III. Boletín Técnico de Café (México) 2(22):4. 1983. (206

* RIJO, L. y SARGEANT, J. The fine structure of the uredospore and germ tube of *Hemileia vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 295-319. (207

The uredospore of *H. vastatrix* has a thick, spiny three layered cell wall surrounding the cytoplasm which contains the organelles usually present in other rusts. The germ tube wall is composed of an electron-lucent band apparently derived from the germ pore matrix subjacent to the innermost uredospore wall layer. The structure of the cytoplasm indicated a high metabolic activity. Both the uredospore and germ tube contain tubular complexes which have already been described by the authors in the intercellular mycelium and haustorium and which might function as a Golgi apparatus. Nucleoli, which are not always detected on the non-parasitic stage of other rusts, were commonly observed in the nuclei of germinating uredospores.

* RIVERA, M. Estudio epifitiológico de la roya del cafeto (*Hemileia vastatrix* Berk & Br 1869) en Guatemala. In Simposio Latinoamericano sobre Caficultura, 6a., Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 90-99. (208

RODRIGUES JUNIOR, C.J., RIJO, L. y MEDEIROS, E. Induction of flecks and tumefaction on coffee leaves by washout of coffee rust urediniospores. s.n.t. s.p. (209

Presentado en: Colloque International sur la Protection des Cultures Tropicales, Lyons, 1981.

* _____., RIJO, L. y MEDEIROS, E. Germinação anômala dos uredósporos de *Hemileia vastatrix*, o agente causal da ferrugem alaranjada do cafeeiro. García de Orta (Estudos Agronômicos) 7(1-2):17-20. 1980. (210

In the life cycle of *Hemileia vastatrix* Berk. & Br. there are known 3 types of spores: uredospores, teleutospores and basidiospores. Although with germination ability, the basidiospores do not infect the coffee leaves. An alternate host for the sexual stage is, however unknown. Because the coffee tree is an evergreen, the rust can be maintained on the host all the year round as uredosporic pustules and thus assures the survival of the microorganism. As a rule, the uredospores have a normal germination characterized by the formation of 2-3 germ tubes. An abnormal germination of uredospores, in a way similar to that of the teleutospores, was described only once in India in the laboratory conditions. In the present work is reported that, under the greenhouse conditions, the uredospores can also present an abnormal germination, and to operate as teleutospores whose function in the life cycle of the fungus is still unknown.

_____. et al. Induction of flecks and tumefactions on coffee leaves by incompatible and compatible, viable and non-viable uredospores of *Hemileia vastatrix* and of other rusts and by their leachates. Garcia de Orta (Estudos Agronômicos) 9(1-2):105-110. 1982. (211

Presentado en: Colloque International sur la Protection des Cultures Tropicales, Lyons, 1981.

The induction of flecks and small tumefactions (flt) visible to the naked eye or with a hand lens on coffee leaves can be obtained in the following ways: 1) by inoculation of an avirulent race; 2) by inoculation of a virulent race provided that the inoculated host is heat-treated some days after the inoculation; 3) by inoculation of some rusts not pathogenic to the coffee plant. If these uredospores become aged or are autoclaved and then inoculated, incipient tumefactions and/or cellular alterations around the stomata are sometimes observed. This fact seems to indicate that the flt could be produced without fungus penetration. In fact, dialysed leachates of autoclaved and age old uredospores of *H. vastatrix* and of other rusts applied as drops to excised coffee leaves induced the same type of flt, 15-30 days afterwards. The fact that both incompatible and compatible cultivars reacted similarly to the leachates leads to the conclusion that the specificity of the flt reaction that exists in incompatible interactions by inoculation of viable uredospores is lost if the uredospores are killed (autoclaves) or aged. On the other hand, the ability of the leachates of other rusts to induce on coffee the same type of flt suggests that the elicitor of the reaction might be a principle present in the uredospores of several rusts.

* RODRIGUES JUNIOR, C.J. et al. Lignification of the stomatic cell walls of coffee leaves induced by commercial chitin and by chitin extracted from *Hemileia vastatrix* uredospores. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 283-294. (212

In previous works it was observed that washings of uredospores of *H. vastatrix* and of other rusts not pathogenic to the coffee plant could induce on the leaves of this plant: 1) small flecks and tumefactions identical to those which are produced by a regular inoculation of an avirulent race of the coffee rust; or 2) small microscopic alterations characterized by thickenings of the guard and adjacent cell walls of the stomata.

With the purpose of ascertaining which compounds could be responsible for these alterations it was made the extraction and fractionation of the polysaccharides of the *H. vastatrix* uredospores. The application of the obtained fractions on the coffee leaves as water suspensions indicated that the fraction that precipitates in the aqueous extract after dialysis induced a thickening of the stomata cell walls. This fraction was not completely purified and therefore it is not known for sure what its chemical composition is. It was observed in addition that coloidal chitin isolated from the uredospores as well as chitin of commercial origin induced identical alterations. Tests with phloroglucinol - HC1 and under UV - fluorescence seem to indicate the presence of lignin.

* _____. Raças fisiológicas de *H. vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 69-79. (213

The world survey of physiologic races of *H. vastatrix* has always been one of the CIFC research lines with the aim of knowing the largest possible number of races of the pathogen to be used in coffee screening for rust resistance. In the last years no new races have been detected on the CIFC differential hosts, a fact that must be looked at as possitive in the process of fighting the rust through coffee breeding.

Some of the reasons why no new races have been differentiated are likely bound to the following: 1) the rust collected for differentiation comes mainly from hosts with the factor SH_5 which eliminates right off the possibility of isolating races where gene v_5 is not present; 2) there are not known the host differentials where genes SH_2 and SH_3 are separated from SH_5; 3) some virulence genes of the rust are preferentially bound to interspecific hybrids between *C. arabica* and diploid coffees and the rust sampling out of these hybrids has been quite poor.

Cases which led to think of the appearance of new races have not been confirmed at the CIFC. They might be due to the existance of hosts with unstable reactional behaviour, like some interspecific hybrids, or to particular environmental conditions (interaction host-pathogen-environment). In this latter case, races regularly avirulent to a certain host might get to produce pustules with few uredospores, but the reisolation of this material confirms that there was no race alteration. The search for new races must continue through rust collection on: 1) Diploid coffees; 2) Coffee plants which, belonging

to interspecific hybrids with stabilized resistance, might eventually become infected. These plants should be marked and used as possible new differentials.

* SANTACREO, R., POLANCO, E. y OSEGUERA, S. Período de incubación y generación de *Hemileia vastatrix* Berk. et Br. en tres zonas cafetaleras de Honduras, Centro América. In Simposio Latinoamericano sobre Caficultura, 6a., Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 109-127. (214

Resumen de los resultados en: COMUNIHCAFE (Honduras) 3(2):18-19. 1984.

* SILVA, D.M., OLIVEIRA, A.R. y FIGUEIREDO, P. Indices isométricos dos uredosporos de *Hemileia vastatrix* Berk. et Br. obtidos a partir de fotomicrografias electronicas de varredura. Summa Phytopathologica (Brasil) 6(3/4):130-138. 1980. (215

O estudo estatístico das médias das razões entre eixos perpendiculares (índice de isometria) dos uredosporos das raças R-I, R-II, R-III e R-XV de *Hemileia vastatrix* Berk. et Br. revelaram que R-I e R-II diferem significativamentede R-III e R-XV, mas não diferem entre sí.

* SREENIVASAN, M.S. y RAMACHANDRAN, M. A new technique for detached leaf culture of *Hemileia vastatrix* B. & Br. Turrialba (Costa Rica) 32(1):95-96. 1982. (216

Se ha puesto en uso un plato de petri-modificado, al cual se decidió designar como "Aparato SV", para estudiar in vitro el proceso de infección de la roya del cafeto y el cual evitó los cruzamientos entre patógenos y redujo el costo de los trabajos.

EPIDEMIOLOGIA Y DISEMINACION

* AGUILAR L., C., RIVERA C., J.M. y OSEGUERA V., S.H. Desarrollo de la roya del cafeto y su relación con factores biológicos y climáticos en Santiago de La Paz. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 216-223. (217

Se estudió el desarrollo de la roya del cafeto en la zona cafetalera de Santiago, Departamento de La Paz (1,000 m.s.n.m.), de febrero de 1982 a febrero de 1984. Quincenalmente se efectuaron lecturas para determinar el nivel de infección en bandolas pre-marcadas y en muestras de hojas al azar provenientes de un lote del cultivar Caturra, bajo sombra; simultáneamente se registró la precipitación pluvial ocurrida. Se determinó que la incidencia de roya es baja durante el período anterior a junio, por efecto de limitaciones térmicas y de humedad para el desarrollo del organismo causal, a pesar de que en ésta época la planta presenta la mayor cantidad de área foliar disponible para infección. A partir de junio-julio, en respuesta a la disponibilidad de humedad determinada por la iniciación previa de la temporada lluviosa en mayo-junio, se observó la aparición progresiva de hojas infectadas, hasta registrarse el mayor número de las mismas en los meses de setiembre-octubre. Durante este período y hasta febrero, inclusive, se observó la mayor cantidad de hojas caídas,

de las cuales aquellas afectadas por roya representaron usualmente más del 60% del total. A partir de octubre el número de hojas infectadas por efecto de la defoliación, hasta registrarse los menores niveles de infección en febrero. La información reafirma la necesidad de efectuar las aplicaciones protectoras con fungicidas de cobre en el mes de mayo, antes de la iniciación de la temporada lluviosa.

AKUTSU, M. Relação de funções climáticas e bioticas com a taxa de infecção da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.). Tese Mag. Sc. Viçosa, MG, Brasil, Universidade Federal, 1981. 67 p. (218

* BECKER, S. Epidemiología y combate de la roya del cafeto. In Congresso Agronomico Nacional, 6°, San José, Costa Rica, 1984. Memoria. San José, Costa Rica, 1984. v.3, pp. 34-44. (219

* BECKER, S.M. Coffee leaf rust and its epidemiology. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 1-9. (220

** BECKER-RATERINK, S.M. Epidemiology and spread of *Hemileia vastatrix*. In Fulton, R.H., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 35-40. (221

* BONILLA B., C.A., RIVERA C., J.M. y OSEGUERA V., S.H. Desarrollo de la roya del cafeto y su relación con factores biológicos y climáticos en el Lago de Yojoa. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 182-190. (222

Se estudió el desarrollo de la roya del cafeto de enero de 1982 a enero de 1984 en la zona del Lago de Yojoa (750 m.s.n.m., ca. 3,200 mm. precipitación pluvial anual). Se condujeron simultáneamente conteos quincenales en bandolas marcadas y en muestras de hojas al azar, en adición a inoculaciones artificiales en plántulas para determinar duración del ciclo biológico de H.v. Se determinó que la incidencia es relativamente baja en el período anterior a junio-julio. Posteriormente, y como resultado de la iniciación de las lluvias en mayo-junio, determinando condiciones de humedad sobre las hojas, ocurrencia de temperaturas favorables y la presencia de una abundante masa foliar emergida durante el período precedente, los niveles de incidencia se incrementan aceleradamente hasta observarse los mayores valores en el período comprendido de setiembre a diciembre; durante este período ocurre la mayor defoliación, una gran parte de ella atribuible a la roya. Los datos confirman la necesidad de efectuar las aplicaciones protectoras con cobre antes de la iniciación de la estación lluviosa.

* CADENA-GOMEZ, G. Diseminación de *Hemileia vastatrix* Berk. y Br. In Taller sobre Roya del Cafeto, *Hemileia vastatrix* Berk. y Br., Manizales, Colombia, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-27. (223

De acuerdo con los resultados obtenidos por los distintos investigadores, la diseminación de la roya del cafeto no se efectúa como resultado de la acción de un sólo factor sino que es la resultante de

eventos que en distintas proporciones configuran la dispersión del inóculo a corta, media y larga distancia. La sumatoria de la acción del viento, la lluvia, los insectos y el hombre dan como resultado la dispersión del inóculo y la velocidad con que dicha dispersión se efectúe en una región dada.

** CARNEIRO FILHO, F. Doze anos de ferrugem do cafeeiro no estado do Paraná; epidemiología. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, Brasil, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 11-12. (224

* COSTA RICA. MINISTERIO DE AGRICULTURA Y GANADERIA. DEPARTAMENTO DE FITOPATOLOGIA. Determinación del área foliar del cafeto en diferentes épocas. In _____. Informe anual de labores 1984. San José, 1985. p. 1. (225

* CHALFOUN, S.M. y ABREU, M.S. DE. Importância da chuva e da temperatura do ar na incidência de ferrugem (*Hemileia vastatrix* Berk. & Br.) em cafeeiros, de tres localidades do estado de Minas Gerais. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte, MG. Projecto café; resumos de trabalhos. Belo Horizonte/MG, Brasil, EPAMIG, 1980. pp. 101-104. (226

* _____. Relação de diferentes índices de infecção de ferrugem (*Hemileia vastatrix* Berk. & Br.) sobre a produção de cafeeiros (*Coffea arabica* L.) em algumas localidades do estado de Minas Gerais. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte, MG. Projeto café; resumos de trabalhos. Belo Horizonte/MG, Brasil, EPAMIG, 1980. pp. 105-113. (227

* También en: Fitopatología Brasileira 6(2):137-142. 1981.

Com a finalidade de se estudar o efeito da incidência de ferrugem sobre a produção, procurou-se correlacionar diferentes índices de infecção (% de folhas com ferrugem) e produção de anos posteriores em tres localidades do Estado de Minas Gerais - Alfenas, Jacutinga e Ponte Nova durante o período de 1973 a 1977. Em Alfenas e Ponte Nova foram observados índices de correlação negativos altamente significativos com valores superiores a 50% após 1974 para as variáveis em estudo. Em Jacutinga devido a elevada capacidade de recuperação da lavoura, nao foram detectados índices de correlação significativos entre as variáveis.

Foram ainda observados o comportamento, quanto a produção, de plantas pulverizadas e nao pulverizadas para controle à ferrugem. Ficou assim comprovado nas condições do presente trabalho, que os danos causados pela ferrugem sobre a produção são indiretos, isto é, o efeito do ataque de ferrugem em determinado ano será evidenciado principalmente sobre a produção do ano posterior. Por outro lado, plantas nao pulverizadas, submetidas a sucessivos ataques de ferrugem tenderam a produzir cada vez menos, evidenciado assim o efeito cumulativo da doença.

* DUARTE, G. DE S. y BARBIN, D. Curva epidemiológica da ferrugem alaranjada do cafeeiro da zona da Mata-Minas Gerais. In Reunião Internacional de Biometría, 2°, Piracicaba, Brasil, 1975. Anais. São Paulo, Brasil, Fundação Cargill, 1979. pp. 167-184. (228

The present research was carried out to obtain theoretical equations of the epidemiological curve of the coffee leaf rust. The

data about the percentage of infection were obtained from the controls of experiments carried out in "Zona da Mata" and they are obtained from "SERAC - 2", in "Caratinga", state of Minas Gerais, Brazil. Original data were submitted to two transformations, the first, according to Bliss, that is: y = log (F P + 1) where F P = percentage of infection, and the second according to Van der Plank: $y = \log \frac{1}{1 - X}$ where

$X = \frac{F\ P}{100}$. A periodic regression or harmonic analysis was adapted to the transformed data, which is recommended when the data are repeated in a specific interval of time. By the first transformation it could be verified that the data can be represented by the sine curve thru out the equation

$$\hat{Y}_i = 1.1917 + 0.2893\ u_{1i} - 0.3678\ v_{1i} .$$

The coefficient of variation and the coefficient of determination were found to be of 18.63% and 94.11%, respectively. By the second transformation, also the sine curve has fitted well to the data, giving the following equation:

$$\hat{Y}_i = 0.7267 + 0.4137\ u_{1i} - 0.5371\ v_{1i} .$$

In this case, the coefficient of variation was equal to 11.81% and the coefficient of determination was equal to 95.77%. In both cases it could be concluded that June and December were the months of maximum and minimum infection, respectively.

DUARTE, G. DE S. O emprêgo da analise harmonica no estudo da incidência da ferrugem alaranjada do cafeeiro (*Hemileia vastatrix* Berk. et Br.) no estado de Minas Gerais. Tese Doutor en Agr. Piracicaba, SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz, 1981. 84 p. (229

* DURAN LOPEZ, C. Avance de los estudios epidemiológicos de la roya del cafeto (*Hemileia vastatrix* Berk. et Br.) en México. In Taller Regional de PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zia U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 33-52. (230

* ECHEVERRI RODRIGUEZ, J.H. Epidemiología y diseminación de la roya del cafeto. Agro (Rep. Dominicana) 11(99):3-6. 1982. (231

* ESKES, A.B., KROON, C. y WEG, W.E. VAN DE. Efeito da luminosidade sobre o nível de resistência a *H. vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, 1980. Resumos. Rio de Janeiro, Instituto Brasileiro do Café, 1980. pp. 83-86. (232

* FUMAGALLI, A., RIVERA, M. y MENENDEZ, L.A. Proyecto del método para calcular el efecto acumulativo de la roya del cafeto. Guatemala, Comisión México-Guatemala para la Prevención y Control de la Roya del Cafeto, 1982. 12 p. (233

* También en: Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 323. 1983? pp. 157-168.

* GALVEZ, G.C., MONTOYA, M. y CORDOVA OSORIO, M. Estudio epidemiológico de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.) en condiciones de media altura de El Salvador. Resúmenes de Investigaciones en Café (El Salvador) 5:22-27. 1983. (234

* _____., MONTOYA, M. y CORDOVA OSORIO, M. Estudio epidemiológico de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.) en El Salvador. In Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 323. 1983? pp. 121-141. (235

* También en: Resúmenes de Investigaciones en Café (El Salvador) 4:37-40. 1981.

* _____. Estudio epidemiológico de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.) en condiciones de media altura de El Salvador. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 200-205A. (236

También: Resúmenes de investigación sobre el problema de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 48-51.

* JAVED, Z.U. Biología, epidemiología y control de la roya del cafeto. Boletín de PROMECAFE (Costa Rica) no. 19:4-9. 1983. (237

Describes leaf rust and control methods. Points out that the necessary spraying programmes will vary according to conditions and that each Central American producing country will need to develop its own spraying programmes. Most smallholders will not, owing to lack of capital, be able to use chemical control methods. For them the development of coffee varieties resistant to rust may be a long-term solution. (ICO. Library Monthly Entries no. 50).

* KUSHALAPPA, A.C. A method to quantify and seasonal variability in coffee leaf fall due to rust (*Hemileia vastatrix*) in Viçosa, MG, Brazil. Fitopatología Colombiana 8(1): 29-30. 1979. (238

Sólo sumario.

A method was developed to evaluate leaf fall in coffee by rust, *Hemileia vastatrix* B. & Br. A predeterminated number of trees and branches were marked and data on the presence of leaf, the intensity of rust and other damages on each leaf were collected periodically. Four branches were selected at random on each of 15 randomly selected trees in one hectare of 10 year old 'Mundo Novo' coffee plantation. Data on the presence of leaves at every node, intensity of rust and other damages in every leaf were collected at 14 day interval from Dec. 77 to June 78. A computer program 'LEAFAL' was developed to reduce data to give a total number of new, current and fallen leaves; intensity of rust on current and fallen leaves; and distribution of fallen leaves per cent rust and by nodal position. Maximum leaf formation was from Jan. through April, maximum leaf fall from Jan. to

March and maximum rust intensity from Feb. to April. Among the fallen leaves 80% had up to 30% rust, of which 64% had 1-5% rust. Per cent leaf fall varied with nodal position. Maximum number of leaves fell from 2nd through 5th node of the maximum 11 leaf bearing nodes observed per branch.

* KUSHALAPPA, A.C. y CHAVES, G.M. An analysis of the development of coffee rust in the field. Fitopatología Brasileira 5(1):95-103. 1980. (239

The intensity of coffee rust in Viçosa, Brazil estimated by the proportion of leaves rusted, number of pustules per leaf and percentage leaf area rusted, was lowest in November and highest from January to March. The spore-bearing surface, as proportion of the diseased area, decreased from April to the end of October; then, as temperature rose, sporulation spread around the margins of the old lesions. These spores initiated infections in early November, forming new lesions after 40 days incubation. Stepwise regression analysis was used to identify biological and meteorological factors influencing coffee rust development. Per cent sporearea index alone explained 90% of the variation in coffee rust development.

* _____. et al. Fatores que influenciam o desenvolvimento da ferrugem do cafeeiro em Minas Gerais. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte, MG. Projeto Café; resumos de trabalhos. Belo Horizonte/MG, Brasil, EPAMIG, 1980. pp. 93-94. (240

* _____. y MARTINS, C.P. Incubation and generation periods for *Hemileia vastatrix* on coffee in Viçosa, Minas Gerais. Fitopatología Brasileira 5(2):177-183. 1980. (241

The incubation period (IP) and generation period (GP) for *Hemileia vastatrix* Berk. & Br. on coffee, under shade, ranged from 29 to 62 days and 38 to 70 days, respectively, for different monthly inoculations from February 1979 to January 1980. The time difference between the appearance of 5 and 95% of maximum lesions (in IP) or sporulating lesions (in GP) in 50% of the leaves that were finally developing, lesions ranged from 4 to 22 days for IP and 16 to 27 days for GP at different times of the year. The equations for predecting IP (Y) based on maximum (X_1) and minimum (X_2) temperatures during IP were: $Y = 53.12 + 1.779\ X_1 - 3.987\ X_2$ and $Y = 100.894 + 0.088\ X_1 - 4.084\ X_2$ and for generation period (Y) were: $Y = 74.495 + 0.984\ X_1 - 3.428\ X_2$ and $Y = 98.374 + 0.579\ X_1 - 4.128\ X_2$ respectively, for micro and macroclimatic conditions. The range of IP estimated for Viçosa, based on micro and macroclimatic data, using the equation developed for Sao Paulo was relatively wider than that observed at Viçosa.

* _____. Um método para calcular a taxa de infecção aparente corrigida para queda e formação de folhas. Fitopatología Brasileira 5(3):411. 1980. (242

Sólo sumario.

Presentado en: Congresso da Sociedade Brasileira de Fitopatología, 13a., Río de Janeiro, 1980.

A fórmula de Van der Plank para calcular a taxa de infecção aparente corrigida para crescimento da planta ($p = 1/t_2 - t_1 \log_e$ de X_2 m

$(1 - X_1)/X_1(1 - X_2)$ foi modificada para calcular a corrigida para queda e formação de folhas. O método envolveu a avaliação da intensidade de ferrugem em folhas individualmente mapeadas (em 60 ramos escolhidos ao acaso, em 15 árvores de café var. 'Mundo Novo' em Viçosa, durante o período de dezembro de 1977 - novembro de 1978) e processamento parcial deste dados com o programa de computador "LEAFAL". Usando a fórmula de Van der Plank, o cálculo de p apresentou valores relativamente baixos e negativos devido a queda e formação de folhas, embora o número total de folhas infectadas tivesse aumentado. O erro devido a correção incompleta em p para a formação de folhas, a fórmula foi modificada, assim, $p' = 1/t_2 \cdot t_1 \log_e$ de $X_2 (1 - X \neq_1 m')/(1 - X_2)$, onde $m' = Y_1/Y_2$. Esta correção nao se faz necessária para calcular p_1 para corrigir o erro devido as folhas caídas, entre t_1 e t_2, a fórmula para p' foi mais modificada; onde $X_2 = X_{2Cf}$ e $m' = m'_{cf} = Y_1/Y_{2cf}$; cf, corrigida para queda das folhas (outros símbolos: t, tempo; X, proporção de folhas doentes; Y, massa de folhas) $m = Y_2/Y_1$. Este método poderá ser utilizado para qualquer cultura e patógeno foliar, desde que a sequência de formação e queda de folhas possa ser determinada.

* KUSHALAPPA, A.C. Modelos de regressão e de "Path" para a taxa de desenvolvimento da ferrugem do cafeeiro. Fitopatología Brasileira 5(3):411. 1980. (243

Sólo sumario.

Presentado en: Congresso da Sociedade Brasileira de Fitopatología, 13a., Río de Janeiro, 1980.

Em Viçosa, em um hectare de cafezal 'Mundo Novo', 15 plantas e quatro ramos em cada planta foram marcados ao acaso. Em cada ramo foi avaliada a presença de folhas em cada nó, área foliar coberta pela ferrugem, a intervalos de 14 días, a partir de dezembro de 1977 até novembro de 1978. Os dados foram processados parcialmente pelo programa de computador 'LEAFAL'. A taxa de desenvolvimento de doença foi calculada pela fórmula $X_2 - X_1$, onde X é a proporção de folhas com ferrugem (PFF) ou área foliar com ferrugem (PAFF), 1 e 2, datas de leituras. A taxa foi corrigida para a formação queda de folha. A análise de regressão múltipla "stepwise" foi aplicada para identificar as combinações de fatores biológicos e meteorológicos que influenciam a taxa. As variáveis dependentes foram as taxas (PFF e PAFF) para o intervalo de 14 dias entre 28-42 e 42-56 días após a data de previsão,t.As variáveis independentes foram: 1. Biológicas - PFF, PAFF, índice de área foliar com esporo (IAE), proporção de folhas novas (PFN) em t e 14 dias antes de t; 2. Meteorológicas - temperatura máxima (MAX), mínima (MIN), umidade relativa (UR) e precipitação pluviométrica (PP) para o intervalo de 14 e 28 dias antes de t. As variáveis que não explicaram significativamente (P = 0,05) a variação em Y foram eliminadas da equação. Até um máximo de 94% de variação na taxa foi explicada pelas variáveis IAE, MIN, PP, MAX e PFN dos quais 92% foram explicadas pelas três primeiras variáveis dependendo dos intervalos de previsão. A análise de "path", através de modelos e coeficientes, que indicaram as variáveis que não entraram nesta equação, também são bastante importantes; a maioria não entrou devido a multicolinearidade entre as variáveis independentes.

* KUSHALAPPA, A.C. y MARTINS, C.P. Período de incubação e de geração de *Hemileia vastatrix* em Viçosa, MG. Fitopatología Brasileira 5(3):412. 1980. (244

Sólo sumario.

Presentado en: Congresso da Sociedade Brasileira de Fitopatología, 13°, Río de Janeiro, 1980.

O período de incubação (PI) e o período de geração (PG) de *Hemileia vastatrix* em café a sombra, foi de 29 a 62 dias e de 38 a 70 dias, respectivamente, para inoculações mensias de fevereiro de 79 a janeiro de 80. O espaço de tempo decorrido para surgir 5% e 95% de lesões máximas (PI) ou lesões esporulantes (PG) em 50% das folhas nas quais lesões se desenvolviam variou de 4 a 22 dias e de 16 a 27 dias, respectivamente. As equações para PI (Y) baseadas em temperaturas máxima (X_1) e mínima (X_2) durante o PI foram:

$Y = 53,12 + 1,779 - 3,987\ X_2$ e

$Y = 100,894 + 0,088\ X_1 - 4,084\ X_2$ sendo para o período de geração

$Y = 74,495 + 0,984\ X_1 - 3,428\ X_2$ e

$Y = 98,374 + 0,579\ X_1 - 4,128\ X_2$ respectivamente para as condições de micro e macroclima. A variação no periodo de incubação estimado para Viçosa, baseando-e em dados de micro e macroclima, e utilizando-se a equação desenvolvida para São Paulo, foi relativamente mais ampla do que aquela observada em Viçosa.

_____. Linear models applied to variation in the rate of coffee rust development. Phytopathologische Zeitschrift 101(1):22-30. 1981. (245

The method developed assesses the intensity of infection by *Hemileia vastatrix* on individually mapped leaves, the data being processed by a computer programme. Most of the variation in rate of disease development could be explained by applying linear models. Considering the influence of various biological and meteorological factors, preliminary equations for the rate of rust development were formulated. (Review of Plant Pathology 61(3):1215. 1982).

* _____. y LUDWIG, A. Calculation of apparent infection rate in plant diseases: development of a method to correct for host growth. Phytopathology 72(10):1373-1377. 1982. (246

The use of the logistic growth model to calculate the apparent infection rate (r) and to characterize plant disease progress was developed by Van der Plank; however, its use resulted in empirical problems. In various coffee rust epidemics, the estimation of Van der Plank's r as well as his p (infection rate corrected for host growth) for intervals within a disease progress curve often gave negative values. These values resulted from rapid host growth, which reduced the cumulative proportion of disease (x). We developed a new method to adequately correct for host growth in calculating a corrected infection rate (p'). Similar correction for the exponential, monomolecular, and Gompertz growth models also are described. All of these growth models have a basic requirement that the asymptote is constant over the course of the epidemic ($A/Y_{max} = 1$, in which A is the maximum diseased area and Y_{max} is the maximum host

area, and it is assumed that all host area can become diseased by the end of the epidemic). In our method of calculating the intrinsic growth rate of X, the diseased area as a proportion of variable host mass is corrected by a factor (Y_t/Y_{max}), thus representing X as proportion of the asymptote (A or Y_{max}).

** KUSHALAPPA, A.C. Principios de epidemiología. Viçosa/MG, Brasil, Universidade Federal de Viçosa. Departamento de Fitopatología, 1982. 38 p. (247

Incluye roya del cafeto.

* _____., AKUTSU, M. y LUDWIG, A. Application of survival ratio for monocyclic process of *Hemileia vastatrix* in predicting coffee rust infection rates. Phytopathology 73(1): 96-103. 1983. (248

Apparent infection rates corrected for leaf formation (p') were determined based on proportion of leaves (PLR) and leaf area rusted (PRA) on 60 branches marked among 15 plants on 1 ha of cultivar Mundo Novo coffee in Viçosa, Minas Gerais, Brazil, at 14-day intervals from August 1978 to July 1980. Hourly temperature and leaf wetness were recorded and the data were transformed to infection equivalents for environment (INFEE) and to dissemination equivalent for environment (DISEE). The INFEE was determined by laboratory experiments to be the product of infection equivalents for hours of free water and for temperature, which were calculated from the function of hours of free water and of temperature, respectively, for infection, and determined by laboratory experiments. The functions are: Y = 1-1.996 exp (-0.1089) and Y' = sin2 (188.1x-41.6x2-151.3x3), respectively, in which Y and Y' are the proportions of maximum infection observed (= INFEE), x is the Schrodter's temperature equivalent, and t is hours of free water. DISEE was based on the proportion of rainy and windy days (for 28 days before DP) multiplied by the proportion of leaf density. The monocyclic process equivalents for environment (MPEE) related to the whole monocyclic process was derived from MPEE = DISEE X INFEE. The inoculum was quantified as the proportion of leaf area occupied by visible spores and proportion of spore area index (PSAI). The calculated proportion of spores surviving dissemination and able to cause infection was designated as the proportion of infective spore area index, PISAI = PSAI X DISEE X INFEE. The following regression equations were developed to predict coffee rust infection rates: Y1 = 2.0804 + 0.1533X1 + 0.852X2 (r2 = 0.72), and Y2 = 1.393 + 0.1149X1 + 0.0708X2 (r2 = 0.49), in which Y is p' for 28 days after the date of prediction (Y1 is based on PLR, Y2 on PRA), X1 is logit PISAI and X2 is host available for infection, -logit xy when xy is PLR or PRA on the date of prediction corrected for leaf formation during the 28 days after the date of prediction.

** _____. et al. Um modelo de previsão da ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, Brasil, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 237-245. (249

* _____. Proporção de área abaixo da curva de progresso da doença e da curva de remoção do hospedeiros. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, Brasil, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 335-337. (250

* KUSHALAPPA, A.C. et al. Equations for predicting the rate of coffee rust development based on net survival ratio for monocyclic process of *Hemileia vastatrix* (En portugués). Fitopatología Brasileira 9(2):255-271. 1984. (251

Rates of coffee rust development corrected for leaf formation (p") were determined based on the proportion of leaves (PLR) and leaf area rusted (PRA). From 1978 to 1980, data were taken on 60 branches on 15 plants in 1 ha of *Coffea arabica* at each of four locations in the state of Minas Gerais. Hourly leafwetness and temperature while free water was present were recorded and transformed to infection equivalent for environment (INFEE). Macroclimatic data on daily rainfall and windspeed were recorded and transformed to dissemination equivalent for environment (DISEE), as was host density data. From INFEE and DISEE, the monocyclic process equivalent for environment (MPEE = INFEE X DISEE) was derived. The berry yield for each season was measured and transformed to monocyclic process equivalent for predisposition of host (MPEHP). All four varieties used here were considered equally susceptible, and from this, and from MPEHP the monocyclic process equivalent for host susceptibility (MPEH) was derived. The proportion of pathogen (PP) or inoculum was calculated as the proportion of leaves rusted (PLR), leaf area rusted (PRA), or active leaf area rusted (PARA). The net survival ratio for monocyclic process (NSRMP) was derived as: NSRMP = PP X MPEE X MPEH.

The values of NSRMP based on three different types of PP for 28 days before the date of prediction were regressed against the rates of coffee rust development (p") for 28 days after the date of prediction. The equation that explained the maximum variation was $y = 0.00044 + 14.77$ NSRMP - PRA - 2511.21 NSRMP - PRA^2 ($R^2 = 0.76$) in which y is p" for 28 days based on PRA, and NSRMP - PRA is the NSRMP based on PRA as inoculum.

* _____. et al. Patterns of host growth and rust progress curves in bean and coffee. Fitopatología Brasileira 9(1):45-49. 1984. (252

In comparisons of different growth models, all 8 disease progress curves for *Uromyces phaseoli* on bean (*Phaseolus vulgaris*) based on proportion of leaflet area and leaves infected fitted best to the Gompertz model, while the 4 host growth curves, based on leaflets, fitted the logistic model. Of 4 disease progress curves for *Hemileia vastatrix* on coffee based on proportion of leaf area infected, 2 fitted best to the Gompertz model and 2 to the monomolecular model, while of 4 curves based on proportion of infected leaves, 2 fitted the logistic and 2 the monomolecular. Of 4 host growth curves (leaves formed), 2 fitted the logistic, 1 the Gompertz and 1 the monomolecular model. (Review of Plant Pathology 64(1):117. 1985).

* MACHADO, J.R.M. y MATIELLO, J.B. Curva epidemiológica da ferrugem (*Hemileia vastatrix*), em cafeeiros sombreados e a pleno sol, na Ibiapaba, noroeste do Ceará. In Simpósio sobre Ferrugens do Cafeeiros, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 157-161. (253

Durante 2 ciclos de doença, foi estudada a curva epidemiológica da ferrugem do cafeeiro (*Hemileia vastatrix* Berk et Br) em

condições equatoriais de altitude a 4°2' de latitude sul, no estado do Ceará, Brasil. Foi comparada a evolução da doença em cafezal sombreado e a pleno sol, verificando-se que os índices de infeção foram mais altos, mantendo-se por um período mais longo no cafezal sombreado. A pleno sol, as desfolhas naturais de correntes do ciclo bienal de produção, fez com que os índices de infeção fossem bem mais baixos.

* MARCO GLOBAL de los estudios epidemiológicos. In Taller Regional del PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 135-136. (254

* MENENDEZ CHAVARRIA, L.A. Estudio epifitiológico de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.) en nueve condiciones climáticas de Guatemala, C.A. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 50-73. (255

* MONTOYA, R. y CHAVES, G.M. Influencia de la temperatura y de la luz en la germinación, infectividad y período de generación de *Hemileia vastatrix* Berk. Br. IICA. Publicación Miscelánea no. 278. 1981. 33 p. (256

Con el fin de estudiar la influencia de la temperatura y de la luz en la germinación de uredosporos y sobre el período de generación y el grado de infección de *H. vastatrix*, se realizaron experimentos en invernadero y en el laboratorio de fitopatología de la Universidad Federal de Viçosa, Brasil. Para los experimentos sobre plántulas de cafeto, se emplearon plántulas de la variedad 'Catuai'. La inoculación se efectuó por el método de pincel sobre el par de hojas más nuevo, cuyo crecimiento ya había completado. Las plántulas se colocaron en cámaras de incubación durante 24 horas con luz y temperatura controladas.

Las temperaturas estudiadas fueron 18, 20, 22, 24 y 26°C, y las exposiciones iniciales a la oscuridad y a la luz por 24 horas fueron 4, 8, 12, 16, 20 y 24 horas. En la evaluación de la germinación en plántulas de cafeto, se utilizó el método de la celoidina. Para la evaluación del período de generación y el grado de infección, las plántulas, después del tiempo de incubación, fueron transferidas a condiciones de invernadero. El período de generación fue evaluado por el tiempo necesario para que el 50% de las lesiones en la hoja esporularan. El grado de infección fue evaluado por el número de pústulas por hoja.

Los resultados mostraron que el proceso de germinación y penetración de *H. vastatrix* se realiza por completo en 24 horas y que la temperatura y la luz que actúan en este período, afectan la infectividad y el período de generación. Se estimó en 23,7°C la temperatura óptima de germinación sobre las plántulas de cafeto. El porcentaje de germinación disminuye continuamente a partir del punto óptimo, no habiendo sido observada la relación bimodal encontrada por Nutman y Roberts. El grado de infección fue positivamente correlacionada con el porcentaje de germinación, en las temperaturas estudiadas. El período de generación varió de 33 a 50 días y estuvo relacionada con el grado de infección.

A la temperatura óptima, exposiciones a la luz y a la oscuridad, mostraron que la germinación se produce principalmente en esta última condición. El grado de infección fue correlacionado positivamente con crecientes períodos de exposición inicial a la oscuridad. Dentro de los intervalos estudiados, el alargamiento del tubo germinativo siempre fue creciente con el aumento de temperatura, indicando que algunas condiciones de temperaturas adversas a la germinación no lo son a la continuación del proceso germinativo, una vez iniciado.

Sobre agar-agua al 2%, el efecto de la temperatura sobre la germinación fue semejante a lo observado en plántulas de cafeto, y la temperatura óptima fue evaluada en 22°C. Al contrario de la germinación, la del tubo germinativo aumentó con la temperatura. Los resultados confirmaron el efecto negativo de la luz sobre el proceso de germinación de los uredosporos; crecientes períodos de oscuridad estimularon la germinación sobre todo si anteceden a la exposición a la luz.

* MUTHAPPA, B.N. Behavior of *Hemileia vastatrix* during unfavourable weather. Journal of Coffee Research 10(2):31-35. 1980. (257

Behaviour of *Hemileia vastatrix* B. and Br. during the unfavourable cold and dry weather is discussed. On naturally infected as well as artificially inoculated *Coffea arabica* L. (Kents and S. 795) the rust pustules developed mostly as tiny blisters with necrosed central depression and with negligible or no sporulation in December and January. In April when the weather became warm and humid after the summer rains, the latent pustules sporulated freely, producing uredospores on the older infected leaves, and the disease spread to the new leaves which developed after the summer rains.

* OSEGUERA V., S. Avances del programa de protección vegetal en el estudio epidemiológico y control químico de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). In Seminario Nacional de Investigación Cafetalera, 2°, Tegucigalpa, 1982. Memoria. Tegucigalpa, 1982. pp. 135-150. (258

_____. Curso sobre epidemiología, control químico y genético de la roya del café. Siguatepeque, Honduras, Instituto Hondureño del Café, 1983. 13 p. (259

* OSORIO, J.A. La información epidemiológica para el control químico de la roya del cafeto. FONAIAP Divulga (Venezuela) 1(9):35-36. 1983. (260

* PAUL, V. Biology and distribution of *Hemileia vastatrix* Berk. et Br., the pathogen of coffee rust. Pflanzenschutz-Nachrichten Bayer 33(2):97-107. 1980. (261

Se describen y presentan los distintos estadios de desarrollo de *Hemileia vastatrix* Berk. et Br., el agente patógeno de la roya del cafeto. A continuación se informa sobre la diseminación geográfica de la roya del cafeto. En el continente sudamericano, que hasta la fecha no se ha reportado incidencia de la enfermedad del cafeto más importante desde el punto de vista económico, aparece también desde hace poco y sigue diseminándose. Concluyendo se llama la atención sobre el riesgo de una diseminación ulterior de la roya del cafeto y sus consecuencias socio-económicas. Es necesario tomar, por tanto, las correspondientes medidas de control.

PEDRO JUNIOR, M.J. Effects of meteorological factors on the development of coffee leaf rust. EPPO Bulletin 13(2):153-155. 1983. (262

The development of coffee leaf rust (*Hemileia vastatrix*) was studied at Pindorama, Sao Paulo State, Brazil, on a non-sprayed coffee plantation (cv. Mundo Novo). The disease intensity, evaluated by the proportion of rusted leaves, was lower during January and increased to reach its highest values in June-July. Stepwise regression analysis was used to identify the meteorological factors influencing coffee rust. Rain and temperature explained most of the variation in the coffee leaf rust development.

* PLIEGO TAMAYO, J.I., PONCE DIAZ, P. y SERNAS M., V. Epidemiología de la roya del cafeto en el Soconusco, Chiapas, México. In Simposio Latinoamericano sobre Caficultura, 6°, Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 164-175. (263

* RECOMENDACIONES AL plenario; métodos para el estudio de la epidemiología de la roya del cafeto. In Taller Regional del PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 131-134. (264

* REINA M., F.E., RIVERA C., J.M. y OSEGUERA V., S.H. Desarrollo de la roya del cafeto y su relación con factores biológicos y climáticos en la zona de Santa Bárbara. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 191-202. (265

El presente estudio fue conducido durante el período comprendido de febrero, 1982, a enero, 1984, en una zona cafetalera del Departamento de Santa Bárbara. Para caracterizar el desarrollo de la enfermedad y los factores involucrados se efectuaron (a) lecturas quincenales de infección en bandolas marcadas y muestreo de hojas al azar; (b) inoculaciones artificiales mensuales en plantas de vivero; y (c) registros de precipitación pluvial. Se evidenció que las condiciones climáticas prevalecientes y aspectos fenológicos de la planta de café estaban estrechamente asociados con el desarrollo de la roya del cafeto. Niveles de incidencia bajos se presentaron durante la estación seca (enero-mayo), período en el cual ocurrió el grueso de la foliación de la planta. Precedido 1 - 1 1/2 mes por la iniciación de la temporada lluviosa (mayo-junio), se registró la aparición acelerada de nuevas hojas infectadas, observándose el mayor número de ellas en el mes de setiembre. Durante este período y hasta octubre inclusive, se presentaron los períodos de incubación y generación mas cortos de *H. vastatrix*. Posteriormente los niveles de incidencia bajaron por efecto de defoliación natural e inducida por roya, sin reposición significativa con nuevas hojas, hasta alcanzar valores mínimos en la estación seca e inicios de la temporada de lluvias.

* RIBEIRO, I.J.A. et al. Effect of temperature on the incidence of coffee leaf rust disease. Indian Coffee 45(7):195, 197. 1981. (266

* RIVERA C., J.M. Avances en el estudio de la epidemiología de la roya del cafeto en Honduras. In Taller Regional de PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 1-32. (267

* RIVERA M., M.A. Estudio epidemiológico de la roya del cafeto (*Hemileia vastatrix* Berk. & Br., 1869) y parcelas de validación de recomendaciones bajo nueve condiciones climáticas en Guatemala. In Taller Regional del PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 109-123. (268

* SANTACREO, R. et al. Desarrollo de la roya del cafeto y su relación con factores climáticos en la zona cafetalera de La Paz. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 203-215. (269

Durante 1982-83 se estudió el comportamiento de la roya en condiciones naturales y su relación con la precipitación y temperatura imperantes. En adición a inoculaciones artificiales efectuadas mensualmente en plántulas del cultivar Caturra, se efectuaron simultáneamente cada 15 días lecturas de incidencia (porcentaje de hojas con roya = PHR) en bandolas marcadas y en muestras de hojas obtenidas al azar en plantas adultas del cultivar Typica. No se encontró mayor diferencia entre ambos métodos para caracterizar el desarrollo de la enfermedad per se. Se determinaron varias etapas en el desarrollo de la epidemia, a saber: (a) Baja Incidencia: finales de estación seca - iniciación lluvias; (b) Incidencia Ascendente: iniciación establecimiento-temporada lluviosa; (c) Incidencia Alta Estática: finales estación lluviosa; (d) Incidencia Descendente: inicio - mediados estación seca. El aumento en incidencia en (b) se observó 1 - 1 1/2 después de la iniciación de las lluvias, en presencia de temperaturas máximas inferiores a 27°C y mínimas usualmente superiores a 16°C, con diferencia <10°C entre ambas, condiciones que persistieron usualmente hasta finales de año. Durante este período se registraron períodos de generación del hongo tan cortos como 35-40 días, en contraste a 80-93 días registrados en inoculaciones efectuadas en febrero en condiciones de ninguna precipitación, máximas superiores a 27°C y mínimas inferiores a 16°C. Los datos confirman la necesidad de efectuar aplicaciones protectoras con cobre antes de la iniciación de la estación lluviosa.

* _____., REYES P., E. y OSEGUERA, S. Estudio del desarrollo de la roya del cafeto, *Hemileia vastatrix* Berk. et Br. y su relación con factores biológicos y climáticos en condiciones de campo en zonas cafetaleras de Honduras, C.A. In Simposio Latinoamericano sobre Caficultura, 6°, Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 199-213. (270

Resúmenes de resultados en: Comunihcafé (Honduras) 3(1):11. 1984.

* SEIVERT, B. et al. La rouille orangée du caféier arabica en Nouvelle-Calédonie. III. Comparaison de l'épiphytie dans les plantations traditionnelles et dans les plantations nouvelles. Café, Cacao, Thé 38(3):209-214. 1984. (271

Se ha emprendido, en 1980, una encuesta acerca de la epidemiología de la roya anaranjada, debida a *Hemileia vastatrix* Berk. & Br., que se ha desarrollado en las plantaciones de *Coffea arabica* L. de Nueva Caledonia. Las observaciones han consistido en un cómputo mensual de las hojas sanas e infectadas en árboles seleccionados en tres

plantaciones pertenecientes a diversas regiones del territorio y constituidas, ya sea por cultivares tradicionales o bien, por variedades enanas recientemente introducidas (Bourbon red y Pache Typica Guatemala). La roya se encuentra presente en todos los lugares, en estado endémico, y puede provocar graves epidemias en los nuevos cultivares cuando las condiciones climáticas son favorables. Los árboles de las plantaciones tradicionales han puesto de manifiesto cierta tolerancia, que podría ser aprovechada en selección. Por el momento, los tratamientos químicos y la introducción de cultivares de C. *arabica* mejor adaptadas, constituyen una necesidad realmente imperiosa.

* SIMARO, A.C.R. et al. Flutuação populacional do bicho-mineiro do café, *Perileucoptera coffeella* (Guér.-Mén., 1842), e da ferrugem do cafeeiro, *Hemileia vastatrix* Berk, et Br., em Espírito Santo do Pinhal-S.P. Ecossistema (Brasil) 5(1):105-108. 1980. (272

Este trabalho foi realizado no município de Espírito Santo do Pinhal, com coletas mensais de folhas, durante 3 anos, em um total de 500 folhas por 4000 pés de café, sendo retiradas 10 folhas por pé á 0.70 m da superfície do solo. Foi observado um aumento da infestação de bicho-mineiro do café (*Perileucoptera coffeella*) no início da estação chuvosa, outubro-novembro, mesmo sem ter sido feito controle à ferrugem (*Hemileia vastatrix*). O índice de infecção da ferrugem, no início do período chuvoso, decresceu, aumentando posteriormente, quando as condições se tornaram favoráveis para o desenvolvimento do fungo.

* SOUZA, S.M.C. DE. Importância da chuva e da temperatura do ár na incidência da ferrugem (*Hemileia vastatrix* Berk. e Br.) em cafeeiros de três localidades do Estado de Minas Gerais. Tese Mest. Lavras, Brasil, Escola Superior de Agricultura, 1980. 58 p. (273

O presente trabalho foi desenvolvido com o objetivo de se determinar a influência dos fatores climáticos, temperatura do âr e chuva sobre a evolução da ferrugem do cafeeiro. Para tanto, observações foram realizadas durante o período de 1973 a 1978 em três localidades intencionalmente seleccionadas, por seram tradicionalmente cafeicultoras, no Estado de Minas Gerais, a saber: Alfenas, Jacutinga e Ponte Nova, sendo as duas primeiras localizadas na Região Sul e a última na Zona da Mata do Estado de Minas Gerais.

Junto às lavouras, instalou-se um abrigo para instrumentos meteorológicos contendo termômetros de máxima, de mínima e um termohigrógrafo e ao lado do abrigo um pluviômetro. De posse dos dados sobre temperatura, chuva e índice de ferrugem (expresso em porcentagem de folhas infectadas) foram feitas análises de correlação entre índice de ferrugem de determinado mês e chuva e temperatura de meses anteriores, até que o máximo coeficiente de correlação fosse obtido, considerando-se os dois fatores climáticos isoladamente.

Os resultados das análises de correlação entre índice de ferrugem e precipitação demonstraram que os maiores coeficientes de correlação obtidos foram aqueles entre índice de ferrugem de um mês e chuva de 5 a 6 meses anteriores. Portanto, o início de desenvolvimento da doença em determinado ano agrícola até atingir seu ponto máximo, nas três localidades estudadas, não coincidiu com o início do período

chuvoso, não se prestando apenas este como parâmetro indicativo para se prever a elevação do índice de doença nas lavouras.

Por outro lado, a partir de maio/junho a ocorrência de baixas temperaturas, principalmente durante o período noturno, afetou o processo de germinação dos esporos de ferrugem fazendo com que 3 a 4 meses após, ocorresse um decréscimo no índice de ferrugem nas lavouras. Tal fato tornouse evidente a través das análises de correlação onde apenas foram obtidos coeficientes de correlação significativos entre índice de ferrugem de determinado mês e temperatura (número de horas com temperatura noturna entre 15°C e 28°C durante um período de pelo menos 8 horas) de 3 a 4 meses anteriores.

As localidades estudadas portanto, caracterizaram-se por apresentarem um período de verão chuvoso e um de inverno seco, o que condicionou a ocorrência de um único surto da doença durante o ano sendo que, o período de maior desenvolvimento da doença ocorreu no período de 5 a 6 meses após o início da estação chuvosa, isto é, de janeiro/fevereiro até abril/maio, quando condições de baixas temperaturas passaram a limitar o processo de infecção nas lavouras.

Sugeriu-se ainda que fossem examinadas as condições climáticas de chuva e temperatura de outras localidades a fim de se estudar a possibilidades de extrapolação dos resultados obtidos com o presente trabalho para estes locais.

* SRINIVASAN, C.S. A modified standard area diagram method for estimating the field incidence of coffee leaf rust. Journal of Coffee Research 12(1):20-21. 1982. (274

The modification of a method for estimating (*Hemileia vastatrix*) field incidence is described. (Review of Plant Pathology 61(8): 4159. 1982).

* USDA RESEARCH Station studies coffee rust, cold weather tolerance. World Coffee and Tea 24(5):58-60. 1983. (275

A description of the USDA Agricultural Research Service Subtropical Research Station in Miami, Florida, where more than 340 varieties and five different species of coffee plants are grown. The station holds a pure 'germ plasm' collection from which breeding material of the hybrids developed there can be sent all over the world, and specializes in breeding for rust resistance and cold tolerance in coffee.

VALLECILLO, S.H.O. Efeito de fatores biológicos e climáticos sobre o desenvolvimento da ferrugem (*Hemileia vastatrix* Berk. & Br.) do cafeeiro. Tese de Mestrado. Viçosa, Brasil, Universidade Federal de Viçosa, 1980. 57 p. (276

WALLER, J.M. Coffee rust - epidemiology and control. Crop Protection 1(4):385-404. 1982.

The history and spread of coffee rust, from its first detection in Sri Lanka to the latest developments in Central America, are discussed. The epidemiology of the disease has been a subject of controversy in the past, but during the last decade most of the questions concerning the mode of spore dispersal seem to have been answered. Although it is necessary to investigate further the influence of host physiology on some epidemiological factors, such as latency and sporulation, sufficient is now known of the epidemiology of the disease to predict its behaviour in different regions and to devise provisional chemical control schedules. Copper fungicides still remain the most widely used chemicals but some of the more modern systemic fungicides are showing great potency. Advances in spraying techniques, with concomitant reductions in volumes and doses, have made chemical control more economic. The chemical control of coffee rust is greatly influenced by socioeconomic and physiographic factors as well as by the agronomy of the crop. Resistant varieties have so far played little part in coffee rust control, but some lines from Arabica-Robusta hybrids may show durable resistance.

COMBATE DE LA ENFERMEDAD

General

* ARCO GUEVARA, O. DEL. El costo de convivir con la roya del cafeto. Boletín Técnico de Café (México) 1(9):3. 1982. (278

The author calculates the actual costs involved in the application of a systemic fungicide (Bayleton) and a preventative copper fungicide. Respectively these are $1,300 for 1 kg of the former (one application only) and four applications of the latter at $225 per 3 kg. This gives a total annual cost per ha of $7,848, considered equivalent to the profit obtainable from 1,900 kg of dry cherry.

* BOLETIN TECNICO del Departamento de Investigaciones en Café. Subgerencia Técnica, ANACAFE. Revista Cafetalera (Guatemala) no. 225:24-31. 1982. (279

Based on research carried out by ANACAFE, recomendations are made for leaf rust control and details are given of resistance trials. In the latter case the most resistant varieties appear to be Catimor, followed by Geisha and S6 Cioiccie.

CADENA GOMEZ, G. La roya del cafeto y su control. Bogotá, FEDERACAFE, 1975. 19 h. (280

* COMBATE DE la roya del café. Guía Agropecuaria (Costa Rica) 2(4):60-63. 1984. (281

** COMISION MEXICO-GUATEMALA PARA LA PREVENCION Y CONTROL DE LA ROYA DEL CAFETO. Memoria del trabajo. Guatemala, 1981. 33 p. (282

* CONTROL DE la roya del cafeto. Carta Informativa ISIC (El Salvador) 3(5):2. 1981. (283

* COSTA RICA. MINISTERIO DE AGRICULTURA Y GANADERIA. Manual del caficultor; combate de la roya del cafeto. San José, Oficina del Café, FAO, 1985. 44 p. (284

* COSTA RICA. OFICINA DEL CAFE. Manual de recomendaciones para el combate de la roya del cafeto. San José, Programa Cooperativo Oficina del Café-Ministerio de Agricultura y Ganadería, 1984. 10 p. (285

COSTA RICA. PROYECTO no. 9242. Aprueba contrato de préstamo celebrado el 24 de diciembre de 1981 entre el gobierno de la República de Costa Rica y el Banco Centroamericano de Integración Económica por un monto de US$1.400.000 para financiar parcialmente el proyecto de prevención de la roya del cafeto. Gaceta (Costa Rica) 104(109):1-4. 1982. (286

* ESCOBAR, M.A. El programa nacional para el control de la roya en El Salvador. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 122-134. (287

* ESTUDIOS PARA el control de la roya del cafeto. In Reunión del Consejo Asesor del Programa Cooperativo para la Protección y Modernización de la Caficultura, 8a., Veracruz, México, 1984. Memoria. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 339. 1984? pp. 61-62. (288

* FORRER, H.R. Comments on the coffee rust project of the LIQC. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 71-72. (289

INSTITUTO HONDUREÑO DEL CAFE. Recomendaciones oficiales para el combate de la roya del cafeto. Tegucigalpa, 1982. 5 p. (290

* INSTITUTO MEXICANO DEL CAFE. Programa contra la roya del cafeto en México. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 74-90. (291

** INSTITUTO NACIONAL DEL CAFE (EL SALVADOR). La roya del cafeto y su control. San Salvador, 1981. 35 p. (292

* KEY FOR effective control of coffee leaf rust. Indian Coffee 48(6):17. 1984. (293

* MORA CHINCHILLA, L. La roya del cafeto (*Hemileia vastatrix*). San José, Costa Rica, Banco Nacional de Costa Rica, 1984. 2 p. (294

Esta hoja divulgativa ofrece a los agricultores información básica para el control y prevención de la roya del café.

* LOS MUCHOS enemigos del café; cómo identificarlos y combatirlos. Revista Cafetalera (Guatemala) no. 252:9-13. 1985. (295

Roya: pp. 10-11.

* MULLER, R.A. La lutte contre *Hemileia vastatrix* et autres pathogenes du cafeir. In Seminario de Estudios sobre la Lucha Contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 27-38. (296

NICARAGUA DESTROYS nine mln coffee trees to avert rust. Reuter Coffee Newsletter no. 76/80. 1980. s.p. (297

* PREVENCION Y control contra la roya del cafeto. Carta Informativa ISIC (El Salvador) 3(4):2. 1981. (298

* PROGRAMA COOPERATIVO OFICINA DEL CAFE/MINISTERIO DE AGRICULTURA Y GANADERIA (COSTA RICA). Manual de recomendaciones para el combate de la roya del cafeto. San José, Costa Rica, Oficina del Café, 1984. 10 p. (299

* PROGRAMA COOPERATIVO PARA LA PROTECCION Y MODERNIZACION DE LA CAFICULTURA EN MEXICO, CENTRO AMERICA Y PANAMA. Informe quinquenal de actividades de PROMECAFE 1978-1982. San José, Costa Rica, IICA, 1983? 40 p. (300

An account of the activities of PROMECAFE from its establishment in 1978 to 1982. The emphasis has been on education in modern coffee cultivation methods, with particular emphasis on controlling coffee leaf rust.

** _____. Control de la roya del cafeto. In _____. Sétimo informe de actividades 1984. San José, Costa Rica, IICA-PROMECAFE, 1985? pp. 20-65. (301

* PROYECTO DE combate de la roya del cafeto. Carta Informativa ISIC (El Salvador) 3(5):1. 1981. (302

* RIVERA C., M. y BONILLA B., C. Control y prevención de la roya del cafeto en Honduras. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 24-49. (303

* LA ROYA se puede controlar. Café (Honduras) no. 43:44-45. 1983. (304

* VENEZUELA INITIATES anti-rust campaign. Indian Coffee 49(1):20. 1985. (305

Exclusión y Erradicación

ALCIVAR ALAVA, U. Cuarentena vegetal en puertos marítimos. Programa Nacional del Café (Ecuador). Boletín Divulgativo no. 7. 1979. 30 p. (306

This is a report on the methods used to ensure that agricultural goods passing through Ecuadorian ports are not contaminated with pests or diseases. Products are quarantined, analyzed and fumigated if necessary. The most common insect infesting stored coffee is *Araecerus fasciculatus* (Gorgojo picudo). It is eradicated by fumigation of warehouses, and coffee leaf rust by fumigation of containers and freight cars. (ICO. Library Monthly Entries no. 53:17. 1984).

ALVAREZ M., J.A. El proceso adoptivo y los canales de comunicación en la campaña divulgativa de la roya del cafeto (*Hemileia vastatrix* Berk.) en la Seccional de Chaparral. Tesis Ing. Agr. Ibagué, Colombia, Universidad del Tolima, Facultad de Agronomía, 1976. 97 p. (307

** BENAVIDES G., M. Informe sobre la cuarta evaluación de la campaña de erradicación de la roya del cafeto (*Hemileia vastatrix* Berk. y Br.) en Nicaragua. Bogotá, Asociación Nacional de Cafeteros, 1979. s.p. (308

* CARDONA, L.M. Técnicas de muestreo de cafetales para la búsqueda de la roya y la broca del grano. In Curso de Técnicas Modernas para el Cultivo del Café, Nueva San Salvador, El Salvador, 1979. Documentos. Nueva San Salvador, Instituto Salvadoreño de Investigaciones del Café, 1979. pp. 237-243. (309

* CASTILLO S., J.L. Busquemos la roya del cafeto. Revista Cafetalera (Guatemala) no. 200: 18, 20, 22, 24. 1980. (310

* CASTRO ESQUIVEL, R. y JURGENS, G. Plan de acción para ejecutarse en el caserío de Pueblo Nuevo del distrito de Venecia del cantón de San Carlos de Alajuela y otras zonas del país ante la presencia de la roya del cafeto. Noticiero del Café (Costa Rica) no. 233: 1. 1984. (311

CENTRAL AMERICAN governments agree on measures to stop coffee rust. Reuter Coffee Newsletter no. 6/80. 1980. s.p. (312

* COOPERACION REGIONAL en materia de cuarentena y protección de plantas. FAO. LARC 82/9. 1982. 9 p. (313

Presentado en: FAO Regional Conference for Latin America, 17th., Managua, 1982.

Incluye roya del café.

In a short section on coffee rust disease in Latin America, the problem of control is discussed. On modern plantations, the disease can be effectively controlled by spraying with fungicides, but this is not technically or economically feasible on smallholder

'fincas'. FAO, in collaboration with some countries in the region, is trying to develop coffee plants with durable genetic resistance to coffee rust.

* FEDERACION NACIONAL DE CAFETEROS DE COLOMBIA. Política colombiana relacionada con la posible entrada de la roya del cafeto (*Hemileia vastatrix* B. & Br.) al país. In Seminario de Estudios sobre la Lucha Contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 19-26. (314

El presente trabajo resume las medidas que ha adoptado la Federación Nacional de Cafeteros de Colombia, dentro de un plan general de acción desarrollado para hacerle frente al problema de la roya (*Hemileia vastatrix* B. & Br.). Dicho plan de acción comprende los siguientes puntos:

- Cuarentenas nacionales e internacionales.
- Campaña divulgativa y educativa.
- Investigación agronómica.
- Adiestramiento de técnicos y caficultores.
- Renovación de la caficultua de zonas óptimas.
- Cooperación internacional.
- Adquisición de fungicidas y equipos.

Los objetivos básicos de este plan son:

- Impedir la introducción de la roya del cafeto al país.
- En caso de presentarse, intentar su erradicación.
- Preparar la caficultura nacional para controlar la enfermedad si ésta se establece.

Basados en los propósitos anteriores y de acuerdo con los principios generales de control de enfermedades de las plantas - exclusión, erradicación, protección e immunización - se resumen los trabajos realizados en el período comprendido entre 1970 y 1977, dándole énfasis a los resultados de las investigaciones con variedades resistentes.

* HERRERA C., S. Programa de prevención de la roya del cafeto (*Hemileia vastatrix* Berk. and Br.) y de la broca del cafeto (*Hypothenemus hampei* Ferrari). San José, Costa Rica, Ministerio de Agricultura y Ganadería, 1982. 9 p. (315

KAIMOWITZ, D. The Nicaraguan coffee harvest 1979-80; public policy and the private sector. Development and Change 11:497-516. 1980. (316

Describes the policy with regard to coffee production of the Sandinista Front for National Liberation (FSLN) in Nicaragua. The main government bodies involved are ENCAFE (marketing); the Ministry of Agricultural Development (MIDA), which through the Agrarian Reform Institute, INRA, administers expropriated farms and processing plants, and through its technical division is responsible for plant protection measures against *Hemileia vastatrix* and other matters concerning cultural practices and agronomic research; and finally the National Development Bank (BND), which provides credit to growers. The non-governmental organizations active in coffee are the Association of Rural Workers (ATC), representing workers and small growers and the Federation of Coffee Growers, dominated by large growers and affiliated to UPANIC, the National Union of Agricultural Producers.

* MATUS PORTOCARRERO, H. y MURILLO C., J. Programas que se desarrollan en Nicaragua a partir de la presencia de la roya del café (*Hemileia vastatrix* Berk. & Br.). In Reunion Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 91-111. (317

* NUEVO PLAN contra la roya ante su aparición en el valle central. Noticiero del Café (Costa Rica) 20(237):2-3. 1984. (318

** OTERO, G.R. An effort to control and possibly eradicate coffee rust in Nicaragua. In Fulton, R. H., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 93-104. (319

PEÑA ESPINOSA, G. DE LA. Evaluación de la campaña divulgativa contra la roya del cafeto. Información a nivel nacional. Bogotá, Federación Nacional de Cafeteros de Colombia, Departamento de Comunicaciones y Adiestramiento, 1978. 55 p. (Avance de Investigación no. 1). (320

QUARANTINE REGULATIONS for introduction of coffee into Papua New Guinea. Research Newsletter, Coffee Industry Board (Papua New Guinea) 2(1):11-12. 1982. (321

Regulations to prevent the introduction of coffee rust to Papua New Guinea are described.

ROJAS MARTINEZ, B.A. Muestreo para detectar la roya del cafeto en México. INIA. Tema Didáctico no. 13. 1981. 14 p. (322

* LA ROYA del cafeto visitante indeseable. Agricultor Venezolano 40(257):4-6. 1982. (323

Although leaf rust has so far not been found in Venezuela the government, through the Ministry of Agriculture and Livestock, has taken various measures to prepare for its possible introduction. This includes a joint programme with the Universidad Central de Venezuela to develop rust-resistant varieties on Margarita island. Strict plant quarantine measures have been introduced and training has started in plant protection techniques. Other organizations involved are listed.

* SANCHEZ Y RAMIREZ, V. y RODRIGUEZ RODRIGUEZ, R. Sistema de muestreo para detección de la roya del cafeto. Boletín Técnico de Café (México) 2(24):1. 1983. (324

* SEGURA MONGE, A. Metodología de muestreo para la detención de la roya del café. Noticiero del Café (Costa Rica) 20(243):1-2. 1984. (325

* VIGILE SU cafetal (ante posibilidades de roya). Noticiero del Café (Costa Rica) no. 189: 4. 1980. (326

Combate cultural

* ALOISI SOBRINHO, J., FUJIWARA, M. y MORAES, F.R.P. DE. Efeito do espaçamento e da recepa sobre o ataque da ferrugem e na produção de café. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, Brasil, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 147-149. (327

* ANGEL ORELLANA, M.A. Evaluación de seis modalidades de reestructurar un cafetal para adecuarlo al combate de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Resúmenes de Investigaciones en Café (El Salvador) 5:58-60. 1983. (328

> El objetivo de este ensayo, es el de determinar el sistema de reestructurar un cafetal que permita producciones rentables, facilidad para la circulación del personal con equipo de aspersión motorizado de espalda, y adecuada estructura de los cafetos, para lograr eficiente penetración y cobertura de los productos químicos aplicados al follaje.

BASAGOITIA M., C.R. Evaluación de seis modalidades de reestructurar un cafetal para adecuarlo al futuro combate de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Resúmenes de Investigaciones en Café (El Salvador) 4:62-65. 1981. (329

* También en: Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.), San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 16-17.

* CAMPOS CAMPOS, J.C. Aprovechamiento de la precipitación pluvial para el eventual combate químico de la roya del cafeto (*Hemileia vastatrix* Berk. et Br.). In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.), San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 57-64. (330

* COSTA RICA. MINISTERIO DE AGRICULTURA Y GANADERIA. DEPARTAMENTO DE FITOPATOLOGIA. Prácticas de nutrición del cafeto y combate de la roya. In _____. Informe anual de labores 1984. San José, Costa Rica, 1985. pp. 4-5. (331

* GUERRA DIAZ, A. Algunas consideraciones sobre poda del cafeto en relación a la roya. In Curso de Técnicas Modernas para el Cultivo del Café, Nueva San Salvador, 1979. Documentos. Nueva San Salvador, El Salvador, ISIC, 1979. pp. 139-148. (332

* HERNANDEZ RUBALLOS, B. Captación y almacenamiento de la precipitación pluvial para el combate químico de la roya del cafeto. Boletín Técnico Comunihcafé (Honduras) 1(1):10-13. 1981. (333

** INSTITUTO MEXICANO DEL CAFE. Contra la roya: acondicionamiento de cafetales. Jalapa, Ver., s.f. 10 p. (334

MORENO V., G. Comportamiento de la roya del cafeto bajo tres diferentes tipos de poda en el cultivar Bourbon. Resúmenes de Investigaciones en Café (El Salvador) 4:41-44. 1981. (335

* RAMIREZ ROJAS, J.E. Cafetales con manejo tecnificado: única posibilidad de minimizar los costos en el combate de la roya del cafeto. Noticiero del Café (Costa Rica) 20(243): 2-3. 1984. (336

* URIBE-HENAO, A. y MESTRE-MESTRE, A. Efecto de la densidad de población y su sistema de manejo sobre la producción de café. Cenicafé (Colombia) 31(1):29-51. 1980. (337

Six places in the Colombian coffee zone were used to compare three planting distances (1.00 x 1.00 meters with 10,000 plants per hectare, 1.42 x 1.42 meters with 5,000 plants/ha, and 2.00 meters x 2.00 meters with 2,500 plants/ha) and several management systems for the highest density under test. These management systems consisted of sucessive thinnings of the stand. The experimental results indicated that the 1.00 x 1.00 meter distance was superior to those of 1.42 x 1.42 meters and 2.00 x 2.00 meters. Subjecting planting distances to successive annual thinnings, it was not possible to obtain higher yields above 1.00 x 1.00 meter planting distance without thinning. Nevertheless, all the treatments which were subjected to thinnings showed higher yields than the ones obtained with planting distances of 1.42 x 1.42 and 2.00 x 2.00 meters.

In order to obtain good results with high density plantings, it is necessary to set up short yield cycles through periodic renovations of the plantation. In the case of the present experiments, a five year cycle starting from the date of planting is considered to be appropriate. If, for any reason, it is necessary to increase the distance of planting, as in the case of spraying for the control of coffee rust, the thinning of the 10,000 plants per hectare does not affect the yield of the remaining trees and, in turn, outyield the plantings originally established at 1.42 x 1.42 meters and 2.00 x 2.00 meters. It is expected that with shorter production cycles, three years after the planting it would be possible to either avoid coffee leaf rust control or make it easier, thus obtaining high yields per year and per unit of area.

Combate biológico

* ALBA, A.P.C. et al. Common antigens in extracts of *Hemileia vastatrix* urediniospores and of *Coffea arabica* leaves and roots. Fitopatología Brasileira 8(3):473-483. 1983. (338

Common antigens were detected in extracts of urediniospores of *Hemileia vastatrix* and in leaf and root extracts of coffee plant prepared by different methods. An antigenic disparity was observed between coffee plants of physiologic groups D and E. The occurrence of common antigens in coffee plants and urediniospores of *H. vastatrix* and their possible involvement in such interaction are discussed.

BAEZA ARAGON, C.A. Investigaciones básicas en las relaciones *Hemileia vastatrix-Coffea* spp. Chinchiná, Colombia, Cenicafé, 1976. 43 h. (339

* BERETTA, M.J.G., MARTINS, E.M.F. y MORAES, W.B.C. Indução de proteção a *Hemileia vastatrix* em plantas de café suscetíveis, por fungos não patogênicos ao cafeeiro. Fitopatología Brasileira 5(3):387. 1980. (340

Sólo sumario.

Presentado en: Congreso da Fitopatologia, 13a., Río de Janeiro, 1980.

Baseando-se na metodologia descrita por Moraes et al. (Sum. Phytopath. 2:39-43. 1976) para indução de proteção a *Hemileia vastatrix* Berk. et Br. em *Coffea arabica* L. cultivar Mundo Novo, usamos como indutor, neste trabalho, diferentes fungos não-patogênicos ao cafeeiro. Os indutores foram aplicados sob as formas de suspensão de esporos em água destilada estéril (10^6 esporos/ml) e filtrado dessa suspensão, livre de células.

Como indutores foram usados os seguintes fungos: *Puccinia psidii*, *Tranzchelia pruni-spinosae* var. *discolor*, *Puccinia oxalidis*, *Ustilago maydis*, *Helminthosporium carbonum*, *Micosphaerella melonis*, *Ceratocystis paradoxa* e *Cladosporium cucumerinum*. Como controle foi usada água destilada estéril no lugar do indutor.

Após 72 hs de aplicação, em folhas de cafeeiro, do indutor foi inoculada uma suspensão de urediniosporos de *H. vastatrix* na concentração de 2 mg/ml em Tween 20,02%. As plantas foram mantidas em câmara úmida por 48 hs. A contagem das lesões foi feita 30-40 dias após a inoculação e o resultado foi avaliado em relação ao controle como porcentagem de proteção.

Os dados obtidos sugerem que o indutor na forma de suspensão é mais eficiente quanto a indução de proteção, uma vez que apenas o *C. paradoxa* e o *C. cucumerinum* não conferiram resistência ao cafeeiro; en quanto que na forma de filtrado apenas a *P. oxalidis* foi efetiva em induzir significativamente proteção. Como conclusão podemos afirmar que é possível induzir resistência em cafeeiros suscetíveis a *H. vastatrix*, por meio de tratamento com diferentes fungos não-patogênicos ao cafeeiro e que essa proteção se manifesta em diferentes graus de acordo com o indutor.

* CRUICKSHANK, I.A.M. An introduction to procedures used in the study of phytoalexins. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 199-211. (341

* FORRER, H.R. Possibilities of the utilization of hyperparasites and application of natural compounds for the control of rusts. In Seminario de Estudios sobre Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 63-70. (342

GARCIA ESTRADA, G.A. Evaluación del efecto enzimático del hongo *Verticillium vastatrix* (Berk. & Br.) incitante de la roya del cafeto. Tesis Ing. Agr. Guatemala, Universidad de San Carlos, 1984. 61 p. (343

* También en: Simposio Latinoamericano sobre Caficultura, 6a., Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 176-187.

* GUEDES, M.E.M. y NUNES, M.A. Trocas gasosas em folhas de cafeeiro infectadas por *Hemileia vastatrix* Berk. & Br. Garcia de Orta (Estudos Agronômicos) 5(1-2):31-36. 1978. (344

Presentado en: Colóquio Internacional do Café, 8°, Costa de Marfil, 1977.

Mediram-se as trocas gasosas em folhas de uma combinação compatível hospedeiro-parasito obrigatório (cafeeiro-ferrugem) em vários estádios da infecção. Usando métodos de análise de CO_2 por radiações infravermelhas, técnica manométrica de Warburg e cromatografia gasosa, foram determinadas as taxas de troca de CO_2 e de O_2 á luz e ás escuras e a produção de etileno. O comportamento da fotorrespiraçao em função da tensão de oxigênio revelou que aquela parece desaparecer desde as fases iniciais da infecção. A respiração no escuro aumentou muito no sistema folha-parasita e a produção de etileno aumentou progressivamente com o tempo após a inoculação. O ponto de compensação para o CO_2 aumentou significativamente na fase de esporulação.

* _____. Formação de fitalexinas em interacções incompatíveis *Coffea arabica-Hemileia vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 205-216. (345

Na sequência de trabalhos anteriores verificou-se que em combinações incompatíveis *Coffea arabica-Hemileia vastatrix* há produção de 3 fitalexinas do tipo dos sesquiterpenoides, no qual 1 é capsidol, 6-10 dias após a inoculação. Estes compostos foram detectados por meio de cromatografia em camada fina, usando placas de sílica gel 60F254 e reagentes específicos, não se encontrando presentes nas combinações compatíveis e testemunha.

Estes resultados sugerem que as fitalexinas, tal como noutras combinações hospedeiro-parasita já estudadas por outros investigadores, possam desempenhar um papel importante na resistência do cafeeiro à ferrugem alaranjada.

LIM, T.K. y NIK, W.Z. Mycoparasitism of the coffee rust pathogen, *Hemileia vastatrix*, by *Verticillium psalliotae* in Malaysia. Pertanika 6(2):23-25. 1983. (346

Uredinia of *H. vastatrix* were parasitized by *V. psalliotae* in several coffee plantings in Selangor. Scanning electron microscopy and Nomarski interference light microscopy revealed that the mycoparasite grew vigorously between the warts on the urediospore surface, forming many conidiophores and conidia, and the hyphae also grew inside living spores. Infected spores eventually lost their contents (except for oil bodies) and died. No penetration of *H.* germ tubes or mycelium was observed. (Review of Plant Pathology 63(2-3):644. 1984).

* MAHLOW, M., SUBIN-SEPLAN, M. y ELZA, M.F. Estudo de substâncias tipo fitoalexinas em frutos verdes de café. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Rio de Janeiro, Instituto Brasileiro do Café, 1983. p. 137. (347

Sólo sumario.

Substâncias do tipo fitoalexinas, produzidas por hospedeiros, se acumulam nas plantas em concentrações capazes de inibir o crescimento de agentes infecciosos quando testados in vitro. Estas substâncias podem se acumular tanto no local como ao redor do ponto de infecção en níveis capazes de inibir o agente patogênico. Frutos verdes de cafeeiros (*Coffea arabica* L.) cv. Mundo Novo, foram lavados, cortados ao meio e inoculados com uma suspensão de esporos de *Helminthosporium carbonum* e água como controle. Após 48 horas, em condições controladas, obtene-se o difusato, que em experimentos anteriores mostrou ação fungitóxicas. Dos meios frutos de cada tratamento foram obtidos extratos etanólicos. Após análise preliminar, partiu-se para a semi-purificação destes extratos, submetendo-osa bipartição em igual volume de solventes orgânicos de polaridade crescente (éter de petróleo, éter etílico e acetato de etíla). Constatou-se a presença de atividade antifúngica nas frações de éter de petróleo e acetato de etíla do extrato dos frutos inoculados com *H. carbonum*, através de ensaios de germinação de urediosporos de *H. vastatrix* ou crescimento de micélio de *Cladosporium cucumerinum* em cromatograma.

MORAES, W.B.C. et al. Studies on the induced protection in coffee plants to *Hemileia vastatrix*. IV. Chemical analysis of the inducer. s.n.t. s.p. (348

Presentado en: Colloque International sur la Protection des Cultures Tropicales, Lyons, France, 1981.

* _____. et al. Induced protection to *Hemileia vastatrix* in coffee plants. Summa Phytopathologica (Brasil) 2(1):39-43. 1976. (349

Heat-treated uredospores of *Hemileia vastatrix* Berk. & Br. induced protection in susceptible coffee plants (*Coffea arabica* L. cultivar "Mundo Novo") to a later challenge by the pathogen. The effectiveness of this protection was very high when both inducer and challenger were at the same concentration. The effectiveness decreased as the challenger concentration increased. The protection in coffee plants was observed even when the interval of time between the inducer application and the challenge inoculation reached 14 days. No hypersensitive reaction was detected in host plants, following the inducer application. The mechanism of this protective action is still unknown.

* _____. The possibility of inducing protection in susceptible plants to pathogens. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 258-262. (350

** MORAES, W.B.C. Host parasite interactions in the coffee, *Hemileia vastatrix* system. In Fulton, R.H., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 59-74. (351

MORENO RUIZ, G. et al. Compuestos volátiles en hojas de cafetos y su papel en la interacción con patógenos. Bogotá, Federación Nacional de Cafeteros de Colombia, Laboratorio de Investigaciones sobre la Química del Café y de los Productos Naturales, 1980. s.p. (LIQC-EC-013) (352

REICHEL, H. Towards a control of the coffee leaf rust (*Hemileia vastatrix* B. and Br.). Speculations in Science and Technology 5(2):147-150. 1982. (353

From a discussion of induced protection of coffee leaves to rust, details of a suggested mechanism for such immunity are suggested. It is speculated that plants susceptible to pathogens could be vaccinated with plant interferon.

ROJAS, M.L. y SIEVERS, S. Actividad de la peroxidasa en hojas sanas de cafetos portadores de diferentes factores de resistencia contra la roya (*H. vastatrix*). Bogotá, Federación Nacional de Cafeteros de Colombia, Laboratorio de Investigaciones sobre la Química del Café y de los Productos Naturales, 1980. s.p. (LIQC-EC-012) (354

* STAHMANN, M.A. Enzymatic changes in host-pathogen interactions. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 117-123. (355

Combate químico

* AGUILAR, C.A., RIVERA, J.M. y OSEGUERA V., S.H. Evaluación de dosis y frecuencia de aplicación de oxicloruro de cobre para control de roya del cafeto en La Paz. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café. 1984. pp. 315-325. (356

Se evaluó la efectividad en el control de roya del cafeto de 9 tratamientos resultantes de combinar 3 dosis (1, 2 y 4 kg/ha) del fungicida Cobox (84% oxicloruro de cobre, 50% CM) con 3 frecuencias de aspersión (20, 40 y 60 días entre aplicación, totalizando 7, 4 y 3 aspersiones en el ciclo, respectivamente). El estudio, establecido en Santiago de La Paz, La Paz, se condujo consecutivamente durante 1982 y 1983, en un cafetal del cultivar Caturra, incorporándose para fines comparativos un testigo sin tratamiento. Las aspersiones en ambos años se iniciaron a finales de abril. Se presentaron diferencias estadísticas entre tratamientos a partir de agosto y hasta diciembre inclusive ambos años. Al someter los datos obtenidos con las combinaciones a análisis factorial se detectaron diferencias entre dosis y entre frecuencias en 1982 (meses de setiembre, octubre, noviembre y diciembre); en 1982 se presentaron diferencias estadísticas solamente entre dosis, y restringidos a los meses de junio y julio. Consistentemente, los mejores tratamientos fueron: 4 kg/ha/20 días (7 aspersiones totalizando 28 kg/ha), 2 kg/ha/20 días (7 aspersiones

totalizando 14 kg/ha) y 4 kg/ha/40 días (4 aspersiones totalizando 16 kg). Aparentemente la dosis óptima se ubica entre 2-4 kg/ha, con intervalos no mayores de 40 días entre aplicaciones.

* AGUILAR, C.A., RIVERA, J.M. y OSEGUERA V., S.H. Programas de aspersión para control de la roya del cafeto en Marcala. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 269-278. (357

Se está tratando de determinar la época apropiada de iniciación y el número mínimo de aspersiones de fungicida de cobre requeridos para control efectivo de la roya del cafeto en Marcala, La Paz, a 1,230 m.s.n.m., con 1,400 mm de precipitación pluvial anual. El estudio, iniciado en abril de 1983, incluyó los siguientes tratamientos: a) aspersiones mensuales (6) de abril a setiembre; b) aspersiones mensuales (5) de abril a agosto; c) aspersiones mensuales (4) de abril a julio; d) aspersiones bimensuales (3) de abril a agosto; e) aspersiones mensuales (4) de marzo a agosto; f) aspersiones mensuales (3) de mayo a julio; g) aspersiones bimensuales (3) de mayo a setiembre; h) testigo sin tratar. Los resultados del primer año de conducción indicaron que todos los programas de aspersión, sin excepción, determinaron la ocurrencia de índices de incidencia inferiores a los mostrados por el testigo. Los programas con aspersiones a intervalos bimensuales (3 aspersiones) siempre mostraron menor efectividad en el control de roya, independientemente del mes de iniciación. No se observó diferencia entre aplicar 6, 5 ó 4 aspersiones iniciales en abril, encontrándose uniformemente alta efectividad. Aspersiones iniciadas en mayo no fueron usualmente tan efectivas como las iniciadas en abril, lo cual probablemente se debe a que las aspersiones iniciales se efectuaron después de la iniciación de la temporada lluviosa.

** ALMEIDA, S.R. DE. Efeitos de fungicidas sobre a ferrugem (*Hemileia vastatrix* Berk. & Br.), mancha de olho pardo (*Cercospora coffeicola*, Berk & Cooke) e produção do cafeeiro, em região de altitude elevada. Tese Mag. Sc. Lavras, MG, Brasil, Escola Superior de Agricultura de Lavras, 1980. 54 p. (358

Um experimento foi executado para testar o efeito de fungicidas sobre a ferrugem (*Hemileia vastatrix* Berk et Br), a cercosporiose (*Cercospora coffeicola*, Berk et Cooke) e sobre a produção do cafeeiro.

Sete fungicidas (Daconil 2787, Orthodifolatan 4F, Benlate, Antracol, Rodisan, Derosal e Oxicloreto de Cobre) foram aplicados isoladamente ou em combinação com Oxicloreto de Cobre, em um experimento localizado no município de Ouro Fino-MG, em altitude média de 900 metros. Entre os fungicidas testados, apenas os cúpricos são largamente recomendados no Brasil, para controle a ferrugem das folhas do cafeeiro. Os resultados mostraram que os fungicidas Rodisan e Oxicloreto de cobre em aplicações isoladas, bem como todas as misturas com oxicloreto de cobre, propiciaram excelente controle da epidemia de ferrugem durante o período de 1974 a 1978.

Os fungicidas Daconil 2787, Orthodifolatan 4F, Benlate, Antracol e Derosal, quando usados isoladamente deram controle menos satisfatório.

As associações dos fungicidas com Oxicloreto de cobre foram altamente efetivas no controle à *Cercospora coffeicola*, Berk et Cooke, apresentando a seguinte ordem decrescente de eficiência: mistura de Oxicloreto de cobre com Orthodifolatan 4F, com Antracol, com Derosal e com Rodisan. Benlate, Oxicloreto de cobre, Antracol, Derosal, Orthodifolatan 4F e Rodisan, quando usados isoladamente, deram níveis intermediários de controle à cercospora.

Embora, o Oxicloreto de cobre tenha dado o melhor controle da ferrugem, o maior aumento de produção foi obtido com os seguintes tratamentos em ordem decrescente de efetividade: Orthodifolatan 4F, Benlate, Oxicloreto de cobre + Daconil 2787; Oxicloreto de cobre + Orthodifolatan, Rodisan e Oxicloreto de cobre + Benlate.

O fungicida Orthodifolatan 4F destacou-se dos demais no aumento da produção de café. Os fungicidas Benlate e Rodisan deram também resultados lucrativos nesta localidade de altitude elevada, porém, os demais tratamentos não são promissores para uso prático, conforme os resultados obtidos e com quatro pulverizações anuais. Além do efeito direto dos tratamentos no controle a ferrugem, alguns fungicidas, especialmente o Orthodifolatan 4F, apresentou um interessante "efeito tônico" sobre a produção do cafeeiro.

Consideramos, que este "efeito tônico" pode possivelmente ser devido à quatro fatores: a) a efeitos estimulantes de alguns fungicidas sobre o crescimento vegetativo; b) o controle simultaneo de outros microorganismos; c) um possível efeito do cobre sobre o equilíbrio biológico, favorecendo a ocorrência de outros parásitas do cafeeiro, e d) um efeito depressivo do cobre sobre o crescimento vegetativo do cafeeiro.

Os resultados observados poderiam estimular estudos mais detalhados sobre a viabilidade econômica e o efeito tôco dos fungicidas cúpricos, Orthodifolatan 4F, Benlate e Rodisan em relação à produção, nas várias regiões cafeeiras, propícias ao seu cultivo.

** ALMEIDA, S.R. DE. et al. Efeito da aplicação de fungicidas sistêmico e cúprico, em pulverizações isoladas e associadas, no controle à ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, Brasil, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 314-316. (359

* _____., MATIELLO, J.B. y MANSK, Z. Estudo comparativo entre fungicidas cúpricos com baixa concentração de cobre e sistêmicos, no controle a ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 259-261. (360

APHON THAMMAKHET, PRAKHONG WUTTHIWANIT y NIYOM CHIUCHIN. Study on the chemical control of leaf rust on *Coffea arabica* L. (En tailandés). In Thailand. Department of Agriculture. Research report 1977. Bangkok, 1980. p. 81. (361

Sólo sumario.

_____. y SUPHACHAI LICHIRACHAMNIAN. Effectiveness of certain chemicals against leaf rust of coffee (En tailandés). In Thailand. Department of Agriculture. Research report 1978. Bangkok, 1981. p. 70. (362

Sólo sumario.

* ARANGO-BERNAL, L.G. Control químico de la roya del cafeto. In Taller sobre Roya del Cafeto *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-47. (363

* BIEYSSE, D., LEGUIZAMON C.,J. y MULLER, R.A. Note sur une technique d'étude in vitro des effets de fongicides systémiques ou pénétrants sur *Hemileia vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 549-555. (364

* BOCCAS, B. et al. La rouille orangée du caféier arabica en Nouvelle-Calédonie. II. Essais de contrôle chimique. Café, Cacao, Thé 28(3):203-208. 1984. (365

Se han sometido a ensayo dos fungicidas en las plantaciones de cafetos Arabica, atacados por la roya anaranjada en Nueva Caledonia. El primer producto, un fungicida de contacto cuyo principio activo es el oxiquinoleato de cobre, no ha llegado a reducir de forma significativa el desarrollo de la enfermedad. El segundo producto, cuyo principio activo es la oxicarboxina, ha permitido, en cambio, demostrar una excelente eficacia en la lucha contra *Hemileia vastatrix*.

* BONDIO, H. y SCARICABAROZZI, R. Electrostatic application of pesticides, present situation and possible development. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 173-180. (366

The possibility of improving the process of pesticide spraying and reducing the losses by the use of electrostatic fields is discussed. The work undertaken in this direction in different countries is summarized and results that show a deposition from four to seven times superior to the conventional methods are reported. A research plan developed at the Physics Department of Cauca University is explained. Some theoretical results concerning the dispersion of a unipolar jet are reported.

* BONILLA, C.A., OSEGUERA V., S. y HERRERA, J. Evaluación de épocas de aplicación de oxicluro de cobre en el control de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). In Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 323. 1983? pp. 142-146. (367

* _____., REINA, F. y OSEGUERA V., S. Evaluación de diferentes programas de aspersión para el control de la roya del cafeto (*Hemileia vastatrix* Berk.). COMUNIHCAFE (Honduras) 3(1):2-7. 1984. (368

* _____., RIVERA, J.M. y OSEGUERA V., S. Evaluación de diferentes programas de aspersión para el control químico de la roya del cafeto en el Lago de Yojoa. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 257-268. (369

Se condujo un ensayo durante 1982-83 con el propósito de determinar la época adecuada de iniciación y el número mínimo de aspersiones requeridas para el control de la roya del cafeto. Los tratamientos evaluados fueron los siguientes programas de aspersiones:

a) de abril a octubre (7 aspersiones); b) de abril a setiembre (6 aspersiones); c) de mayo a setiembre (5 aspersiones); d) de mayo a agosto (4 aspersiones); e) mayo, julio y setiembre (3 aspersiones); f) junio a setiembre (4 aspersiones); g) abril, junio y agosto (3 aspersiones); h) testigo. Se aplicó el fungicida Cobox (84% Oxicloruro de cobre, 50% CM) en dosis de 3.5 kg/ha, empleando una aspersora de mochila de presión neumática; mensualmente se calificaron los índices de infección tomando una muestra al azar de 50 hojas en cada parcela útil (10 hojas por planta) y determinando en ellas el porcentaje que presentaban roya. Se pudo establecer que programas de 6 y 7 aspersiones iniciadas en abril y programas de 5 y 4 aspersiones iniciadas en mayo presentaron consistentemente control satisfactorio de la enfermedad en los 2 años que duró el estudio; 4 aspersiones iniciadas en junio mostraron un control deficiente de la enfermedad; programas involucrando 3 aspersiones presentaron mucha variación en los resultados de un año a otro. Todos los programas determinaron niveles de incidencia inferiores, en mayor o menor grado, a los mostrados por el testigo.

* BONILLA, C.A., AGUILAR, C. y OSEGUERA V., S. Evaluación de dosis y frecuencias de aplicación de oxicloruro de cobre en el control de la roya del cafeto (*Hemileia vastatrix* Berk. et Br.). In Simposio Latinoamericano sobre Caficultura, 6°, Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 292-321. (370

Resúmenes de resultados en: COMUNIHCAFE (Honduras) 3(1):12. 1984.

* _____. et al. Evaluación de dosis y frecuencias de aplicación de oxicloruro de cobre para el control de la roya del cafeto en el Lago de Yojoa. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 289-302. (371

Se estableció un ensayo en 1982 para evaluar la efectividad relativa en el control de roya de 9 tratamientos resultantes de la combinación de 3 dosis (1, 2 y 4 kg/ha) y 3 frecuencias de aplicación (intervalos de 20, 40 y 60 días entre aspersiones) del fungicida Cobox (84% Oxicloruro de Cobre, 50% C.M.), agregándose un testigo absoluto. El ensayo se condujo en Tapiquilares, Lago de Yojoa, Cortés, efectuándose un máximo de 9 aplicaciones, en el período comprendido de abril a setiembre. Se efectuaron lecturas mensuales de incidencia, a partir de abril, en muestras de 50 hojas por parcela útil, colectadas al azar (5 plantas por parcela útil, 4 repeticiones), determinándose en ellas el número de hojas con roya. Se encontraron diferencias consistentes y significativas ($p = 0.01$), entre tratamientos, en los meses de octubre y noviembre, en ambos años. Las combinaciones 4 kg/ha cada 20 días (9 aplicaciones), 4 kg/ha cada 40 días (5 aplicaciones) y 2 kg/ha, cada 20 días (9 aplicaciones), fueron los tratamientos que presentaron mejor control de la enfermedad; 2 kg/ha cada 40 días (5 aplicaciones), mostró efecto medianamente satisfactorio; aplicaciones de 1, 2, 4 kg cada 60 días fueron prácticamente inefectivas.

* BONILLA, C.A. et al. Evaluación de fungicidas comerciales en el control de la roya del cafeto en el Lago de Yojoa. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 326-337. (372

Se evaluó la efectividad en el control de la roya del cafeto de 10 fungicidas comerciales. Los productos fueron: Difolatan WP (80% i.a., kg/ha), Sicarol 15 Disp. (15% i.a. 3 lt/ha), mezcla de Daconil + Cobox (75% i.a. y 50% CM, 1.5 kg + 1.5 kg, respectivamente/ha), Dithane M-45 (3 kg/ha), Tricarbamix (45%, 15%, 3 kg/ha), Cobox (50% CM, 3 kg/ha), Copper Count-N (8% Cu, 6 lt/ha), Caldo Bordelés (25% CM, 4 kg/ha), y se agregó un testigo absoluto. Se registró mensualmente el porcentaje de hojas (PHR) presentes en bandolas marcadas al inicio del ensayo. Las aspersiones se iniciaron en el mes de abril, efectuándose aplicaciones bimensuales con los productos sistémicos Sicarol y Bayleton, hasta totalizar 3 aplicaciones en el mes de agosto; con los otros productos se efectuaron aplicaciones mensuales para totalizar 6 aspersiones en el mes de setiembre. El análisis estadístico de los resultados, indicó que se presentaron diferencias significativas (p = 0.01) en el grado de control obtenido con los productos de junio a noviembre, inclusive. Los productos de contacto Cobox y Parasol a base de cobre y el fungicida sistémico Bayleton, mostraron consistentemente alta eficiencia en el control de la roya, superando a los restantes fungicidas evaluados.

* BONILLA G., J.C. Estudio del efecto de fungicidas recomendados contra roya (*Hemileia vastatrix* Berk. & Br.) en el contenido nutricional de los cafetos. In Simposio Latinoamericano sobre Caficultura, 3°, Tegucigalpa, 1980. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 263. 1981? pp. 40-55. (373

* Resumen en: Resúmenes de Investigaciones en Café (El Salvador) 3: 48-50. 1980.

* También en: Resúmenes de Investigacion sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 53-56.

Following eight applications of anti-leaf rust fungicides on coffee trees no significant changes in the foliar nutrition content of the trees was observed. There were, however, significant increases in the magnesium, zinc and copper content of the leaves, in view of the composition of the fungicides used, which were Sicarol 15% (Pyracarbolide), Cobox (Copper oxychloride 84% - metallic copper 50%), Dithane M-45 (80% Ethylene bidiothiocarbamate of Zn and Mn), and Bayleton 25% WP (Triadimephon).

* _____. Evaluación de fungicidas sistémicos aplicados solos o asociados con oxicloruro de cobre, en el combate de la roya del cafeto. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk, & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 57-64. (374

* BONILLA G., J.C. Evaluación de la eficiencia de fungicidas en el combate de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Resúmenes de Investigaciones en Café (El Salvador) 5:28-33. 1983. (375

El presente estudio se desarrolló con la finalidad de evaluar la efectividad contra la roya del cafeto, de algunos fungicidas protectivos a base de cobre; determinar posibles resíduos en el grano, la alteración en la calidad de la bebida provocada por las aspersiones y establecer costos en el control de la enfermedad.

* BOSHELL, J.F. Determinación de las épocas de control de la roya del cafeto en Honduras con base en datos meteorológicos. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 224-242. (376

* BUJULU, J. Chemical control of coffee leaf rust in Tanzania. East African Agricultural and Forestry Journal 45(2):137-141. 1979. (377

Coffee leaf rust caused by *Hemileia vastatrix* is a very serious disease in Tanzania particularly at lower altitudes around 1000 m.a.s.l. Both common species grown in Tanzania (Arabica and Robusta coffees) are susceptible to coffee rust disease. Presently, the only way to combat this disease is the use of copper fungicides accompanied by better coffee husbandry. Ten fungicides including six non-copper formulations were tested between 1979 and 1980. Out of those Kocide 101, Bayleton, Dusan, Sicarol, Oleo Nordox, San 269 and Copper Sandox controlled coffee leaf rust effectively and are being recommended. The rest must undergo further tests.

* CAMPACCI, C.A. y OLIVEIRA, D.A. Teste de novos fungicidas para o controle da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.). In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 288-290. (378

** _____. y CHIBA, S. Efeito do Triadimefon puro e associado a fungicidas cúpricos no contrôle da ferrugem do cafeeiro no Estado de São Paulo. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 49-52. (379

* CARNEIRO FILHO, F., MATIELLO, J.B. y MANSK, Z. Competição de fungicidas sistémicos puros ou associados a oxicloreto de cobre no controle a ferrugem do cafeeiro no Paraná. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos de Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 286-287. (380

* _____., MATIELLO, J.B. y MANSK, Z. Epoca de pulverização com Bayleton (Triadimefon) puro e associado a oxicloreto de cobre, no controle a ferrugem do cafeeiro no Paraná. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 296-298. (381

** CARNEIRO FILHO, F., MATIELLO, J.B. y MANSK, Z. Competição de novos fungicidas sistêmicos e cúpricos de baixa concentração no controle da ferrugem do cafeeiro do Paraná. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 376-377. (382

* CARRILLO P., I.F. Determinación de Cu depositado en hojas, por espectro-fotometría de absorción atómica. Cenicafé (Colombia) 28(4):153-157. 1977. (383

CID MORAN, J.M. DEL. Efecto de diferentes dosis de dos fungicidas cúpricos en el control de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Tesis Ing. Agr. Guatemala, Universidad de San Carlos, 1984. 68 p. (384

* COMISION MEXICO-GUATEMALA PARA LA PREVENCION Y CONTROL DE LA ROYA DEL CAFETO. Manual para el control químico de la roya del cafeto. Guatemala, Ministerio de Agricultura, Ganadería y Alimentación, 1983. 68 p. (385

* CONTROL OF coffee berry disease and leaf rust in 1980. Kenya Coffee 44(525):13-18. 1979. (386

The recommended fungicides for controlling *Colletotrichum coffeanum* (*Glomerella cingulata*) and rust (*Hemileia vastatrix*) with rates and frequency of application are given. (Review of Plant Pathology 59(11):5199. 1980).

* CONTROL OF coffee berry disease and leaf rust in 1980. Kenya Coffee 45(526):9-13. 1980. (387

Recommended fungicides and spray schedules are given for the control of *Colletotrichum coffeanum* (*Glomerella cingulata*) and rust (*Hemileia vastatrix*). (Review of Plant Pathology 59(11):5201. 1980).

* CONTROL OF coffee berry disease and leaf rust in 1981. Kenya Coffee 46(538):25-29. 1981. (388

The severity of coffee berry disease in Kenya in 1981 was low due to below average rainfall and to the correct use of recommended fungicides. These are: Captafol (Orthodifolatan), chlorathalonil (Daconil 2787-W75), Dithianon (Delan) and formulations containing 50% copper. Recommended application rates, formulations and spray programmes are given for CBD and also for leaf rust. The recommended fungicides for the latter are 50% copper formulations, Fentin hydroxide (Du-Ter Extra), Dithianon (Delan), Pyracarbolid (Sicarol), and Triadimefon (Bayleton).

* CONTROL OF coffee berry disease and leaf rust in 1982. Kenya Coffee 47(550):9-14. 1982. (389

Recommended fungicides and spray programmes for controlling coffee berry disease and leaf rust are given, with details on the use of fungicides, on spray programmes appropriate for either side of the Rift Valley, and of an integrated CBD/leaf rust control programme.

* CONTROL OF coffee berry disease and leaf rust in 1983. Kenya Coffee 48(562):38-44. 1983. (390

This technical circular gives details of six spray programmes for the control of coffee berry disease and leaf rust.

* CONTROL OF coffee berry disease and leaf rust in 1983. Kenya Coffee 48(564):94-100. 1983. (391

The recommended fungicides, formulation rates and schedules for the control of coffee berry disease and leaf rust are presented. (Review of Plant Pathology 63(2-3):643. 1984).

* CONTROL OF coffee berry disease and leaf rust in 1983. Kenya Coffee 48(571):266-272. 1983. (392

* CONTROL OF coffee berry disease and leaf rust in 1985. Kenya Coffee 50(583):271-277. 1985. (393

* CONTROL OF three major diseases of coffee. Kenya Coffee 45(536):316-317. 1980. (394

* CONTROL OF three major diseases of coffee. Kenya Coffee 46(538):14-16. 1981. (395

Recommendations are given for the control of coffee berry disease (*Glomerella cingulata*), leaf rust (*Hemileia vastatrix*) and bacterial blight (*Pseudomonas syringae*). (Review of Plant Pathology 60:6489. 1981).

* CONTROL OF three major diseases of coffee. Kenya Coffee 46(546):285-287. 1981. (396

* CONTROL OF three major diseases of coffee. Kenya Coffee 47(559):243-245. 1982. (397

The recommended control measures are given for coffee berry diseases, leaf rust and bacterial blight. (Review of Plant Pathology 63(2-3):640. 1984).

* CONTROL OF three major diseases of coffee. Kenya Coffee 48(563):55-57. 1983. (398

* CONTROL OF three major diseases of coffee. Kenya Coffee 48(570):234-237. 1983. (399

Recommendations are given for the control of coffee berry disease, coffee leaf rust, and bacterial blight of coffee.

* COSTA RICA. MINISTERIO DE AGRICULTURA Y GANADERIA. DEPARTAMENTO DE FITOPATOLOGIA. Combate de la roya del cafeto (*Hemileia vastatrix* Berk. y Br.) por medio de fungicidas de acción sistémica. In _____. Informe anual de labores 1984. San José, Costa Rica, 1985. pp. 10-11. (400

* _____. Ensayo de persistencia activa de fuentes de cobre. In _____. Informe anual de labores 1984. San José, Costa Rica, 1985. pp. 16-19. (401

* COSTA RICA. MINISTERIO DE AGRICULTURA Y GANADERIA. DIRECCION DE SANIDAD VEGETAL. Combate de roya. s.l., Convenio Costarricense-Alemán (GTZ), s.f. 10 p. (402

* ECHEVERRI RODRIGUEZ, J.H., CHAVES, G.M. y ZAMBOLIM, L. Ação de fatores do ambiente sobre a efetividade biológica do fungicida maneb aplicado en folhas de cafeeiro. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte, MG. Projeto café; resumos de trabalhos. Belo Horizonte, MG, Brasil, EPAMIG, 1980. pp. 134-136. (403

* EXPERIENCIAS CON Bayleton en el control de la roya del cafeto en el Brasil. Revista Cafetalera (Guatemala) 6(204):50. 1981. (404

* FARAGO, M.E. Metal ions and plants. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 127-132. (405

* FEDERACION NACIONAL DE CAFETEROS DE COLOMBIA. GERENCIA TECNICA. Determinación de épocas probables para el control químico de la roya del cafeto (*Hemileia vastatrix* Berk. y Br.). In _____. 40 años de investigación en CENICAFE. Chinchiná, Colombia, CENICAFE, 1983. v.2, pp. 49-51. (406

* FEHRMANN, H. Systemic fungicides - possibilities, mode of action, and limitations. In Seminario de Estudios sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 113-115. (407

* FIGUEIREDO, P. et al. Avaliação de novas formulações de fungicidas no controle da ferrugem do cafeeiro no Estado de São Paulo. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 242-244. (408

* _____. et al. Avaliação de novas formulações de fungicidas no controle da ferrugem do cafeeiro e seus efeitos na desfolha e produção nas condições do Estado de São Paulo. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 285-287. (409

* _____. et al. Efeito do pyracarbolid e oxicarboxin aplicados em misturas e intercalados com fungicida cúprico no controle da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. & Br.). Biológico (Brasil) 47(9):239-244. 1981. (410

O efeito dos fungicidas sistêmicos oxicarboxin e pyracarbolid no controle da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. & Br.) foi estudado em condições de campo, sobre o cultivar Mundo Novo com 12 anos de idade, em Garça-SP durante o período compreendido entre 1975 e 1980. Foram testados dezesseis tratamentos, constituídos de doze com fungicidas sistêmicos, aplicados sozinhos, alternados e em mistura com o fungicida padrão oxicloreto de cobre. Os resultados evidenciaram baixa ação dos fungicidas sistêmicos, quando aplicados sozinhos ou em alternancia com o oxicloreto de cobre. Nas misturas dos sistêmicos com a padrão cúprico, houve melhor controle da ferrugem e aumento da produção.

* FIGUEIREDO, P. et al. Avaliação de novas formulações de fungicidas no controle da ferrugem (*Hemileia vastatrix* Berk. & Br.) e seus efeitos na desfolha das plantas e na produção do cafeeiro (*Coffea arabica* L.) nas condições do Estado de São Paulo. Biológico (Brasil) 48(12):305-309. 1982. (411

Foi avaliado o comportamento de novas formulações de fungicidas e programas de aplicacão dos mesmos no controle da ferrugem do cafeeiro, em Vera Cruz-SP. Para tanto esse experimento foi conduzido sobre o cultivar Mundo Novo, com seis anos de idade, durante os ciclos de produção 79/80 e 80/81, estabelecido para 13 distintos tratamentos. Os fungicidas foram aplicados em pulverização a alto volume, exceto o oxicloreto de cobre 45% usado em U.B.V. Os critérios adotados para avaliação dos resultados foram: a) porcentagem de folhas com ferrugem, b) número de folhas retidas por ramo e c) produção de café. A análise estadística dos resultados revelou, como superiores, os tratamentos em que se utilizaram, por 1000 covas, oxicloreto de cobre 50% (4,0 kg), oxicloreto de cobre 17% (7,51), chlorothalonil 25% + óxido cuproso 25% (4,51) e óxido cuproso 50% (2,0 kg).

* FILANI, G.A. Laboratory evaluation of chemicals for the control of *Hemileia* leaf rust of coffee in Nigeria. Plant Disease Reporter 63(10):844-847. 1979. (412

Coffea arabica is grown successfully in Nigeria only on the mambilla plateau on the southern tip of the Gongola State in the northeastern part of the country. The plateau, about 1500-2000 m above sea level, is about 4000 km^2 and has weather suitable for the cultivation of C. *arabica*. One of the most important diseases of this crop in Nigeria, and in most other coffee-producing parts of the world, is orange leaf rust disease, caused by *Hemileia vastatrix* Berk. & Br. The gray rust caused by *Hemileia coffeicola* Maubl. & Roger is widespread only in the nursery and has been controlled effectively by improved cultural practices. When coffee plants are heavily attacked by *H. vastatrix*, defoliation occurs. This reduces the physiological vitality of the plant, and therefore berry production is reduced and losses in revenue result. On many private farms, disease incidence is so severe that farmers find the growing of coffee to be unprofitable. Efforts are presently being made to rehabilitate neglected farms and to open new ones; this has led to a need for guidance in the use of fungicides for control of the disease. This paper reports initial laboratory evaluation of ten fungicides for control of *Hemileia* leaf rust of coffee.

** FULTON, R.H. Chemical control of coffee leaf rust in Central America. In _____., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 75-83. (413

* GIL FAGGIOLLY, S.L. Determinación de la dosis óptima de oxicloruro de cobre 50% C.M. y óxido cuproso 50% C.M., para el combate de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 69-83. (414

* También en: Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 323. 1983. pp. 200-216.

* También en: Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 152-155.

* GIL FAGGIOLLY, S.L. y PEREZ, F.B. Evaluación de épocas y frecuencias de aplicación de oxicloruro de cobre 50% C.M. y su persistencia activa en el área foliar para el combate de la roya del cafeto, *Hemileia vastatrix* Berk. & Br. In Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 323. 1983. pp. 81-90. (415

* También en: Boletín Técnico ISIC (Nueva Serie) (El Salvador) no. 11: 17-38. 1984.

* También en: Resúmenes de Investigaciones en Café (El Salvador) 5:13-17. 1983.

Con el propósito de evaluar épocas y frecuencias de aplicación de Oxicloruro de Cobre 50% C.M., en el combate de la roya del cafeto y conocer su persistencia como protectivo a través del tiempo con y sin adherente, se instaló este ensayo en la finca Santa Elena, Antiguo Cuscatlán, Departamento de La Libertad, a 925 m.s.n.m., de mayo 1981 a abril 1983.

El diseño utilizado fue bloques al azar con 9 tratamientos y 6 repeticiones, consistiendo los tratamientos en programas de aspersión con Oxicloruro de Cobre 50% C.M., en una dosis de 3.5 kg/ha por aplicación.

Los resultados mostraron que los programas de cinco, cuatro y el de tres aspersiones en junio, agosto y octubre, fueron los más eficaces en el combate de la enfermedad. Los programas con dos aspersiones con y sin adherente en la mezcla fungicida, fueron menos eficientes que los anteriores, pero superiores al testigo. Observándose que la adición de adherente no influyó en la persistencia y eficacia del fungicida.

La pérdida del cobre metálico a través del tiempo, resultó ser progresiva, tanto en tratamientos con y sin adherente, detectándose que el efecto protectivo se redujo notablemente entre 45 y 60 días después de la aspersión. Se observaron correlaciones negativas y altamente significativas, entre cantidades de cobre presente en las hojas y los porcentajes de infección en discos de éstas.

Las variables medidas (porcentaje de hojas enfermas, pústulas por hoja y hojas enfermas caídas), correlacionaron entre sí en forma positiva y altamente significativa.

* GIL FAGGIOLLY, S.L. Determinación de épocas y frecuencias de aplicación de oxicloruro de cobre 50% C.M. para el combate de la roya del cafeto, *Hemileia vastatrix* Berk. & Br. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 149-151. (416

* También en: Boletín Técnico ISIC (Nueva Serie) no. 11:3-16. 1984.

Con el propósito de determinar épocas y frecuencias de aplicación de Oxicloruro de Cobre 50% C.M. para el combate de la roya del cafeto, se realizó el presente trabajo en la Finca El Recuerdo, Departamento de Usulután, a 650 m.s.n.m., de mayo 1980 a abril 1981. El diseño utilizado fue bloques al azar con 7 tratamientos y 6 repeticiones. Los tratamientos consistieron en programas de aspersión con Oxicloruro de Cobre 50% C.M. en una dosis de 3.5 kg/ha por aplicación. Los resultados mostraron que programas de tres a siete aspersiones comprendidas de mayo a noviembre (período lluvioso), presentaron en términos de porcentaje de hojas enfermas un buen control de la roya del cafeto; excepto el programa con tres aspersiones realizadas en mayo, agosto, noviembre, el cual mostró el mayor porcentaje de hojas enfermas, diferiendo significativamente al resto de tratamientos.

* _____. Efecto del oxicloruro de cobre 50% C.M. y óxido cuproso 50% C.M. con y sin adherente en el combate de la roya del cafeto, *Hemileia vastatrix* Berk. y Br. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 165-167B. (417

* También en: Resúmenes de Investigaciones en Café (El Salvador) 5:18-21. 1983.

* _____. y JAVED, Z.U. Epocas de aplicación de un fungicida cúprico para el combate de la roya del cafeto, *Hemileia vastatrix* Berk. y Br. en El Salvador. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 176-178. (418

* _____. Evaluación de un programa de aspersión de fungicidas sistémicos y cúpricos durante la época lluviosa y seca en el combate de la roya del cafeto, *Hemileia vastatrix* Berk. y Br. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 168-175. (419

* HASHIZUME, H. y MATIELLO, J.B. Diferentes processos de aplicação do fungicida sistêmico Triadimefon no contrôle da ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 139-140. (420

* _____., MATIELLO, J.B. y MIGUEL, A.E. Diferentes processos de aplicação de fungicidas sistêmicos no contrôle a ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 208-211. (421

* INDIA COFFEE BOARD. RESEARCH DEPARTMENT. Thirty-fourth annual detailed technical report, 1980-81. Karnataka, India, 1981. 171 p. (422

Included in the Plant Pathology section (86-98) are the results of trials on the control of rust (*Hemileia vastatrix*) with Plantvax (oxycarboxin), Vitavax (carboxin) and Bayleton (triadimefon). Experiments were also carried out against brown eyespot (*Cercospora coffeicola*) with oxycarboxin, triadimefon and Bavistin (carbendazim). A survey was conducted to estimate the incidence of root disease (*Fusarium oxysporum* f.sp. *coffeae*). (Review of Plant Pathology 61(10):5771. 1982).

* _____. Thirty-fifth annual detailed technical report, 1981-82. Karnataka, India, 1982. 198 p. (423

Included in the Plant Pathology section (90-106) are the results of trial on the control of leaf rust (*Hemileia vastatrix*) with Plantvax (oxycarboxin) and Bayleton (triadimefon). Experiments were also carried out against black rot, *Fusarium* root disease and brown eye spot. New records included blight caused by *Phoma costarricensis* and seedling leaf rot due to *Rhizoctonia solani*. (Review of Plant Pathology 63(2-3):642. 1984).

* JAVED, Z.U.R. Established procedures for laboratory and field screening of new fungicides for control of coffee diseases in Kenya. Kenya Coffee 44(524):11-19. 1979. (424

The screening procedures established at the Coffee Research Station against *Hemileia vastatrix* and *Colletotrichum coffeanum* (*Glomerella cingulata*) are described. Included are accounts of experimental design, disease and yield evaluations, pricing, long-term screening of recommended fungicides, compensation for crop loss in commercial trials and withdrawal of fungicides. (Review of Plant Pathology 59(11):5198. 1980).

* _____. Effectiveness of new and recommended fungicides in controlling coffee leaf rust during 1978. Kenya Coffee 45(533):249-254. 1980. (425

Hemileia vastatrix was effectively controlled by the new fungicides EL-228 at 0.3%, San 26940 WDC at 0.3% and Dekotan (0.5%). Delan 75% WPat 0.3%, 0.27% and a tank mixture of captafol + dithianon (0.2% + 0.15%) were less effective. A tank mixture of captafol + Perenox (0.2% + 0.5%) was as effective as the standard cuprous oxide (0.7%). Cuprous oxide (87% Cu) and Burcop tested at various rates failed to give good control. The implications of these results are discussed. (Review of Plant Pathology 60(7):3784. 1981).

* _____. Establishment procedures for laboratory and field screening of new fungicides for control of coffee diseases in Kenya. Kenya Coffee 46(540):93-100. 1981. (426

Describes the methodology used for testing new fungicides mainly against *Hemileia vastatrix* and *Colletotrichum coffeanum* in Kenya.

* JAVED, Z.U.R. Field trials with new and recommended fungicides for leaf rust control during 1979. Kenya Coffee 46(538):19-24. 1981. (427

During the 1978/79 season and under high leaf rust epidemic, the new fungicides, Haitin, Plantvax and EL-228 at various rates tested in the field were found effective against leaf rust. Antracol 70% WP at one site did not control leaf rust significantly. Of the recommended fungicides tested for their efficacy against leaf rust, Sicarol 15% OD gave poor control of leaf rust. Perenox 50% WP at 0.7% controlled leaf rust effectively and also gave high yields. The effects of all other anti-rust fungicides on yields are discussed in this report.

* _____. Field trials with new and recommended fungicides for leaf rust control during 1980. Kenya Coffee 46(545):239-245. 1981. (428

In 1980 the new fungicides Vigil (0.3%) A 6054A (0.5%) and Plantvax (0.75%) were effective in controlling leaf rust at two different sites. EL-228 (0.1%), Polyoxin Z (0.4%), Antracol (0.4%) and Haitin (0.4%) were not successful in controlling leaf rust effectively. Dacobre 500 (0.7%) was found effective against leaf rust under low rust epidemic conditions. Of the recommended fungicides Perenox (0.7%) and Bayleton (0.1%) controlled leaf rust effectively but Du-Ter Extra (0.27%) gave poor control of leaf rust. All the new products except Dacobre 500 (0.7%) gave significantly lower yields compared to the standard product Perenox (0.7%) in Thika River Trial I during the 1979/80 period. Plots sprayed with Du-Ter (0.27%) and Bayleton (0.1%) also recorded lower yields compared to the standard treatment at one site (Thika River Trial I).

_____. Efficacy of various 50% formulations of cupric chloride against leaf rust in Kenya. Kenya Coffee 47(551):51-56. 1982. (429

During 1979 and 1980 seasons and under high and moderate leaf rust epidemics various 50% formulations of cupric chloride, Copsap, Pereclor, Cobox, Cupravit and Vitigran conc. at application rates of 0.7% were effective against leaf rust at two different sites. Plots sprayed with Copsap, Pereclor, Cobox,Cupravit and Vitigran conc. gave yields as high as the standard product Perenox (0.7%); Kauritil and Cobre Oleoso did not give satisfactory leaf rust control. Cuprossina (Cuprous oxide) at the application rate of 0.7% was found effective against leaf rust in these trials.

_____. Field efficacy of Bayleton 25% WP against coffee leaf rust in Kenya. Garcia de Orta (Série Estudos Agronômicos) 9(1-2):111-118. 1982. (430

The field experiments in 1978-79, four or six sprays of Bayleton 25% WP at different application rates applied throughout the season gave significant control of leaf rust but Bayleton sprayed plots gave yields lower than the unsprayed plots. Two sprays of Bayleton (0.2%) applied as curative sprays after 20% rust levels in the field were effective in controlling leaf rust and had no

adverse effect on the yield. Four or six sprays of Perenox 50% WP (0.7%) applied throughout the season gave significant control of leaf rust and Perenox sprayed plots gave higher yields. It is recommended, therefore, to use Bayleton 25% WP as curative fungicide and not as protective fungicide recommended previously to control leaf rust, in coffee growing areas of Kenya where both leaf rust and coffee berry disease are major problems.

* JAVED, Z.U.R. Trials with new and recommended fungicides for leaf rust control. Kenya Coffee 47(557):199-205. 1982. (431

During the 1980/81 season and under moderate leaf rust epidemic, the new fungicides Haitin, Antracol, Dacobre 500, A6054A and A6097B were found effective against leaf rust but all these products gave lower yields compared to the standard product Perenox 50% WP. MK-23 was significantly inferior in controlling leaf rust. Of the recommended fungicides tested for their efficacy against leaf rust, Sicarol 15% O.D. gave poor control of leaf rust and recorded very low yield. Bayleton and Du-Ter Extra gave effective leaf rust control but both products gave yields significantly lower than the standard product. Practical implications of the results are discussed.

* _____. Effectiveness of reduced rates of cuprous oxide and cupric hydroxide in controlling coffee leaf rust in Kenya. Turrialba (Costa Rica) 33(4):351-360. 1983. (432

Se encontró que la aplicación de 0.35% (3.8 kg/ha) óxido cuproso (Perenox y Copper Nordox) e hidróxido cúprico (Kocide 101) son eficientes en el control de la roya del café en tres sitios con alta infestación de roya durante los períodos 1979 y 1980. Con la atomización con niveles bajos (0.35%) de Perenox, Copper Nordox y Kocide 101 se obtuvo rendimiento tan alto como los obtenidos al aplicar los resultados al 0.7%. Por lo tanto, se recomienda aplicar 3.8 kg/ha de Perenox, Copper Nordox y Kocide 101 para el control de la roya del café en Kenia.

* KANNAN, N. y MUTHAPPA, B.N. Effect of plantvax 20 Ec with an adjuvant on coffee leaf rust. Journal of Coffee Research 11(2):52-53. 1981. (433

* _____. y MUTHAPPA, B.N. Compatibility and bioefficacy of Bayleton with foliar nutrients and insecticides. Indian Coffee 49(1):11-12. 1985. (434

* KASPERS, H. y PATEL, N.K. Trials for the control of coffee leaf rust (*Hemileia vastatrix* Berk. et Br.) in Kenya. Pflanzenschutz-Nachrichten Bayer 33(2):152-164. 1980. (435

Se informa sobre nueve ensayos con Bayleton 25 WP para combatir la roya del cafeto (*Hemileia vastatrix* Berk. et Br.) en Kenia. Como indican los resultados, Bayleton resulta excelentemente apropiado para el control de la roya. Bayleton controla la roya del cafeto preventiva y erradicante. Después de tratamientos tanto erradicativos como preventivos, el rendimiento de cafetos aumenta considerablemente en comparación con el

testigo no tratado. Pueden considerarse como valores informativos en el tratamiento preventivo dosificaciones de 0,5-1 k g de Bayleton 25 WP/ha, aplicadas a intervalos de aproximadamente cuatro semanas y en el caso del método erradicativo un tratamiento con 2 kg de preparado/ha. Al presentarse nuevas infecciones conviene efectuar un segundo tratamiento con 1 kg de preparado/ha.

* KIRANGU, A.W. y JAVED, Z.U.R. Comparative efficacy of nine fungicides for control of coffee leaf rust in the 1981/82 period in Kenya. Kenya Coffee 48(567):169-174. 1983. (436

Efficacy of nine fungicides, Calirus 50% WP, A6097A 25% EC, Perenox 50% WP, Delan 75% WP, Copper Nordox 50% WP, Kocide 101 50% WP, Sicarol 15% OD, Duter Extra 47.5% WP and Bayleton 25% WP, was compared for the control of coffee leaf rust under field conditions. All the fungicides effectively controlled coffee leaf rust under high epidemics. Under high disease pressure, at Azania, Calirus 50% WP (0.3 & 0.2%) (% concentration is based on formulated product), A6097A 25% EC (0.1%), Delan 75% WP (0.3%), Copper Nordox 50% WP (0.35%) and Kocide 101 50% WP (0.35%) sprayed plots gave yields as high as plots sprayed with Perenox 50% WP (0.7%), which was used as a standard fungicide. The rest of the fungicides i.e. Duter Extra 47.5% (0.27%), A6097A 25% EC (0.2%) and Sicarol 15% OD (0.4%) gave much lower yields than Perenox 50% WP (0.7%) sprayed plots. The implications of these results are discussed.

* KUSHALAPPA, A.C. Un sistema de previsión de roya del cafeto y su empleo en la selección de épocas de aplicación de fungicidas. In Taller Regional del PROMECAFE sobre Epidemiología de la Roya del Cafeto, Antigua, Guatemala, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 354. 1985. pp. 124-130. (437

* LEANDRO, G. y SOTO, C.A. Evaluación de fungicidas para el combate de *Mycena citricolor* y *Cercospora coffeicola* en café. Agronomía Costarricense 4(1):41-45. 1980. (438

El presente trabajo se realizó en San Juan Sur de Turrialba. Se evaluaron varios productos en el combate de enfermedades foliares del café, algunos de los cuales se han reportado como de buen control sobre la roya del café. Los productos evaluados fueron Captafol, Clorotalonil, Piracarbolid, Triadimefón, Oxicloruro de cobre, arseniato de plomo y las siguientes mezclas preparadas por los fabricantes: Captafol con hidróxido de cobre y sulfato de zinc; clorotalonil con hidróxido de cobre; óxido cuproso con sulfato de manganeso y sulfato de zinc; Maneb y Zineb con oxicloruro de cobre; sulfato tetracúprico y tricálcico. En relación a *Mycena citricolor* los tratamientos que presentaron menor número de lesiones con gemas y menor número de gemas por hoja fueron el arseniato de plomo y el triadimefón. Aunque la infección de *Cercospora coffeicola* fue moderada se encontraron diferencias significativas entre tratamientos; los más eficaces fueron Piracarbolid más oxicloruro de cobre, Triadimefón más oxicloruro de cobre y la mezcla de óxido cuproso con sulfato de manganeso y sulfato de zinc alternando con la mezcla de Maneb y Zineb con oxicloruro de cobre y sulfato tetracúprico y tricálcico.

* LOPEZ ALZATE, R. et al. Estudio económico de aspersiones para un eventual control de la roya del cafeto (*Hemileia vastatrix* Berk. y Br.). Cenicafé (Colombia) 32(2):54-68. 1981. (439

The present work was designed in order to know the physical and monetary expenses, at both the farming and the national level, for the chemical control of coffee leaf rust (*Hemileia vastatrix* Berk. & Br.) in Colombia. The work was carried out in the absence of the disease in nine coffee farms covering different ages of coffee tree development (6-12, 12-24, and older than 24 months), and located in terrain of different slopes (0-30, 30-60 and 60-90%). The total costs of spraying to the hectare of coffee under the different conditions analyzed varied between 232 and 3,238 pesos for the hand operated knapsack sprayer and between 246 and 3,945 pesos for the motorized knapsack sprayer. Among the components of the costs of spraying, the greater ones were hand labor and fungicides, which represent 44 and 30% of the total costs, respectively. It was found that both the age of the plantation and the slope of the terrain have a notorious influence on the cost of leaf rust control which do not allow to generalize the cost of this practice. Of the equipments tested, the pressurized knapsack sprayer seems to be the most adequate for the conditions prevailing in the Colombian coffee zone. If at the national level it were necessary to undertake a control program of this disease, the basic expenses needed to spray five times a year, under the conditions of the present study, would mean 7,150 millions of pesos for the coffee farmers for the first year. This amount of money would be distributed as follows: 18% for buying manual equipment, 23% for fungicides, and 59% for hand labor. It is concluded that in order to control coffee leaf rust in Colombia it is necessary to allocate a sizeable amount of resources; some of them would have to be transfered from another economic sector or activity (hand labor) which in turn would increase its cost or in some other cases they would have to be imported (equipment and fungicides) thus causing a decrease in the country's foreign income.

* MANSK, Z. y MATIELLO, J.B. Doses de fungicidas sistêmicos para o controle da ferrugem do cafeeiro com uma única aplicação. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 30-31. (440

* _____. y MATIELLO, J.B. Efeito de novos fungicidas sistêmicos no contrôle à ferrugem do cafeeiro, *H. vastatrix* Berk. e et Br. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 177-178. (441

* _____. y MATIELLO, J.B. Efeito de dosagens dos fungicidas Bayleton e Delan no controle à ferrugem e na produção do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, Sao Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 143-144. (442

* MANSK, Z. y MATIELLO, J.B. Estudo sobre dosagem de fungicidas sistêmicos e suas associações com ox. de cobre no controle à ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 153-155. (443

* _____. y MATIELLO, J.B. Estudo sobre dosagem de novos fungicidas sistêmicos no controle a ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 151-152. (444

_____. y MATIELLO, J.B. Acção do fungicida sistêmico Triadimefon (Bayleton 25PM) em relação a ferrugem do cafeeiro (*H. vastatrix* Berk. et Br.). In International Scientific Colloqium on Coffee, 10th, Salvador, Brazil, 1982. Proceedings. s.n.t. pp. 537-540. (445

The curative and translocation action of the 'Bayleton 25-WP' on coffee leaf rust was studied under field conditions. In the translocation assay the coffee seedlings were inoculated with rust uredospore 3 days before the fungicide application, 2,5 g/l of water and 2 ml/plant. The following treatments were studied: translocation between 2 pairs of terminal leaves and 2 pairs of basal leaves; between 2 pairs of basal leaves and the terminals; between opposite leaves of 2 nodes; between the halves of a same leaf; between the basical and apical parts of a same leaf and throughout the radicular system. For the curative effect study, the lateral branches of adult coffee trees were previously inoculated, and the fungicide applied in the dose of 5 g/l of water, after 5, 10, 15, 20, 25, 30 and 35 days of the inoculation. Partial translocation was observed between the pairs of leaves in the vertical and horizontal senses not sufficient enough to stop the uprising of the lesions. Total translocation occurred between the parts of a same leaf and through the radicular system, inhibiting the development of the lesions and avoiding defoliation. The curative effect was observed from 5 days up to 35 days after inoculation with the following changes: no more uprising of the lesions, paralisation of the lesions which had already appeared and the elimination of the uredospores. In a field trial Bayleton was tested in 3 doses, 1g, 2g, and 3g per coffee plant in 3 sprays a year, from January to March each year, during 5 years (1977-81). The curative effect of Bayleton resulted in better foliation and high production. No phytotoxic or negative effects were observed even in the 3g/plant dose. The Bayleton 1g/plant gave similar results in production (average of 5 years) to 3g/plant of copper-oxichloride.

** _____. y MATIELLO, J.B. Efeito do ciclo bienal de produção do cafeeiro em relação ao no. de aplicações do fungicida sistêmico Bayleton (Triadimefon 25PM) no contrôle a ferrugem (*H. vastatrix*). In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 123-125. (446

** MANSK, Z. y MATIELLO, J.B. Estudos sobre novas formulações cúpricos no controle à ferrugem do cafeeiro (*H. vastatrix*, Berk. et Br.). In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 199-200. (447

* _____. y MATIELLO, J.B. Efeito de fungicida Bayleton, aplicado isoladamente ou associado a oxicloreto de cobre, sobre cafeeiros com diferentes índices de infeção de ferrugem (*H. vastatrix* Berk. et Br.). In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 613-619. (448

O fungicida sistêmico Bayleton (Triadimefon 25%) foi testado na dose de 1600 g por mil cafeeiros, isoladamente, em mistura ou alternancia com Oxicloreto de cobre 50% na dose de 3200 g por mil cafeeiros por aplicação, iniciando-se o tratamento com diferentes índices de infeção da ferrugem (*H. vastatrix*). Concluiu-se que é perfeitamente possível usar esquemas de controle baseados em índice de infeção, usando o efeito curativo do Bayleton ou suas associações com Oxicloreto de Cobre. Até a faixa de 20 a 40% de infeção para inicio de controle conseguiu-se manter, no final do ciclo da doença, bom nível de enfolhamento das plantas.

* _____. y MATIELLO, J.B. Estudo sobre dosagens de fungicidas sistêmicos e suas associações com oxicloreto de cobre no controlo à ferrugem do cafeeiro. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 583-589. (449

Foi estudada a aplicação isolada e em mistura dos fungicidas sistêmicos Bayleton (Triadimefon) e PP 296 (exp. ICI) com fungicida cúprico, no controle da ferrugem do cafeeiro (*H. vastatrix*) em Venda Nova-ES, Brasil.

Testou-se doses de 0,5 a 1 g/por planta dos fungicidas, mais 2 g de oxicloreto de cobre 50%. Os resultados de infeção, desfolha e produção no período de 1980/81, mostraram que os tratamentos com Bayleton puro ou associado ao oxicloreto de cobre foram superiores, sendo que a associação com cobre foi significativa com a dose mais baixa de Bayleton e ambas as doses do PP 296.

* MARIOTTO, P.R. et al. Estudo da época e número de aplicações de fungicidas cúpricos para o controle da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.) nas condições do Estado de São Paulo. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Ribeirão Preto/SP, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 313-315. (450

In field trials at several places 50% copper oxychloride at 3 and 6 kg was sprayed at 400 1/1000 holes. Infection was estimated by picking from the middle-lower third of each plant 10 leaves at random, in all 100 leaves/plot. Disease incidence was min. with monthly sprays, ending in March and April. At most places significant differences were found between the doses. In general yield was maximum with programmes that resulted in minimum infection. (Review of Plant Pathology 61(1):252. 1982).

* MARIOTTO, P.R. et al. Estudos sobre o controle químico da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.) e seus efeitos na produção nas condições do Estado de São Paulo. Biológico (Brasil) 45(9/10):165-174. 1979. (451

Foram instalados em 8 diferentes localidades do Estado de São Paulo (Votuporanga, Oswaldo Cruz, Catiguá, Jaú, Ipauçu Garça, São João da Boa Vista e Mococa) experimentos visando determinar a época, dose e número de aplicações necessários para o controle químico da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.). A época de maior eficiência para utilização de produtos químicos no controle da doença, esta compreendida entre os meses de novembro a março-abril, em aplicações mensais. O término antecipado das aplicações no mês de febereiro ou programas de controle com término em março ou abril e com intervalos de 60 días entre as pulverizações, podem propiciar principalmente, em anos de condições favoráveis ao desenvolvimento da doença, uma sensível elevação do nível de infecção ao final do ciclo, e causar pela acentuada desfolha um agravamento dos danos prejudicando a produção do ano seguinte. Em 4 localidades a dose de 6,0 kg/1.000 covas de oxicloreto de cobre PM 50% foi superior a dose de 3,0 kg/1.000 covas no controle da doença, mas não proporcionou diferenças estatísticas significativas com relação a produção. Em regiões de menor altitude (Votuporanga e Oswaldo Cruz) a severidade da doença foi menor e seu controle químico facilitado.

* MARTINEZ SARRIA, C. Campaña de prevención contra la roya en la frontera Colombo-Venezolana. Revista Cafetera de Colombia no. 174:9-16. 1980. (452

Reviews anti-rust measures in Colombia, particularly in border areas. It is estimated that if rust were to spread through Colombia it would be necessary to apply fungicides at a rate of 5-6 kg per hectare from 6 to 8 times a year. Costs of such a programme could only be justified for modernised coffee farms and traditional farms with yields above 80 arrobas per hectare per annum. In the worst circumstances up to 110,000 families might have to abandon the coffee areas.

* MATIELLO, J.B. y MANSK, Z. Efeito de fungicidas cúpricos de baixa concentração no controle a ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 141-142. (453

* También en: Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 563-568.

Testou-se a eficiência de novas formulações de fungicidas, com baixo teor de cobre metálico, no controle da ferrugem do cafeeiro (*H. vastatrix*), em cafezal Mundo Novo, com 6 anos de idade, em Venda Nova-ES, Brasil, em 1980/81. As avaliações de infeção e desfolha permitiram concluir pela boa eficiência de formulaçoes a base de Quinolato de cobre, TOP-COP (enxofre e cobre) e calda bordaleza instantânea, que apresentaram controle satisfatório apesar do teor de cobre metálico situar-se na faixa de 250 g por hectare por aplicação.

** MATIELLO, J.B. y MANSK, Z. Efeito de doses de novas fungicidas sistêmicos associados ou não a oxicloreto de cobre, no controle a ferrugem do cafeeiro (*H. vastatrix* Berk. et Br.). In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 255-256. (454

** _____. y MANSK, Z. Efeito de fungicidas cúpricos de baixa concentração no controle a ferrugem do cafeeiro (*H. vastatrix* Berk. et Br.). In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 42-43. (455

** _____. y MANSK, Z. Sistemas de aplicação de fungicida sistêmico e efeito do tamanho da área aplicada, no controle da ferrugem do cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 313-314. (456

* MAZZONE, J. Brazil report. World Coffee 23(4):46-47. 1982. (457

A report on the mechanical coffee harvesters produced by Maquinas Agricolas Jacto, of Pompeia, Sao Paulo. The K-3 harvester moves over the coffee trees, and vibrating fibre-glass arms from the vertical axles shake off the ripe coffee berries, which are collected and separated from the leaves. It does the daily work of 150 men, harvesting a bag a minute, and can work 18 hours a day for, it is estimated, 10 years. The cost of US$80,000 is justified by experience on a plantation in Minas Gerais of 1.6 million trees, where picking costs were reduced by 50%. A fungicide-fertilizer named 'Calda Vicosa', which controls African coffee rust, has been developed by the University of Vicosa.

MEOÑO MERIDA, L.M. Determinación de la época y frecuencia adecuada para el control químico de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Tesis Ing. Agr. Guatemala, Universidad de San Carlos, 1984. 66 p. (458

* MEZA, J.M. y GIL, S. Efecto de las combinaciones de oxicloruro de cobre, urea y elementos menores en el control de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Carta Informativa ISIC (El Salvador) 6(2):2, 6. 1985. (459

* MIGUEL, A.E., MATIELLO, J.B. y ALMEIDA, S.R. Estudo do efeito de doses e época de aplicação do fungicida sistêmico Triadimefon em aplicações isoladas e associadas com fungicida cúprico, no controle à ferrugem do café. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 47-49. (460

* _____., MATIELLO, J.B. y REIS, G. N. DOS. Efeitos da aplicação de Bayleton em cafeeiros com diferentes níveis de infecção de ferrugem e em aplicação alternada ou em mistura com oxicloreto de cobre. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 54-55. (461

* MIGUEL, A.E. et al. Baixa dosagem de fungicidas cúpricos, aplicados a baixo volume, no controle à ferrugem do cafeeiro. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 541-548. (462

Em um experimento de campo, conduzido no município de Lajinha-MG, Brasil, no período 1975/76 a 1978/79, estudou-se o efeito da aplicação de baixas dosagens de cobre (0; 0,25; 0,5 e 1,0 kg de Cu/ha) em emulsão água/óleo a baixo volume no controle da ferrugem e na produtividade do cafeeiro, variedade Mundo Novo, 6 anos de idade, espaçamento 4 x 2 m.

Os dados de infecção, desfolha e produção permitem concluir ser viável reduzir as dosagens de cobre em aplicações a baixo volume, sem prejuizo para o controle da ferrugem e da produção, podendo-se recomendar em anos de alta produção 1,00 kg de Cu/ha e em anos de baixa produção 0,50 kg Cu/ha/aplicacao.

* _____. et al. Efeito da aplicação de fungicidas cúpricos em cafeeiros com diferentes graus de intensidade de ataque de ferrugem. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 627-634. (463

Em um experimento de campo, conduzido no município de Abre Campo-MG, Brasil, no período 73/74-77/78, estudou-se o efeito de diferentes níveis iniciais de infecção e sua influencia no controle final da ferrugem (*H. vastatrix*), em cafeeiros da variedade Mundo Novo, com 5 anos de idade, plantados no espaçamento de 4 x 2 m. As aplicações variando de 1 a 5 conforme o tratamento, foram realizadas com fungicida cúprico na dosagem de 4,0 kg/ha, aplicado a alto volume no período de Nov.-Dez. a Março-Abril.

Os dados de infecção, de desfolha e produção permitem concluir que com índices iniciais de infecção até na faixa de 10 a 20% é possível conseguir bom controle da ferrugem utilizando-se fungicida cúprico.

* _____. y MATIELLO, J.B. Estudo do comportamento do fungicida sistêmico aplicado no solo em diversas doses e em diferentes épocas no controle à ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.). In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 557-562. (464

Testou-se doses de 1 a 3 g/planta/aplicação de Bayleton (Triadimefon - 25%), aplicado no solo, em 3 épocas, com aplicações em fevereiro; janeiro e fevereiro; e janeiro e março, visando o controle à ferrugem do cafeeiro (*Hemileia vastatrix*). Comparou-se a eficiência de controle, com aplicações foliares de 1 g/planta em 2 aplicações em janeiro e março.

O Bayleton, nas doses mais elevadas de 2 a 3 g/planta/aplicação, em janeiro e fevereiro, deu um controle satisfatório da doença, com índices de infeção de 5 a 9%, sendo que a aplicação foliar foi de 6% e as parcelas não tratadas atingiram a 58% de folhas infectadas.

* MILLA FLOR, S. DE J. y VEGA ROSALES, M.I. Evaluación de insecticidas recomendados como efectivos en mezcla con oxicloruro de cobre 50% metálico para el combate simultáneo de minador de la hoja y roya del cafeto. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 102-106. (465

* _____. y VEGA ROSALES, M.I. Evaluación de nuevos plaguicidas en diferentes dosis en mezcla con oxicloruro de cobre para el combate simultáneo de minador de la hoja y roya del cafeto. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 99-101. (466

* _____. y VEGA ROSALES, M.I. Evaluación de nuevos plaguicidas en mezcla con oxicloruro de cobre 50% metálico para el combate simultáneo de minador de la hoja y roya del cafeto. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 107-111. (467

* MULLER, R.A. Contribution a la connaissance de la phytomycocénose constituee par *Coffea arabica* L., *Colletotrichum coffeanum* Noack (Sensu Hindorf), *Hemileia vastatrix* B. et Br., *Hemileia coffeicola* Maublanc et Roger. Institut Français du Café et du Cacao. Bulletin no. 15. 1980. 174 p. (468

This study presents a synthesis of results obtained in Cameroon during the 1958-1973 period. Whereas control of the three pathogens normally requires seven or eight copper fungicide applications it was found that with appropriate irrigation at an early stage of growth it was possible to weaken the effects of the pathogens and reduce fungicide applications to three only.

MUTHAPPA, B.N. y NIRMALA KUMARI, K. Persistance of curative and prophylactic fungicides in coffee plants for control of leaf rust. Pesticides 13(8):35-36, 39. 1979. (469

Foliar applications of oxycarboxin persisted in field coffee for 40 days and soil applications for 50 days, after which leaves were again susceptible to *Hemileia vastatrix*. Bordeaux showed prolonged persistance on the leaf surface and prevented infection for up to 120 days. (Review of Plant Pathology 59:4192. 1980).

* _____. Preparation of Bordeaux mixture. More light on lime. Indian Coffee 43(12): 361, 364. 1979. (470

_____. Integrated control of coffee leaf rust using curative and prophylactic fungicides- a new strategy. In Symposium on Plantation Crops Plant Protection, 2nd, Ootacamund, 1979. Proceedings. Kasaragod, Kerala, 1980. pp. 109-117. (471

* _____. Plantvax for coffee rust control in India. Indian Coffee 54(7):145-152. 1980. (472

Plantvax 20 EC, a systemic fungicide, has eradicant, curative, antisporulant and protective action on *Hemileia vastatrix*. It is a quick acting fungicide showing lethal effect on *H. vastatrix* in about 48-72 hours. It moves upwards in the coffee plants.

In bio-efficacy Plantvax is superior to prophylactic Bordeaux mixture. It affords 90-95% control of leaf rust. Effective rate of application is 0.02-0.05% a.i. in high volume spray machines and 0.05-0.1 a.i. in low volume spray machines. For economic reasons 0.02-0.03% a.i. for high volume and 0.05-0.075% a.i. for low volume may be chosen as standard rates. Plantvax is effective for about 50-60 days and the interval between 2 sprays should not be more than 60-65 days. The common races infecting Arabica coffee are sensitive to Plantvax. No resistant or tolerant race has been detected so far. No adverse effect on the vegetative and reproductive growth of coffee plants has been noticed so far. Plantvax affords good retention of foliage with dark green colour ('Tonic' effect). Coffee beans were free of harmful chemical residue. Coffee roots absorb Plantvax and translocate it to foliage controlling *H. vastatrix*. There is scope for using Plantvax as a soil fungicide to replace the foliar spray application if found economical. Plantvax is compatible with fungicides (copper oxychloride, Bayleton and Bavistin), insecticides (quinolphos, methyl parathion, fenthion and phenthoate), foliar fertilizers (urea, ammophos, muriate of potash and zinc sulphate) and plant hormone (napthyl acetic-acid-NAA). Integrated control with prophylactic fungicide Bordeaux mixture alternating with Plantvax has been found effective. Severely infected as well as moribund leaves were shed in about 6-10 days after application of Plantvax due to formation of abscission layers.

* MUTHAPPA, B.N. y KANNAN, N. Efficacy of Vitavax 75 WP for control of coffee rust. Journal of Coffee Research 11(2):47-48. 1981. (473

Vitavax (carboxin) 75 WP at 0.3% a.i. effectively controlled *Hemileia vastatrix* on coffee cv. Kent in glasshouse tests for up to 50 days. (Review of Plant Pathology 60(11):5942. 1960).

_____. Field efficacy of Bayleton 25 EC for control of coffee leaf rust. Journal of Coffee Research 11(1):4-6. 1981. (474

Bayleton 25 EC (triadimefon) proved effective for control of coffee leaf rust caused by *Hemileia vastatrix*. Germination of uredospores was totally inhibited at 0.02% and higher active ingredient (a.i.) concentrations. Bayleton showed in vivo a delayed action on *H. vastatrix*. Its lethal effect on the rust fungus became evident in about 25 to 30 days after the spray application and lasted for a further period of about 50 to 60 days. The effective rate of Bayleton 25 EC for spray application was found to be 0.02% a.i.

* _____. y AHMED, A. A new technique in coffee rust control; treat soil with granular fungicides. Indian Coffee 45(1):1-2. 1981. (475

Plantvax 5G (oxycarboxin) in the soil in a granular formulation at 2g/plant or higher gave control of *Hemileia vastatrix*. (Review of Plant Pathology 61(7):3485. 1982).

* NATARAJ, T. y MUTHAPPA, B.N. Compatibility of Plantvax 20 EC with agricultural chemicals. Journal of Coffee Research 11(1):16-18. 1981. (476

The efficacy of Plantvax (oxycarboxin) against *Hemileia vastatrix* on coffee when mixed with various other pesticides and fertilizers just before spraying is tabulated. No deleterious effects were observed. (Review of Plant Pathology 60(8):4463. 1981).

* _____. y MUTHAPPA, B.N. Field efficacy of Bayleton 25 EC for coffee leaf rust control in low volume spray. Journal of Coffee Research 14(1):7-13. 1984. (477

In low volume spray, Bayleton 25 EC (triadimefon) exhibited systemic, curative, eradicant, antisporulant and protective action against coffee leaf rust fungus, *Hemileia vastatrix* Berk. et Br. As a foliar spray, Bayleton was significantly superior to Bordeaux mixture in effect and afforded prolonged protection than Plantvax 20 EC. Disease build up was significantly less even 90 days after the spray. Uredospore germination was inhibited at 0.02% a.i. and higher concentration of Bayleton. A quantity of 500 ml of the spray solution per plant was sufficient to provide good spray coverage.

* OSEGUERA V., S., BONILLA B., C.A. y HERRERA E., J.S. Evaluación de fungicidas en el control de la roya del café (*Hemileia vastatrix* Berk.). In Seminario Nacional de Investigación Cafetalera, 2°, Tegucigalpa, 1982. Memoria. Tegucigalpa, 1982. pp. 126-130. (478

* _____., BONILLA B., C.A. y HERRERA E., J.S. Evaluación de diferentes dosis y frecuencias de aspersión de un fungicida cúprico en el control de la roya del café (*Hemileia vastatrix* Berk. & Br.). In Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 323. 1983? pp. 111-116. (479

* PAIVA, F. DE A. et al. Efeito de diferentes épocas de aplicação de fungicida cúprico no controle da ferrugem do cafeeiro. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte/MG. Projeto café; resumos de trabalhos. Belo Horizonte/MG, Brasil, EPAMIG, 1980. pp. 127-133. (480

* PALMA, M.R., RIVERA C., J.M. y OSEGUERA V., S.H. Evaluación de programas de aspersión para control de roya del cafeto en Olancho. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 243-256. (481

En el presente estudio, iniciado en 1983, se está tratando de determinar la época más adecuada de iniciación y número mínimo de aplicaciones de Oxicloruro de Cobre requeridas para control efectivo de la roya del cafeto en Olancho. Siete programas de aspersión fueron evaluados en comparación a un testigo no tratado, a saber: a) aspersiones mensuales (6) de mayo a octubre; b) aspersiones mensuales (5) de junio a octubre; c) aspersiones mensuales (4) de junio a setiembre; d) aspersiones mensuales (4) de julio a octubre; e) aspersiones mensuales (3) de julio a setiembre; f) aspersiones bimensuales (3)

de mayo a setiembre; y g) aspersiones bimensuales (3) de junio a octubre. No se encontró diferencia estadística entre efectuar 6, 5, 4 ó 3 aspersiones, aunque aparentemente mayor número de aplicaciones determinaron niveles menores de incidencia. El testigo mostró niveles de incidencia muy superiores y estadísticamente diferentes a los mostrados por los programas. Los resultados sugieren que un programa de 3 aspersiones podría adaptarse a la zona, información que podrá confirmarse en el segundo año de conducción del estudio.

* PARA EL combate químico eficiente contra la roya recomendamos..... Carta Informativa ISIC (El Salvador) 3(5):8. 1981. (482

* PAUL, V. y PATEL, N.K. Studies on the curative and eradicative action of Bayleton against *Hemileia vastatrix* Berk. et Br., the causal organism of coffee rust. Pflanzenschutz-Nachrichten Bayer 33(2):108-122. 1980. (483

Se investigaron los efectos curativos y erradicativos de Bayleton, contra *H. vastatrix* en cafetos. El efecto curativo se manifiesta de manera que las manchas causadas por la infección de *H. vastatrix* se ponen pardas con un borde de verde acuoso que constituye el límite con el tejido hospedante haciendo que el agente patógeno ya no esté en condiciones de continuar creciendo y de esporular. El efecto erradicativo se hace patente por el bloqueo de crecimiento de las pústulas, un típico cuadro macroscópico de síntomas de necrosis así como por una merma de la formación de uredósporas. La cuota de germinación de las uredósporas de las pústulas de roya del cafeto tratadas con Bayleton disminuye en la medida que aumenta la duración de acción del preparado.

* PAULINO, A.J., MATIELLO, J.B. y MANSK, Z. Controle da ferrugem do cafeeiro em café 'Conilon' (*Coffea canephora*) na região do Norte do Espítiro Santo. Fitopatologia Brasileira 5(3):436. 1980. (484

Sólo sumario.

Presentado en: Congresso da Sociedade Brasileira de Fitopatología, 13°, Río de Janeiro, 1980.

A espécie *Coffea canephora* var. Conilon, cultivada nas regiões de baixa altitude no Espírito Santo, não tem sofrido efeitos sensíveis pela infecção de *H. vastatrix*, ao contrário do que se observa na prática com cafeeiros de *C. arabica* nas vizinhanças. Ensaio de controle à ferrugem em lavoura de café Conilon, mostrou a eficiência de produtos cúpricos e organicos, reduzindo os índices de infecção, sem respostas sobre a produção. Instalou-se um ensaio de 1976, em São Gabriel da Palha-ES, em cafezal Conilon c/3 anos de idade, para: estudar o cobre como fungicida e nutriente, verificar os reflexos da ferrugem sobre a produção e observar aspectos de resistência horizontal. O ensaio constou de 3 tratamentos (e 10 rep.): 1) Pulverização c/oxicl. de cobre 50% (4 kg/ha) em nov., jan., mar., jul. e set.; 2) pulv. c/sulf. de cobre a 1% em mar., nov. e jan. e, 3) testemunha. Observou-se que, de maio/76

a maio/79, os índices de infecção na testemunha não passaram de 30-35% de fls. infectadas, nível considerado baixo e, mesmo assim, ocorrendo em fev.-abr./79, período anormalmente muito chuvoso. Igualmente, o no. médio de pústulas por folha, na testemunha, manteve-se sempre baixo e apenas raramente atingiu a 2 pústulas/folha coletada. O controle obtido com oxicl. de cobre foi eficiente, enquanto que o sulf. de cobre, introduzido para verificar o efeito de deficiência do nutriente, comportou-se como a testemunha. Os dados de produção, na média de três safras, 77, 78 e 79, indicaram: 6,8 kg de café cereja/planta com oxicl. de cobres; 6,2 kg para sulf. de cobre, e 6,0 kg para a testemunha, sem diferença estatística entre eles. Quanto à resistência horizontal, observou-se graus de infecção variados entre as plantas, registrando-se, no decorrer do ensaio, desde reações do tipo 1, resistente, predominando plantas moderadamente resistentes, com lesões do tipo flecks, muitas lesões lavadas, sem esporos, até reações do tipo 6. Verificou-se, também, uma maior permanência de folhas, mesmo com lesões, não havendo desfolhas sensíveis. Conclui-se que a interação doença-planta-clima, na região, não propiciou efeitos significativos do controle da ferrugem sobre aumento de produtividade de cafeeiros conilon.

* PEREIRA, A.A. et al. Efeito de diferentes doses de fungicida cúprico, no controle da ferrugem do cafeeiro, *Hemileia vastatrix* Berk. et Br. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte/MG. Projeto café; resumos de trabalhos. Belo Horizonte, Brasil, EPAMIG, 1980. pp. 114-126. (485

* PEREZ, F.B. Evaluación de fungicidas y dosis en laboratorio para el combate de la roya del café (*Hemileia vastatrix* Berk. et Br.). In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 138-148. (486

* Resumen en: Carta Informativa ISIC (El Salvador) 5(3):2-4. 1985.

* PERRIN, D.D. Bioinorganic chemistry and complex formation in the control of pathogenic fungi. In Seminario sobre la Lucha contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 245-257. (487

* RAJENDRAN, C. y NATARAJ, T. Use of systematic fungicides in coffee with special reference to leaf rust. Indian Coffee 47(7):13-14. 1983. (488

Presentado en: Planters' Meeting, Somwarpet, 1983.

* RECOMENDACIONES GENERALES para el combate químico de la roya del cafeto (*Hemileia vastatrix*). Noticiero del Café (Costa Rica) 20(240):3-4. 1984. (489

Under Costa Rican conditions it is recommended that, after the rains start, 4-5 sprayings of copper fungicides should be carried out at 30-45 days intervals against leaf rust. A list of fungicides with commercial names and recommended doses is given. If the infection rate exceeds 20% of leaves

the use of systemic fungicides (Bayleton 25% PM, Tilt 250 cc and Sicarol 15 disp.) is recommended. (ICO. Library Monthly Entries no. 51)

* RECOMENDACIONES PARA el control de la roya en 1983. Café (Honduras) no. 42:32. 1983. (490

Leaf rust control recommendations are given for Honduras, involving four applications of copper fungicides per annum, beginning in the second half of June and continuing at monthly intervals until September, using 6 lbs. of fungicide per manzana. The following 50% copper fungicides are recommended:

Cobox	(copper oxychloride)
Parasol	(copper hydroxide)
Kocide 101	(copper hydroxide)
Copper oxychloride	(copper oxychloride)
Cupravit	(copper oxychloride)
Kauritil	(copper oxychloride)
Copper Sandox	(copper oxychloride)

* REGALADO ORTIZ, A. y PONCE DIAZ, P. Evaluación de fungicidas para el combate de la roya, *Hemileia vastatrix* en México. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 569-582. (491

* REINA M., F.E., RIVERA, J.M. y OSEGUERA V., S.H. Dosis y frecuencias de aplicación de oxicloruro de cobre para control de roya del cafeto en Santa Bárbara. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 303-314. (492

Se condujo un ensayo en 1982 y 1983 para evaluar la efectividad en el control de roya de las combinaciones de 3 dosis (1, 2 y 4 kg/ha) y 3 frecuencias de aplicación (20, 40 y 60 días entre aspersiones) de Cobox (84% Oxicloruro de Cobre), en comparación a un testigo no tratado. El análisis estadístico simple de los datos de incidencia indicó diferencias significativas entre tratamientos de setiembre a diciembre en ambos años, mostrando la mayor incidencia el testigo y 1 kg/60 días. Se practicó un análisis factorial a las combinaciones, confirmando diferencias estadísticas entre combinaciones, dosis, frecuencias y un fuerte efecto interactivo entre dosis y frecuencias. Se determinó estrecha relación entre niveles de incidencia en 1982 y rendimientos obtenidos en 1983-84. Los mejores tratamientos en términos de control y rendimiento fueron: 4 kg/ha cada 20, 40 y 60 días y 2 kg/ha cada 20 y 40 días.

* REIS, G.N. DOS, MATIELLO, J.B. y MANSK, Z. Epoca de controle à ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.) na Bahía. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campo do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 185-187. (493

* RIVERA C., J.M. Recomendaciones para el control químico de la roya del cafeto. COMUNIHCAFE (Honduras) 3(2):10. 1984. (494

* RIVERA RUANO, J.L. Evaluación del grado de estabilidad del cobre en forma total y soluble, en el cultivo del café, bajo condiciones normales de precipitación, en el Municipio de Barberena. Tesis Ing. Agr. Guatemala, Universidad de San Carlos, 1978. 27 p. (495

* RUBIO C., A., RIVERA, J.M. y OSEGUERA V., S.H. Evaluación de programas de aspersión para control de roya del cafeto en Santa Bárbara. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 279-288. (496

Se condujo un estudio durante 1982 y 1983, con el objetivo de determinar (1) época apropiada para iniciación y (2) número mínimo de aspersiones con cobre requeridas para control efectivo de roya del cafeto. Los tratamientos incluyeron: a) 7 aspersiones mensuales iniciadas en abril; b) 6 aspersiones mensuales iniciadas en abril; c) 5 aspersiones mensuales iniciadas en mayo; d) 4 aspersiones mensuales iniciadas en mayo; e) 3 aspersiones bimensuales iniciadas en mayo; f) 4 aspersiones mensuales iniciadas en junio; y g) testigo no tratado. No se encontró diferencia en términos de porcentaje de hojas con roya entre aplicar 7 ó 6 aspersiones a partir de abril y 5 ó 4 aspersiones a partir de mayo, tratamientos todos que ejercieron control satisfactorio de la enfermedad. Programas iniciados en junio o que involucraron aplicaciones bimensuales no ejercieron buen control. El grado de incidencia registrado en 1982 mostró estrecha relación con los rendimientos obtenidos en 1983-84.

* SAN JUAN E., R., LOPEZ DE LEON, E.E. y CID, J.R. DEL. Efecto de las épocas de aplicación del fungicida oxicloruro de cobre para el control de la roya del cafeto, *Hemileia vastatrix*. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 1-23E. (497

* También en: Revista Cafetalera (Guatemala) no. 245:24, 26, 31-32; no. 246:6, 8-9, 11-12, 14, 16-18, 20-21. 1984.

* SANTACREO, R., ESCOTO, J.A. y OSEGUERA, S. Evaluación de fungicidas comerciales en el control de la roya del cafeto (*Hemileia vastatrix* Berk. et Br.) en Honduras. COMUNIHCAFE (Honduras) 3(2):19. 1984. (498

Sólo sumario.

* _____., RIVERA C., J.M. y OSEGUERA V., S.H. Evaluación de fungicidas en el control de roya del cafeto en Marcala. In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 339-346. (499

Durante 1982 y 1983 se evaluó en condiciones de campo la eficiencia en el control de roya del cafeto de los fungicidas Caldo Bordelés PROCIDA (4 kg/ha), Cobox (3 kg/ha), Daconil 2787

(3 kg/ha), Parasol (3 kg/ha); Copper Count-N (6 lt/ha), Bayleton WP (2 kg/ha), Sicarol 15 Disp. (3 lt/ha), Tricarbamix Esp. (3 kg/ha), Difolatan WP (3 kg/ha) y la mezcla de Daconil 2787 + Cobox (1.5 + 1.5 kg/ha), en comparación a un testigo no tratado. Se efectuaron 3 aspersiones espaciadas cada 60 días con Bayleton y Sicarol y 6 aspersiones a intervalos mensuales con los restantes productos. En ambos años los productos determinaron niveles de incidencia inferiores al testigo y siendo usualmente los más eficientes Cobox, Caldo Bordelés, Parasol y la mezcla de Daconil 2787 + Cobox. Se presentó efecto sobre el rendimiento en la cosecha 1983-84, registrándose los más altos rendimientos con los productos que mejor control mostraron en 1982.

* SMITH, F.E., OKIOGA, D. y KHOO, L.E. Control of coffee berry disease, coffee leaf rust and coffee bacterial blight by some new organotin compounds. International Pest Control 22(3):61, 64-65. 1980. (500

The in vitro screening results for a series of eight new organotin compounds against the three most serious diseases of *Coffea arabica* L. in Kenya are described in this report. These are coffee berry disease (CBD) caused by *Colletotrichum coffeanum* Noack sensu Hindorf, coffee leaf rust caused by *Hemileia vastatrix* B. and Br., and coffee bacterial blight (Elgon/Solai die-back) caused by *Pseudomonas syringae* Van Hall.

* SPONCHIADO, O.J. y PRESTES, A.M. Controle químico de *Hemileia vastatrix* no cafeeiro. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campo do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 158-159. (501

* TEXEIRA, A.A. et al. Efeito de fungicidas sobre a qualidade da bebida do café. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 635-649. (502

The effects of application of several fungicides for coffee leaf rust disease control on the coffee cup quality were evaluated in four experiments located in two coffee regions.

It was verified that the fungicide Plantvax-oil affects cup quality deteriorating it. Coffee samples collected in plants treated with these fungicides gave an average number of points of 0.3 similar to that of "Rio" cup inferior quality. The fungicides Claim total, Kauritil, Vitigran conc., Zincofol and Dacobre have not affected cup quality of the harvested coffee which was similar to the standard "Apenas Mole".

Copper fungicides applied as dust, Copper Oxychloride applied in several increased dosages as well as the systemic fungicide HOE 2989 have not altered the cup quality as compared to the standard sample of "Apenas Mole" type.

* VENEZIANO, W. et al. Controle químico da ferrugem (*Hemileia vastatrix* Berk. & Br.) do cafeeiro (*Coffea arabica* L.) e seus efeitos na produção nas condições do Estado de Rondônia. Biológico (Brasil) 49(5):117-123. 1983. (503

An experiment was carried out in Cacoal-RO, Brazil, during 5 years to evaluate the course of coffee leaf rust in the region and determine the number and timing for application of copper oxychloride 50% a.i. to control the disease.

Rust had a rapid development during December and January showing high incidence until harvest time. Then it progressively dropped until August, occurring in low level until October. Delaying the start of fungicide applications permitted the free development of the disease, which resulted in a negative effect, particularly on the spray programme January-April. When the end of the applications was anticipated, a high incidence of rust occurred after February, reducing the yield of the next year.

Best results were obtained when monthly applications starting in October or November were carried out until April.

* VOSSEN, H.A.M. VAN DER. Consequences of phytotonic effects of fungicide to breeding for disease resistance, yield and quality in *Coffea arabica* L. Journal of Horticultural Science 57(3):321-329. 1982. (504

Twice-yearly tonic sprays of fungicide were applied to one half of each plot in a field experiment with two cultivars and 12 progenie of single and multiple crosses of arabica coffee, which varied in resistance to coffee berry disease (CBD) and leaf rust. The tonic sprays significantly increased leaf retention, some growth characters and components of yield as well as liquor quality irrespective of cultivar or cross. Yield over four years was almost doubled in tonic-sprayed subplots of disease-resistant crosses. The incidence of CBD and leaf rust was dramatically increased by tonic sprays in susceptible cultivars or crosses. This caused heavy crop losses, mainly due to CBD, so that the susceptible tonic-sprayed subplots produced the same or even less than non-sprayed subplots. The results indicate that it will be safe to apply tonic sprays of fungicide to CBD- and leaf rust-resistant material in order to increase yields.

* WYBOU, A. y STRIPECKE, W. Control of coffee rust (*Hemileia vastatrix* Berk. et Br.) with Bayleton in Brazil. Pflanzenschutz-Nachrichten Bayer 33(2):123-151. 1980. (505

La roya del cafeto (*Hemileia vastatrix*), cuya aparición en el Brasil se comprobó en 1970 por primera vez en el Estado de Bahía, ha llegado a inficionar todas las regiones cafetaleras del Brasil. La defoliación debida a la roya del cafeto se presenta en el Brasil generalmente en la fase de desarrollo del cafeto, en la que puede perjudicar el rendimiento en la temporada siguiente.

Con una fructificación intensa y un follaje lozano, los cafetos de la variedad Mundo Novo, que en el Brasil se cultiva las más veces, son susceptibles a la roya con tal que reinen favorables condiciones macroclimáticas y microclimáticas. Como el cafeto muestra en el Brasil una marcada alternancia en la productividad, la susceptibilidad a la roya varía en una plantación de año en año.

Hasta la fecha se emplearon en el Brasil productos cúpricos para el tratamiento protector en la lucha contra la roya del cafeto. Estos tratamientos han dado lugar a una aparición incrementada del minador de las hojas del cafeto (*Leucoptera coffeella*) y de ácaros (*Oligonychus ilicis*).

En virtud de los resultados obtenidos en un gran número de primeros experimentos de campo efectuados en Kenia y el Brasil, se ha propuesto emplear Bayleton como preparado contra la roya del cafeto.

En otros ensayos llevados a cabo por nuestro propio grupo de experimentación y por el Instituto Brasileño de Café (IBC) se han investigado las eficiencias protectora, curativa y erradicativa de Bayleton. En cada momento de aplicación y con la dosificación cada vez necesaria, Bayleton mostró una fitocompatibilidad extraordinariamente buena y se logró conservar bien las hojas en el período crítico para el rendimiento.

Tanto nuestro grupo de ensayos como los experimentadores del Instituto Brasileño del Café comprobaron que grados máximos de eficacia no son imprescindibles para conseguir altos rendimientos. Con tal objeto se ha estudiado la influencia que ejerce un diferente grado de infección inicial sobre el resultado definitivo del control de la roya. Se dió a conocer que los tratamientos con preparados cúpricos han de iniciarse imprescindiblemente ya en el momento en que se muestre inficionado el 10 hasta 20% de las hojas. En caso de emplear Bayleton se puede esperar con el primer tratamiento hasta que la infección inicial haya incrementado del 20 al 40%. Bayleton tiene la propiedad de impedir la propagación de las pústulas de roya, es decir, de destruir sus uredósporas y de embarazar ampliamente la esporulación ulterior. Se logra conservar así la mayoría de las hojas inficionadas, lo que es de mucha importancia para asegurar el rendimiento en la temporada siguiente.

Como el grado de ataque que se puede tolerar hasta el comienzo de los tratamientos es para Bayleton mayor que para los productos cúpricos, se puede reducir el número necesario de los tratamientos con Bayleton. Así, en el control de la roya del cafeto en el Brasil se ahorra energía y se aumenta el efecto económico.

Combate químico

Equipo de aspersión

* ALABI, J.A. y CARCAMO, F.S. Evaluación de equipos de aspersión, con sistema de ultrabajo volumen en el combate de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 34-38. (506

* _____. y CARCAMO, F.S. Evaluación de la aspersora estacionaria John Bean en el combate de la roya del cafeto (*Hemileia vastatrix* Berk. et Br.). In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. et Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 29-33. (507

ARGUETA B., O.E. La aspersión aérea en cafetales. Revista Cafetalera (Guatemala) 6(208): 21-22. 1981. (508

* CAMPOS CAMPOS, J.C. Evaluación de equipo agrícola con diferentes sistemas de aplicación para el control de plagas y enfermedades de café. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. et Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 20-26. (509

* _____. Evaluación de equipos de aspersión en cafetales formados en parras y podados por apreciación. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 27-28. (510

* _____. Evaluación de equipos de aspersión en cafetales podados mediante sistema de verticales múltiples. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. et Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 28-29. (511

* _____. Evaluación de equipos aspersores en el combate de la roya del cafeto en El Salvador. In Reunión Regional del PROMECAFE sobre el Control de la Roya del Cafeto, San Salvador, 1984. Memoria. Editado por Zía U. Javed. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 353. 1984. pp. 135-137. (512

CARNEIRO FILHO, F. y MATIELLO, J.B. Pulverização aerea com fungicida sistêmico no controle da ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.). In International Scientific Colloquium on Coffee, 10th, Salvador, Brazil, 1982. Proceedings. s.n.t. pp. 533-535. (513

The efficiency of aerial spray with systemic fungicide in two applications was studied in comparison with terrestrial applications, to control coffee leaf rust on coffee culture. Aerial pulverizations were made in 45 x 350 m zones, with three shots, from a Cessna Agwagon plane, equipped with four Micronairs - 3000. Terrestrial applications were made with motorized knapsack mist blower. Valuation was made on the last two pairs of adult leaves

of median branches. Four branches/plants were blazed, among 40 central plants. The tests were: 1) aerial systemic - solution quantity 10 l/ha; 2) aerial systemic, 30 l/ha; 3) aerial protector, 30 l/ha; 4) terrestrial systemic, 300 l/ha; 5) terrestrial protector, 300 l/ha and 6) control. The systemic fungicide used was the TILT 250 (experimental - CGA - 64250, chemical group: Triazole), with 250 g a.i. by ha, and 4 kg/ha of copper oxichloride 35% of metallic copper protector. It was added 10% of miscible oil in aerial applications. Infection evolved from 40% of infected leaves with 3 lesions/leaf in the last two pairs of leaves, to 97% with 19 lesions two months after the applications in the control plot. In other treatments, infections were: 1) - 58% and 5 lesions; 2) - 50% and 3 lesions, 3) - 80% and 6 lesions, 4) - 42% and 3 lesions, 5) - 85% and 8 lesions/leaf. When infection was already onward, in the beginning of applications, March/82, information about infection and observation of the general aspect of plants (defoliation and production potential), showed that aerial sprays with 10 and 30 liters/ha and terrestrials with 300 liters/ha with systemic fungicide, were equally efficient, reducing infection, protecting against new inoculations and eradicating part of the inoculum. Terrestrial and aerial applications with protective fungicide were not efficient enough, with little difference from the control. (ICO. Library Monthly Entries no. 41:29-30. 1983).

* CENTRAL AMERICA gears to fight coffee rust. Planters' Chronicle 73(4):146-147. 1978. (514

* COSTA RICA. MINISTERIO DE AGRICULTURA Y GANADERIA. DEPARTAMENTO DE FITOPATOLOGIA. Evaluación de equipos de aspersión en el combate de roya. In _____. Informe anual de labores 1984. San José, Costa Rica, 1985. pp. 2-3. (515

FILANI, G.A. Comparative efficiency of four spraying pumps in delivering copper fungicide on coffe leaf surface. In International Scientific Colloquium on Coffee, 9th, London, 1980. Proceedings. Paris, ASIC, 1981. pp. 767-773. (516

Three different pneumatic and a motorised mist-blower were evaluated for their relative efficiency in spraying *Coffea arabica* against *Hemileia* leaf rust disease. The spray pattern and their sizes, flow rate, application rate, droplet size and actual chemical deposits of each of the pumps were determined. In almost all cases, Falcon was found to be most suitable; Yanmar MSI, the motorised mist-blower, although most efficient in its delivery of copper on leaf surfaces, was found to be very wasteful of fungicides, and too expensive and complicated for the ordinary coffee farmer to purchase, use and maintain properly.

LEGUIZAMON CAYCEDO, J. Development and evaluation of sprayers and application systems for dense coffee plantations and on steep slopes. In International Scientific Colloquium on Coffee, 9th, London, 1980. Proceedings. Paris, ASIC, 1981. s.p. (517

For the topografic and the planting systems of Colombian coffee plantations, it is necessary to develop equipment and

application systems to control coffee rust caused by *Hemileia vastatrix* Berk. and Br. with the above objective, in coffee plantations with different ages and slopes and with variable planting distances, tests were carried out on quantitative and qualitative covering, with fluorescent tracers, spray cards (kromecote and regopot violet) and using different stains. Also, copper deposits in leaves, using the doses of 60 miligrams of copper per square meter of foliar aaas tge stabdavk comparison, were determined. As the result of this work, we have developed new application systems: the horizontal boom adapted to conventional pressurized knap sack sprayers, with a variable number of nozzles to simultaneously spray over two or three rows above the treetops. With this system, it is possible to apply between 50 to 100 liters per hectare with a population of 10,000 coffee trees. Vertical booms adapted to conventional pressurized knapsack sprayers, with two of four nozzles for lateral applications between 20 and 100 liters was developed. These modifications guarantee application rates of at least a hectare (5.000 trees) per man-day, when traditional systems of applications only cover 1/4 of a hectare. With national factories, prototypes of pressurized knapsack sprayers were designed, of stainless steel, of low weight and with a capacity of 10 liters beginning at 40 psi of pressure with additions that permit an easy and efficient handling.

** LOPEZ CABRERA, E.A. y ECHEVERRI R., J.H. Evaluación de cuatro equipos de aspersión en tres pendientes de terreno para el combate de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Turrialba, Costa Rica, CATIE, s.f. 17 p. (518

* _____. Evaluación de cuatro equipos de aspersión en tres pendientes de terreno para el combate de la roya del cafeto (*Hemileia vastatrix* Berk. & Br.). Tesis Mag. Sc. Turrialba, Costa Rica, UCR/CATIE, 1983. 79 p. (519

* También en: Simposio Latinoamericano sobre Caficultura, 6°, Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 292-321.

* También por E.A. López Cabrera y J.A. Echeverri Rodríguez en: Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 591-611.

El presente estudio se realizó en cafetales de la Hacienda "Aquiares" en Turrialba, Costa Rica. Se evaluaron cuatro equipos de aspersión a espalda: dos manuales y dos motorizados. Entre los manuales se consideró el equipo corrientemente usado, de palanca y uno modificado de presión previa con boquilla de baja descarga y regulador de la presión de salida del líquido; los equipos de motor, uno con los aditamentos normales y el otro con boquilla de menor descarga y bomba centrífuga que da presión constante en la salida del líquido.

Los objetivos planteados fueron los siguientes: a) establecer si la calibración seleccionada para los equipos de aspersión garantizan la protección de las plantas contra el ataque de la roya del cafeto; b) determinar si es posible introducir algunas modificaciones en los equipos de aspersión para mejorar la eficiencia de aplicación; c) determinar si la pendiente del terreno afecta la eficiencia técnica y el costo económico de las aspersiones.

Los equipos fueron evaluados en tres condiciones de pendiente del terreno, plana (0-20%), media (21 a 40%), e inclinada (41 a 60%); las variables técnicas establecidas fueron, la cantidad de cobre depositado y la cobertura del follaje, además se midió la persistencia del producto. Debido a que en Costa Rica no existe la enfermedad se estableció como base de comparación la presencia por análisis de laboratorio, de cantidades cercanas a 60 mg de cobre/m^2 de área foliar, establecido por Wallis y Firman como suficientes para el combate de la roya. Además de la evaluación técnica se hizo una económica para establecer el costo de aspersión para los equipos, en las diferentes situaciones de pendiente estudiadas.

Se observó que todos los equipos de aspersión depositaron en promedio cantidades de cobre muy cercanas a las establecidas para el combate químico de la roya del cafeto. Por esta razón, se considera que la cantidad de cobre depositada en el follaje depende más de la buena calibración del equipo que de la topografía del terreno y de la clase de equipo utilizado.

La mayor cantidad de cobre fue depositada en las hojas externas y parte media de la planta, encontrándose que el equipo manual modificado fue el que depositó más fungicida. Sin embargo, el equipo con modificaciones presentó en promedio una mejor distribución del fungicida en la planta.

En pequeñas extensiones el costo del combate químico de la roya del cafeto resulta menor para los equipos manuales; situación que cambia cuando se trata de áreas de mayor extensión, donde el mayor rendimiento justifica el uso de equipos de motor.

* MAITHIA, A.S.K. Effect of controlled droplet method of spray application on coffee berry disease and coffee leaf rust control. Kenya Coffee 46(547):295-301. 1981. (520

Captafol (4.4 kg/ha) and Sicarol (pyracarbolid, 4 l/ha), applied suspended in 33, 90, 400 and 500 l/ha, and distributed at droplet size range of 250-400 µ, achieved effective control of *Colletotrichum coffeanum* (*Glomerella cingulata*) and *Hemileia vastatrix*. However, vols. 33 l/ha and 90 l/ha were less effective when the concs. of the fungicides were 0.44% and 0.4%, respectively. The implications of these results are discussed. (Review of Plant Pathology 61(8):4157. 1982).

* MAITHIA, A.S.K. Comparison of overhead, conventional and the alternations of the two methods of spray application in the control of coffee leaf rust using contact and systemic fungicides. Kenya Coffee 48(570):239-250. 1983. (521

Copper Nordox (Cuprous Oxide) and Sicarol (Pyracarbolid) applied by the conventional or the alternating of the conventional and the overhead methods of spray application were superior to the overhead method in coffee leaf rust (*Hemileia vastatrix* B. and Br.) control. However, in almost all cases, Sicarol appeared less effective than Copper Nordox in the control of the same disease. The effectiveness of the conventional and the alternating of the conventional and the overhead methods of spray application in coffee leaf rust control was attributed to the effective distribution of fungicides on both sides of leaves. There was a time saving factor during the spraying when the two methods of spray application were alternated. The implication of these results are discussed.

* _____. Effect of controlled droplet method of spray application on coffee berry disease and coffee leaf rust control. Kenya Coffee 48(563):73-79. 1983. (522

Captafol (4.4 kg/ha) and Sicarol (4.0 l/ha) applied suspended in 33 l/ha, 90 l/ha, 400 ha and 500 l/ha and distributed at droplet size range of 250-400 microm. achieved effective C.B.D. and leaf rust control. However, volumes 33 l/ha and 90 l/ha were less effective in controlling the same diseases when the concentrations of these fungicides were 0.44% and 0.40% respectively. The implications of the results are discussed.

* MARTINEZ G., A. y ECHEVERRI, J.H. Evaluación de tres tecnologías de aspersión utilizadas en cafetales de Costa Rica y su relación con la roya del cafeto. In Simposio Latinoamericano sobre Caficultura, 3°, Tegucigalpa, 1980. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 263. 1981? pp. 114-127. (523

All 3 spray technologies, involving knapsack and motor sprayers and hydraulic pressure equipment, gave adequate control of *Hemeleia vastatrix*. Fungicides should be used on the basis of quantity of water sprayed/ha. There was good correlation between quantity of Cu retained on leaves and that applied in the field. (Review of Plant Pathology 62(9):3873. 1983).

* SEGURA MONGE, A. Primer seminario de capacitación en el uso y manejo de equipos para el combate de la "roya del cafeto". Noticiero del Café (Costa Rica) 20(243):2-3. 1984. (524

* VILLALBA GAULT, D. y RAMIREZ H., C.J. Evaluación del equipo de aspersión Triunfo 40-100-10 FEDERACAFE. In Taller sobre Roya del Cafeto, *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.l., Federación Nacional de Cafeteros, 1982. pp. 1-4. (525

* _____. Técnicas de aplicación de plaguicidas en el cultivo del cafeto. In Taller sobre Roya del Cafeto, *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-22. (526

RESISTENCIA AL HONGO

* ALMEIDA, S.R. Avaliação de germoplasmas com resistência a raças de *H. vastatrix* no sul de Minas; resultados das duas primeiras produções. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, Brasil, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 35-37. (527

* AMAR, C. et al. Multiplication végétative in vitro des caféiers et recherche de génotypes résistants a la rouille. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 485-492. (528

* ANGEL ORELLANA, M.A. Prueba de campo de cafetos con cierto grado de resistencia a roya del cafeto (*Hemileia vastatrix* Berk. & Br.), injertados en patrones de especies Canephora y Congensis. Resúmenes de Investigaciones en Café (El Salvador) 5:60-65. 1983. (529

> Este trabajo se desarrolló con el propósito de encontrar una alternativa para aminorar los efectos de la roya del cafeto y de las plagas del suelo, mediante la evaluación de cafetales injertados de C. *arabica* L. con factores simples de resistencia al hongo, sobre plantas de C. *canephora* y C. *congensis*, que poseen un vigoroso sistema radical.

APHON THAMMAKHET y SUPHACHAI LICHIRACHAMNIAN. Study on varietal reaction of *Coffea arabica* L. to coffee leaf rust (*Hemileia vastatrix* B. and Br.) (En tailandés). In Thailand. Department of Agriculture. Research report 1978. Bangkok, 1981. p. 71. (530

Sólo sumario.

* ARAUJO NETTO, K. DE, FERREIRA, A.J. y PEREIRA, J.B.D. Seleção de cafeeiros portadores de resistência ao nematoide *Meloidogyne exigua* e ao fungo *Hemileia vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 7°, Río de Janeiro, 1979. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1979? pp. 251-254. (531

* _____. et al. Produtividade de progênies de Catimor portadoras de resistência ao nematoide *M. exigua* e ao fungo *H. vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 112-114. (532

* AVANCES DE investigación. I. Variedades resistentes a la roya del cafeto. II. Control de la roya del cafeto. III. Pulpa de café como fuente de energía. Carta Informativa ISIC (El Salvador) 3(5):2, 7. 1981. (533

* BARTHOLO, G.F. y CHEBABI, M.A.A. Melhoramento do cafeeiro: recomendação de linhagens das variedades cultivadas. Informe Agropecuario (Brasil) 11(126):47-50. 1985. (534

* BASAGOITIA M., C.R. Injertación de cultivares resistentes a la roya del cafeto sobre brotes de recepa del cultivar var. 'Pacas'. Resúmenes de Investigaciones en Café (El Salvador) 3:74-75. 1980. (535

> En este ensayo se persiguió evaluar la factibilidad de injertar cultivares resistentes a roya, en brotes de recepas de café 'Pacas'

y además tratar de aumentar la capacidad productiva de los cultivares resistentes, mediante el uso de este patrón, tratando también de determinar la factibilidad del empleo de esta práctica a nivel comercial.

* BASAGOITIA M., C.R. Injertación de cultivares resistentes a la roya del cafeto sobre brotes de recepas del segundo grupo de élites de "Bourbon". Resúmenes de Investigaciones en Café (El Salvador) 3:81-82. 1980. (536

En este ensayo se persiguió evaluar la injertación de cultivares resistentes a la roya sobre brotes de recepas de 'Bourbon', así como tratar de aumentar la capacidad productiva de los cultivares a través del uso de estos patrones, tratando también de determinar la factibilidad del empleo de la práctica a nivel comercial. Se inició en 1975 en la finca El Carmen (955 m.s.n.m), Santa Tecla.

* _____. Prueba de campo de cafetos con resistencia a roya del café injertados en patrones de especies Canephora y Congensis. Resúmenes de Investigaciones en Café (El Salvador) 3:79-80. 1980. (537

* También en: Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 14-16.

* _____. Adaptación de cultivares de café con distintos grados de resistencia a la roya del cafeto (*Hemileia vastatrix* Berk. and Br.). In Simposio Latinoamericano sobre Caficultura, 3°, Tegucigalpa, 1980. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 263. 1981? pp. 201-215. (538

* También en: Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 9-12.

In field trials resistant varieties performed better as altitude or annual rainfall increased. Performance at lower altitudes having 1400-1500 mm rain/yr was unsatisfactory.

* _____. Injertación de cultivares con resistencia a roya del café sobre brotes de recepas en Bourbon Elite del segundo grupo y Pacas. Resúmenes de Investigaciones en Café (El Salvador) 4:77-78. 1981. (539

* También en: Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 12-13.

* BECKER, S. Un método bioquímico para estudiar resistencia a la roya y otras enfermedades del cafeto. Fitopatología Colombiana 8(1):31. 1979. (540

Sólo sumario.

Presentado en: Reunión Anual de la Sociedad Americana de Fitopatología, 18a., Guatemala, 1978.

La Federación Nacional de Cafeteros de Colombia se ha comprometido, en un proyecto con la Sociedad Alemana de Cooperación Técnica, estudiar con métodos bioquímicos la resistencia en plantas del café contra la roya y otras enfermedades. Los trabajos iniciales comprenden estudios de contenido y distribución de algunas enzimas seleccionadas, proteínas, bioelementos y cobre. Se hacen comparaciones de variedades susceptibles con variedades consideradas resistentes a la roya, cultivadas en condiciones bioquímicas y genéticas se incluyen trabajos con cultivos de tejido de café. También se trata de analizar las interacciones entre la planta y el parásito en el proceso de la infección, usando a otras enfermedades del cafeto como modelos. La meta a largo plazo es, definir más exacto los mecanismos de resistencia para ser capaz de identificar y usar más temprano el potencial de la inmunidad de la planta del café en los trabajos de fitomejoramiento.

BECKER-RATERINK, S. International cooperation in plant protection research shown on coffee rust (*Hemileia vastatrix* Berk. et Br.). Gesunde Pflanzen 34(12):273-280. 1982. (541

This is a comprehensive survey of international research in the field of plant protection and resistance to coffee leaf rust. (ICO. Library Monthly Entries no. 49:16. 1984).

* BEGAZO, J.C.E.O., PAULA, J.F. DE. y CARDOSO, A.A. Competição entre cultivares de café (*Coffea arabica* L.). Revista Ceres (Brasil) 28(155):99-101. 1981. (542

The purpose of this study was to evaluate, in Viçosa, Minas Gerais, the performances of 32 coffee genotypes, susceptible and resistant to rust (*Hemileia vastatrix* Berk. et Br.). The lines MNCP 500-11, MNCP 464-15, LA 2897, MNLCP 379-19 and MNLCP 387-15 had the highest yields, although no significant difference was observed among 29 cultivars. The resistant cultivars KP 423-3672, Geisha, IICA e Cioccie-S.6-3 had lower yields than the susceptible varities.

** _____., PAULA, J.F. DE y VIEIRA, J.M. Comportamento de diversas progênies de café com resistência a *H. vastatrix* e cultivares consagrados de *C. arabica*, nas condições de Viçosa, Zona da Mata de Minas Gerais. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 72-73. (543

* BENAVIDES B., J. Cultivares resistentes a la roya del cafeto (*Hemileia vastatrix* Berk. y Br.). I. Noticiero del Café (Costa Rica) 20(235):2-4. 1984. (544

* _____. Cultivares resistentes a la roya del cafeto (*Hemileia vastatrix* Berk. y Br.). II. Noticiero del Café (Costa Rica) 20(236):3-4. 1984. (545

BERTHAUD, J. y LOURD, M. *Hemileia vastatrix* des caféiers de l'espèce *Coffea canephora* de Côte d'Ivoire. Etude de la transmission de ce caractère par croisements contrôlés. García de Orta (Série Estudos Agronômicos) 9(1-2):89-96. 1982. (546

Natural populations of *C. canephora* trees were surveyed in the Ivory Coast and the collected material subject to observation regarding resistance to *H. vastatrix*. Resistant

plants were observed in all the populations and, in one of them, the rust resistant trait seems to be fixed. Dialelic crosses were then made between parents with different degrees of resistance to study the transmission of this trait. Resistance evaluation testing was carried out by artificial inoculation. The results seem to indicate that the parents may be grouped into three categories according to the frequency (light, medium, strong) of the resistant plants they present within the families to which they belong.

* BETTENCOURT, A.J. y LOPES, J. Resistência à *Hemileia vastatrix* de 32 retrocruzamentos (BC_1, BC_2 e BC_3) para Bourbon, Catuaí, Caturra e Mundo Novo do híbrido CIFC HW26 (Caturra vermelho CIFC 19/1 x híbrido de Timor CIFC 832/1). In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 385-387. (547

* BETTENCOURT, A.J. Melhoramento genético do cafeeiro; transferencia de factores de resistencia a *Hemileia vastatrix* Berk. & Br. para as principais cultivares de *Coffea arabica* L. Lisboa, Junta de Investigações Científicas do Ultramar, 1981. 95 p. (548

También en inglés por A.J. Bettencourt, J. Lopes e I.L. Godinho en: International Scientific Colloquium on Coffee, 9th, London, 1980. Proceedings. Paris, ASIC, 1981. pp. 647-658.

Coffee trees possessing genetic factors which condition the resistance to the races of *Hemileia vastatrix* were crossed with trees of 44 cultivars or selections of *Coffea arabica* with the aim to obtain, from the F_3 onwards, recombinations with resistance to the fungus as well as good yield. From 1960 to 1979 were analysed for rust resistance and agronomic traits 6,853 coffee seedlings from 308 F_1 populations (200 simple hybrids, 83 backcrosses and 25 complex hybrids), as well as 15298 coffee seedlings from 370 progenies F_2 to F_5. With a basis on the analysis for rust resistance and on the data for adaptation and yield, it was possible through successive selections, to choose some very promising progenies namely those derived from the hybrids CIFC HW 26 and CIFC H 46 (Caturra Vermelho x Híbrido de Timor), CIFC H 361 (Villa Sarchi x Híbrido de Timor) and CIFC H 528 (BC1 of CIFC HW 26/13 to Catuai), all with resistance to the known rust races (group A); CIFC H 275 (Caturra Vermelho x S.795) and CIFC 315 (Mundo Novo x S.795) with the S_H3 factor single or associated to S_H2; CIFC H 101 (S.333 x Dillo & Alghe) with the factors S_H1 and S_H3; and CIFC H 175 (Caturra Vermelho x S.12 Kaffa) with the factors S_H1 and S_H4. These selections possess good prospectives of being used in commercial scale, in view of the good agronomic characteristics of some progenies F_3, F_4 and F_5. Of particular importance are those derived from the hybrids CIFC HW 26 and CIFC H 46 (Caturra Vermelho x Híbrido de Timor) with resistance of group A, homozygosity for the allele Ct (short size) and with yield, vigour and quality of liquor identical to those of the traditional Arabicas. They are under extensive experimentation in Brazil where they were designated as "Catimor".

** BETTENCOURT, A.J. Estudo genético da resistência das plantas aos fungos; projeto de análise da resistência do 'Híbrido de Timor' a *Hemileia vastatrix*. Lisboa, s.e., 1982. 25 p. (549

** _____. Variedades de café arábica resistentes a la roya y perspectivas para su utilización en la caficultura del futuro. Traducción y adaptación J.H. Echeverri. IICA. Publicaciones Misceláneas no. 393. 1982. 20 p. (550

Presentado en: Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982.

* _____. Características agronômicas de selecções derivadas de cruzamientos entre Híbrido de Timor e as variedades Caturra, Villa Sarchí e Catuaí. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 351-373. (551

BOUHARMONT, P. La selection du caféier arabica au Cameroun. In International Scientific Colloquium on Coffee, 10th, Salvador, Brazil, 1982. Resumos. s.n.t. pp. 407-411. (552

In Cameroon, the selection work was done in low altitude areas (1.000 m) where the orange leaf rust is rampant, and in high altitud areas (1.800 m) where C.B.D. is found very frequently in the plantations. The main selection criteria are: the productivity of different varieties disease resistance (particularly to C.B.D. and orange leaf rust), drought resistance of the tree, the quality of the product. The selection program and its realization:
- Collections were implanted; they include several hundred cultivars which were either found in Cameroun or introduced from foreign countries. Observations are made on the collections.
- Comparative trials containing about 135 cultivars were planted. Some yields were recorded and different observations were made on the trials.
- In each trial, a variety, found in the country where it is called 'Java', and where it is only cultivated on very limited space, and only in low altitude areas, is always situated at the top of the list in terms of productivity.
- Therefore, this variety has been chosen as the selected variety. It is moderately susceptible to orange leaf rust and acts well in low altitude areas where it produces good yields without any fungicide treatment. 'Java' is not very susceptible to C.B.D.; it is therefore well suited to high altitude areas, too, where it produces good yields even without fungicide treatment against C.B.D. Hybridization program:
- About fifty intervarietal hybrids were created in the past.
- Currently, the main orientation of the hybridization program is carried out on the transfer of leaf rust resistance factors to two varieties fitted to local conditions, 'Java' and 'Caturra', and C.B.D. resistance factors to the Caturra variety.

* CADENA-GOMEZ, G. y BURITICA-CESPEDES, P. Expresión de resistencia horizontal a la roya (*Hemileia vastatrix* Berk. et Br.) en *Coffea canephora* variedad Conilón. Cenicafé (Colombia) 31(1):3-27. 1980. (553

Adaptación de parte de la tesis de Mag. Sc. de Cadena-Gómez, C., presentada a la UN-ICA, Colombia.

* También en: Revista Cafetalera (Guatemala) 6(207):26-27, 32, 34, 36; (208):15-17, 24, 30-31. 1981.

Field observations were carried out in order to identify the existence of coffee leaf rust resistance (*Hemileia vastatrix* Berk. and Br.) and to determine its form of expression. For this purpose, 16 plants of *Coffea canephora* var. Conilón and 5 of *C. arabica* var. Mundo Novo were studied. They were planted in one single lot at the Agronomical Institute of Campina, SP, Brazil.

Four branches were selected in each and every one of the trees under study. The branches were located in the middle of the trees and monthly registers were kept to measure the infection index of coffee leaf rust as expressed by the number of lesions, number of lesions with spores (pustules), number of leaves with pustules. The average number of pustules per leaf was also obtained. Measurements were also taken on the defoliation caused by coffee leaf rust, leaf miners (*Perileucoptera coffeella*), natural defoliation and recovery of the foliage. On the basis of these data and monthly climatological readings it was possible to perform both correlation and regression analysis. These statistical analyses determined the contribution of the biological and climatological variables on the infection index and the defoliation registered per plant and per variety.

The analysis of the results demonstrates that there are quantitative differences between the two varieties under comparison. These differences are expressed by a smaller infection index of coffee leaf rust and a higher retention of the leaves in the variety Conilon as compared to those of the variety Mundo Novo.

The characteristics of this type of resistence to coffee leaf and the absence of genes responsible for vertical resistance suggest that the existent resistence found in the plants from Conilon variety might be considered as horizontal resistence.

_____. y BURITICA C., P. Determinación cuantitativa de resistencia a *Hemileia vastatrix* en plantas de *Coffea canephora* variedad Conilón. Cenicafé (Colombia) 32(1):15-34. 1981. (554

* _____. y BURITICA C., P. Evaluación de resistencia a *Hemileia vastatrix* en discos de hojas de *Coffea canephora* variedad Conilón. Cenicafé (Colombia) 32(3):71-87. 1981. (555

In order to evaluate quantitatively the resistance to the coffee leaf rust *Hemileia vastatrix* by means of laboratorial methodology, two tests were performed using leaf discs of *Coffea canephora*

variety Conilon and as witness *C. arabica* variety Mundo Novo was employed. The tests were performed in the Section of Genetics of the Institute of Agronomy of Campinas, S.P., Brazil. Leaf disks were used which had been obtained from plants showing different degrees of severity to the rust under natural or field conditions. The disks were innoculated individually and kept in boxes which permitted their conservation during the test period. The following parameters were measured: Infection Index (1.1) expressed by the percentage of disks with symptoms of the rust and the number of lesions per disk: Incubation Period (P.1.) corresponding to the time necessary for 50% of the disks with lesions caused by rust to present spore production, and Spore Production Index (1.E.) expressed by the percentage of disks with spores and the number of uredospores produced per disk. A block design chosen at random was used, with five repetitions. Each treatment consisted of 40 disks and 8 absolute witness (without innoculation). The results obtained in the two tests suggest that the P.1 and 1.E. are the parameters which best reflect the behavior of the plants in the field. The statistical analysis demonstrated the existence of highly significant and negative correlative coefficients between the P.1 and the 1.E. with better spore production occurring among those plants with a more prolonged P.1. It is believed that the methodology of using leaf disks with some adjustments, especially under environment experimental conditions, is promising for the evaluation of quantitative resistance and to explain the epidemiological mechanisms responsible for the minimal severity of the rust in commercial plantations where Conilon is cultivated.

CADENA-GOMEZ, G. y BURITICA C., P. Horizontal resistance expression to rust (*Hemileia vastatrix* Berk. and Br.) in *Coffea canephora* var. Conilon. In International Scientific Colloquium on Coffee, 9th, London, 1980. Proceedings. Paris, ASIC, 1981. s.p. (556

To identify the resistance expression to *Hemileia vastatrix* Ber. and Br. in *Coffea canephora*, Conilon variety, field observations, laboratory and greenhouse experiments were realized during 1977 in the Campinas agronomic institute, S.P., Brazil. In the field, quantitative differences within Conilon plants and Mundo Novo plants (used as control) were determined, which were expressed by a lower index of infection to rust and a lower percentage of defoliation to rust. The correlated coeficients were very significant within the climatical and biological variables studied.. The variety was the determinant factor in the behavior of the disease. In the laboratory, two experiments using discs from the leaves of Conilon and discs from Mundo Novo, as the control, were realized. The infection index to rust, sporulation index and the incubation period were correlated to each other (R 0.58 and R 0.64) and with the plant's field reaction, corresponding to a lower sporulation index for the plants with the incubation periods prolonged. In the greenhouse three tests, using Conilon plants obtained from seeds and by the rooting of stem cuttings and Mundo Novo plants as the control, were realized. A methodology for quantitative inoculations was developed and the infection index was determined (lesions per inoculated foliar area), sporulation index (percentage of pustules

and uredospore production) and incubation period. Very significant correlated coefficients were obtained between: pustule percentage and the incubation period (R 0.5 and R 0.81) between uredospore per pustule and lesions per squared centimeter of foliar area (R 0.79 and R 0.63). The resistance characteristics expressed by the conilon variety in the field, the laboratory and greenhouse conditions and the absence of genes of vertical resistance to rust suggest the existence of horizontal resistance in that variety.

* CADENA-GOMEZ, G. y BURITICA C., P. Expresión de resistencia horizontal a la roya (*Hemileia vastatrix* Berk. & Br.) en *Coffea canephora* variedad Conilón. In Simposio Latinoamericano sobre Caficultura, 4°, Guatemala, 1981. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 322. 1983? pp. 245-246. (557

* CARDOSO, R.M.L. y SERA, T. Obtençao de cultivares de *Coffea arabica* com resistência simultânea a *Hemileia vastatrix* e *Pseudomonas syringae* Pv. *garcae* no estado do Paraná, Brasil. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 415-423. (558

* CARNEIRO, M.F.N., BETTENCOURT, A.J. y FERNANDES, D.T. Estudo da adaptação às condições da Estação Regional de Uíje, Angola, de selecções de *Coffea arabica* L. e de híbridos tetraplóides de *C. arabica* x *Coffea* spp. portadores de diferentes factores de resistência a ferrugem-alaranjada, *Hemileia vastatrix* Berk. & Br. Garcia de Orta (Estudos Agronómicos) 5(1/2):25-29. 1978. (559

The purpose of this work was to give a contribution to the field evaluation of some selections of *C. arabica* and tetraploid interspecific hybrids under the conditions of the Estação Regional do Uíje (ERU), an experimental station of the ex-Instituto do Café de Angola. The introductions under trial, supplied by the Centro de Investigaçao das Ferrugens do Cafeeiro, possessed different genes for resistance to the races of *Hemileia vastatrix* B. & Br., perhaps the most important pathogen attacking coffee in Angola. Two field trials were thus established in randomized blocks (4x4) in the plots 21 ERU and 22 ERU, respectively in 1969 and 1970. The individual registration of yield and of other characteristics such as uniformity, vegetative vigor, rust resistance, drought resistance, etc., allowed to draw some preliminary conclusions which are discussed.

* CARVALHO, A., FAZUOLI, L.C. y MONACO, L.C. Observações sobre cafeeiros com diferentes fatores de resistência a *Hemileia vastatrix* plantados na mesma cova. Bragantia (Brasil) 38: XIX-XXIV. 1979. (560

Coffea arabica progenies homozygous for the independent genes SH_5SH_1, SH_5SH_2, SH_5SH_3, SH_5SH_4 were evaluated in a randomized block experiment. Two seedlings of different genotypes were planted together in the same hill in 10 different combinations. The effects of these combined genotypes were studied in relation to plant development, yield and incidence of the leaf rust disease. Progenies of Mundo Novo and Catuaí Vermelho cultivars homozygous for the gene SH_5 were used as controls.

Comparison of the total yield from 1974 to 1977 indicated that Catuaí Vermelho was more productive than any other combination, in spite of being susceptible to the disease.

The genotype combinations SH_5SH_2 with SH_5SH_3 and SH_5SH_2 with SH_5SH_4 yielded more than the combinations SH_5SH_1 with SH_5SH_4 and SH_5SH_3 with SH_5SH_4. However the differences were not significant. Differences were noticed in the degree of leaf rust incidence for the genotype combinations SH_5SH_1 with SH_5SH_2 in relation to the combination of SH_5SH_1 with SH_5SH_4. A small negative effect on the general aspect of plant and the plant height was observed for all plants when associated with those having the genotype SH_5SH_2, probably due to the fact that these latter plants were previously selected for yield and plant vigour.

* CARVALHO, A., COSTA, W.M. DA y FAZUOLI, L.C. Comportamento do híbrido de Timor, de híbridos envolvendo esse cultivar e outras combinações com resistência a *Hemileia vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Rio de Janeiro, Instituto Brasileiro do Café, 1981. pp. 182-185. (561

_____. Melhoramento do cafeeiro. Cruzamentos entre C. *arabica* x C. *canephora*. In International Scientific Colloquium on Coffee, 10th, Salvador, Brazil, 1982. Proceedings. s.n.t. pp. 363-368. (562

Natural or artificial crosses, using selected plants of C. *arabica* in crosses with C. *canephora* at di- or tetraploid levels are studied. Tetraploid hybrids were obtained in 1950 in Campinas, Brazil, and in 1965 in Ivory Coast. They revealed to be vigorous and high yielding. In their F2 progenies a great number of abnormal, possibly aneuploid plants, are observed which can be noted in the nursery. Backcrosses were made using selected plants of cv. Mundo Novo or cv. Caturra of C. *arabica* to obtain a more uniform population. Plants in the generations Fs, F3 and F4 of BC1 are being extensively studied in the State of Sao Paulo and in several other regions in Brazil. Main emphasis of the program has been given to the breeding program for resistance to *Hemileia vastatrix* and nematodes, yield capacity, self-fertility, low occurrence of peaberry seed type, low percentage of abnormal seedlings in the progenies and good cup quality. Icatu populations - F2, F3 plants of BC1, BC2 of (C. *arabica* x C. *canephora*) x C. *arabica* segregate reaction to *H. vastatrix* infection, and contain several resistance genes from C. *canephora* parent. Both self-compatible and self-incompatible plants were found and selected for further studies. Also, variation in the proportion of peaberry seeds has been observed. High yielding plants were identified with a low percentage of peaberry seeds. This characteristic may be related to occurrence of abnormal meiosis. Resistance or tolerance to the nematodes *Meloidogyne exigua* and *M. incognita* has been analysed and seems to be due to different genetic factors. Resistance to the fungus *Colletotrichum coffeanum* was also found in some populations. More than 300 selected plants of Icatu populations analysed for cup quality, showed

similar cup quality as the Arabica type. About 20,000 Icatu coffee plants are presently being analysed in several coffee regions in order to identify the best ones for further studies. The possibility of losing genes for resistance or tolerance has to be taken into account when successive backcrosses are carried out for uniformity.

CARVALHO, A. Pesquisa sobre a resistência do cafeeiro a *Hemileia vastatrix* em São Paulo. Garcia de Orta (Série Estudos Agronômicos) 9(1-2):129-135. 1982. (563

Coffee breeding for leaf rust resistance is being carried out at the Instituto Agronomico, Campinas, using the genes for vertical and horizontal resistance found in *Coffea arabica* cultivar and in *C. canephora*. Particular attention is given to Catuaí derived populations segregating for the SH_3 factor, as the v3v5 race of *H. vastatrix* seems not to be so aggressive in our conditions. Selected coffee cultivars with individual resistance factors are used for the development of complex hybrids involving other factors for vertical and horizontal resistance. In the breeding program, major emphasis is given to Icatu and Catimor germplasms originated from hybridizations between *C. arabica* and *C. canephora*. Several degrees of resistance to leaf rust and other coffee parasites can be found among plants of Icatu populations. Some promising lines of Icatu, with resistance and high yields were isolated. Seed bulking of those lines is being carried out for the establishment of new coffee plantations. The development of this breeding program aiming to obtain resistant cultivars has benefited from the invaluable informations provided by the Centro de Investigaçao das Ferrugens do Cafeeiro. Founded by Prof. Branquinho d'Oliveira, this outstanding Center, due to its extensive investigations, is furnishing accurate informations about the underlaying mechanisms involved in the *Coffea-Hemileia* relationships. (ICO. Library Monthly Entries no. 55:26. 1985).

CASTILLO ZAPATA, J. y MORENO, G. Selection of derived breeding from Timor Hybrid in the obtainment of better coffee varieties for Colombia. In International Scientific Colloquium on Coffee, 9th, London, 1980. Papers presented. Paris, ASIC, 1981? s.p. (564

* También en: Cenicafé (Colombia) 32(2):37-53. 1981.

The Timor Hybrid, a population of interspecific origin, has been intensively used to breed coffee for leaf rust resistance in Colombia. In this study, third generation progenies, originated from crosses between Timor Hybrid and cultivar Caturra of *C. arabica* L., were evaluated. A 16 progeny group was observed during 4 crops at Chinchina. Yield, seed characteristics and plant growth measurements were analysed. Other 7 progeny group was grown at 3 locations and studied during 3 crop seasons in relation to yield and yield stability. In both groups, 4 Caturra type cultivars were included as check varieties. In the average, the yields of progenies and check cultivar were similar, but significant difference were observed at two locations. The within progeny variance was larger than the variance within check cultivars (P. 0,01) which are considered genetically homogenous.

If this last variation is only environmental, it is expected that 67% of the within progeny variance is of genetical origin, and the expected genetic advance reaches 29%, when the 5% of highest yielding trees are selected. Third generation progenies differ broadly for yield stability, as measured by their contribution to genotype x location variance, which ranged from 0,5 to 38%. Growth characteristics displayed median heritability, but were not correlated to yield. On the other hand, vigor, as estimated in this study, had law heritability. Seed size and percentages of empty beans and peaberries had medium to high heritabilities. Among tree variance was high, as compared with sample variance, for the last two characteristics, with repetibilities of 0,85 and 0,56, while seed size had a small value (0,16). It is concluded that F3 progenies and check varieties have similar mean yields, but a wide genetic variability (comprising 'among' and 'within' progeny variances) allows to select superior agronomic types. These selections are being used to form a compound cultivar called Colombia variety.

* CASTILLO ZAPATA, J. Necesidad de variabilidad genética y su empleo en la selección de cultivares resistentes a *Hemileia vastatrix* en Colombia. In Taller sobre Roya del Cafeto *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.1., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-8. (565

_____. y MORENO R., G. Obtención de materiales de café resistentes a *Hemileia vastatrix*. Garcia de Orta (Série Estudos Agronômicos) 9(1-2):119-128. 1982. (566

Amont the numerous and deserving achievements in the life of Prof. Branquinho d'Oliveira, the foundation of the Centro de Investigaçao das Ferrugens do Cafeeiro (CIFC) is the most appreciated in the Latin American countries. Particularly for the Colombian leaf rust resistance program, CIFC's contributions have been decisive. Thanks to a continuous cooperative effort between CIFC (Portugal) and CENICAFE (Colombia), the development and selection of resistant materials to *Hemileia vastatrix* have been possible, before detection of coffee leaf rust in this country. Third and fourth generation progenies from crosses between Caturra and Híbrido de Timor, tested at six localities, have displayed yield levels, seed characteristics and cup quality similar to those of cultivar Caturra. Moreover, large variances within progenies indicate the possibility of further genetic improvement. The presence of resistance to coffee berry disease (C.B.D.) and the probable general resistance to leaf rust emphasize the importance of this kind of materials for breeding purposes. Resistance tests to leaf rust, performed at the CIFC, have shown that F2, F3 and F4 plants segregate progenies which are classified into six physiological groups, according to their reaction to 30 leaf rust races. At least three resistance genes may be present, and numerous genotypic combinations are possible within these progenies. Such resistance diversity suggests the possibility of using the derivatives from Híbrido de Timor in a composed cultivar, named Variedad Colombia, made up of numerous selected progenies with different resistance genotypes. Outstanding F5 progenies

are being propagated for this purpose. The proposed use of specific resistance in coffee is discussed in the light of the genetic diversity role in disease resistance stability, repeatedly confirmed in wild populations and multiline cultivars.

* CASTILLO ZAPATA, J. El programa de mejoramiento por resistencia a la roya que se adelanta en el Centro Nacional de Investigaciones en Café. In Taller sobre Roya del Cafeto *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, 1982. pp. 1-17. (567

* _____. Evaluación agronómica de híbridos de café introducidos a Colombia. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 321-350. (568

El suministro de materiales resistentes a *Hemileia vastatrix* para países cultivadores de café es una efectiva forma de colaboración científica practicada por el Centro de Investigaciones de las Royas del Cafeto (CIFC) de Portugal. Los híbridos sintetizados en esta institución son de particular interés, pues involucran germoplasma de fuentes y orígenes muy diversos, de los cuales se espera la generación de abundante variación genética.

En el presente trabajo se analizan 38 progenies de 18 híbridos introducidos a Colombia desde el CIFC. De ellas 26 fueron objeto de selección en CENICAFE.

El análisis de la producción y su variación indica que es factible la selección de materiales tan productivos como las variedades testigos, pero es poco probable sobrepasar este nivel.

Los granos anormales constituyen un obstáculo mayor para la obtención de materiales agronómicamente superiores. Entre ellos, los granos caracoles son el defecto más importante, pues aparecen en niveles altos en los materiales introducidos y en ciertas progenies la variación es reducida. No obstante, un número considerable de éstas tiene variación suficiente para una selección eficaz.

Los granos vanos siguen en orden de importancia. Alcanzan elevados porcentajes en los materiales directamente introducidos, pero en los que fueron seleccionados previamente, una alta proporción de las progenies aparece libre del defecto. Una estrecha correlación entre el vaneamiento de los progenitores y la media de su progenie indica una heredabilidad alta, que permite la selección efectiva, especialmente en el 40% de las progenies, que presenta amplia variación.

En 26 de las progenies la falsa poliembrionía presentó niveles inferiores al 1,2%, similares a los de los testigos. En 11 progenies los porcentajes fueron moderadamente superiores (3,2 a 1,8%), que indican la necesidad de selección adicional. El tamaño de grano constituye un problema menor, ya que el 80% de las progenies tuvo tamaño mediano o grande. La correlación entre progenitor y progenie fue también muy estrecha.

La necesidad de seleccionar por numerosas características, muchas no discutidas en este artículo, reduce drásticamente la proporción de árboles elegibles. El pequeño número de líneas finalmente escogidas sugiere la necesidad de emplear el método de retrocruce, con el fin de incrementar en forma considerable el número de árboles que combine las buenas características agronómicas con la resistencia a las pestes y con otras cualidades deseables derivadas del germoplasma introducido.

COLOMBIA DEVELOPS rust resistant coffee variety. Reuter Coffee Newsletter no. 142/81. 1981. s.p. (569

Germán Valenzuela, technical manager of the Colombian Coffee Federation, has announced a new rust-resistant coffee variety called 'Colombia'. The variety, which took 10 years to develop and test, should be available on domestic and world markets within 3 years. It gives a mild coffee with good taste and high yield.

* COSTA, W.M. DA, FAZUOLI, L.C. y CARVALHO, A. Asociação de diferentes fatores de resistência a *Hemileia vastatrix* em *Coffea arabica*. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, Brasil, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 124-126. (570

CHARLES, A.E. Notes on Aiyura coffee research. I. Research Newsletter. Coffee Industry Board (Papua New Guinea) 1(1):13-15. 1981. (571

The coffee industry of the PNG highlands was built on the Blue Mountain variety, which was introduced from Jamaica before 1939 and has proved a high quality, high yielding type, suited to this environment. However, in field trials the varieties Arusha and Bourbon outyielded Blue Mountain and have set new standards for Papua New Guinea. Other promising new varieties are Mundo Novo and Caturra (a dwarf). 'Rust resistant' varieties are lower-yielding, and are not currently recommended. The results of spacing and density trials are also described.

* CHARRIER, A. La mejoría genética del café. Revolución y Desarrollo (Nicaragua) 3:37-43. 1985. (572

Incluye roya del café.

* CHAVES, G.M., ALMEIDA, L.C. DE. y PEREIRA, A.A. Resistência vertical e horizontal a *Hemileia vastatrix* Berk. et Br., em gerações F_4 e F_5 de progênies de cafeeiro 'Catimor'. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte, MG. Projeto café; resumos de trabalho. Belo Horizonte/MG, Brasil, EPAMIG, 1980. pp. 179-187. (573

* DESARROLLO Y reproducción de variedades resistentes a la roya. In Reunión del Consejo Asesor del Programa Cooperativo para la Protección y Modernización de la Caficultura, 8a., Veracruz, 1984. Memoria. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 339. 1984. pp. 16-26, 64-66. (574

** ECHEVERRI RODRIGUEZ, J.H. Evaluación de las selecciones más avanzadas de Catimor por su uniformidad en su fenotipo, producción y resistencia a la roya del cafeto (*H. vastatrix*). Turrialba, Costa Rica, PROMECAFE, 1984. 24 p. (Manual de procedimientos no. 4. Guía de Experimento Regional). (575

** _____. Resultados de evaluaciones de la resistencia del germoplasma de café al hongo *Hemileia vastatrix* Berk. & Br. Turrialba, Costa Rica, PROMECAFE, 1984. s.p. (576

Presentado en: Reunión Regional de Mejoramiento, 4a., Guatemala, 1984.

* ESKES, A.B., BRAGHINI, M.T. y WEG, E.W. VAN DE. Grau de resistência a *H. vastatrix* observado em várias introduções de *C. arabica* provenientes da Etiopía, è em cruzamentos entre plantas do cultivar Kouillou de *C. canephora*. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 217-219. (577

* _____. y SOUZA, E.Z.DE. Ataque da ferrugem em ramos com e sem produçao, de plantas do cultivar Catuaí. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, Sao Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 186-187. (578

* _____. y BRAGHINI, M.T. Comparação da resistência a *Hemileia vastatrix* do cultivar Kouillou observada em condições de campo, viveiro, estufa e de laboratório. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 189-191. (579

* _____. y BRAGHINI, M.T. Métodos de evaluación de la resistencia contra la roya del cafeto (*Hemileia vastatrix* Berk. et Br.). Boletín Fitosanitario de la FAO 29(3/4):56-66. 1981. (580

Se proponen escalas de valoración de 0 a 9 para el registro cuantitativo del tipo de reacción y frecuencia de infección de la roya de la hoja del cafeto. La escala para tipos de reacción incluye también las reacciones heterogénicas que a menudo pueden encontrarse en las variedades derivadas de *Coffea canephora*. Las escalas para registrar la frecuencia de infección pueden servir de ayuda al caficultor, permitiéndole una rápida evaluación del grado parcial de resistencia a la enfermedad. Se discuten las ventajas de un método de laboratorio que utiliza inoculaciones de discos foliares para evaluar la resistencia.

* _____. y BRAGHINI, M.T. Una proposta para medir a resistência a *Hemileia vastatrix* usando escala de 0 a 9 pontos. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lorenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 199-200. (581

* _____., BRAGHINI, M.T. y HOOGSTRATEN, J.G.J. Segregação para resistência a *H. vastatrix* em cruzamentos entre plantas do cultivar Kouillou de *C. canephora*. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 189-191. (582

ESKES, A.B. y BRAGHINI, M.T. The effect of leaf age on incomplete resistance of coffee to *Hemileia vastatrix*. Netherlands Journal of Plant Pathology 88(6):219-230. 1982. (583

The influence of leaf age on incomplete resistance to race II of coffee leaf rust (*Hemileia vastatrix*), which is the most common race in Brazil, was tested in the greenhouse and in the field. Three stages of leaf age were distinguished: 'young' leaves which had just fully expanded and still had a shiny appearance on the day of inoculation, 'adult' leaves of 1 to 4 months old, and 'old' leaves of 6 to 12 months old which were formed in the foregoing growing season. The effect of leaf age varied with the coffee genotype. With the susceptible *Coffea arabica* cvs. Mundo Novo and Catuaí no important effect of leaf age on latency period and reaction type was observed. Lesion density, depending on inoculation methods, was affected to some extent, older leaves showing lower values. With genotypes of the C. *canephora* cv. Kouillou, which varied in level of incomplete resistance, adult leaves appeared to be more resistant than young and old leaves. This adult leaf resistance was expressed mainly by a lower lesion density, but also by a longer latency period and a lower reaction type. Within the hybrid populations Icatu and Catimor, genotypes with race-specific incomplete resistance were tested and others of unknown specificity. Resistance was expressed mainly by a low reaction type. Generally, resistance decreased with increasing leaf age, which was occasionally associated with a complete change in reaction type. Contrary to cv. Kouillou, in Icatu and Catimor no higher susceptibility of young leaves than of adult leaves was observed. The incomplete resistance to race I of the differential CIFC H152/3, heterozygous for SH4, was also better expressed in young leaves, older ones becoming gradually more susceptible. It is concluded that for screening incomplete resistance to coffee leaf rust leaves of different ages should be tested.

_____. The effect of light intensity on incomplete resistance of coffee to *Hemileia vastatrix*. Netherlands Journal of Plant Pathology 88(5):191-202. 1982. (584

_____. The use of leaf disk inoculations in assessing resistance to coffee leaf rust (*Hemileia vastatrix*). Netherlands Journal of Plant Pathology 88(4):127-141. 1982.(585

The suitability of inoculations of leaf disks of 1.8 cm diameter in determining resistance of coffee to *Hemileia vastatrix*, the causal agent of coffee leaf rust, was studied. Results obtained by this method were similar to those obtained by greenhouse tests with respect to reaction types of coffee plants with complete and/or major gene resistance. The efficacy of the method in assessing incomplete resistance was tested on 19 plants of *Coffea canephora* cv. Kouillou, which varied in level of disease in the field. Four series of inoculation were carried out in four different months of the year, and six components of resistance were assessed. The analysis of multiple correlation, applied to the average data of the four series, indicate that 79% of the variation in disease in the field could be explained by the observations in the leaf disk test. For the individual series this percentage varied from 58 to 70. The coefficients

of correlation between the six components were significant and high. The percentage of leaf disks with sporulating lesions was found to be the most suitable component for assessing incomplete resistance. The number of lesions per disk was affected substantially by the hour of the day of leaf collection and by light intensity in the field. No effect was observed of the size of the disks (1 to 2 cm in diameter) and of the leaf wetness period after inoculation (24 and 48 h). Results were more consistent when the inoculum was applied in droplets of 0,025 ml than when the inoculum was sprayed onto the disks. No genotype X treatment interactions were observed for the hour of leaf collection, for the size of the leaf disk, for the inoculation method or for the leaf wetness period. It is concluded that the leaf disk method, if adequately standardized, can be a very useful tool in breeding for coffee leaf resistance and also in basic research on the coffee-*H. vastatrix* relationship.

** ESKES, A.B. Incomplete resistance to coffee leaf rust (*Hemileia vastatrix*). Doctoral Thesis. Wageningen, Netherlands, Landbouwhogeschool, 1983. 140 p. (586

Incomplete resistance to coffee leaf rust (*Hemileia vastatrix*) may be of value in obtaining durable resistance, which is of great importance for the perennial coffee crop. Methods were developed to assess incomplete resistance to coffee leaf rust by using illustrated scales ranging from 0 to 9 (Chapter 1). A laboratory screening method, which uses leaf disks, has been standardized. The method is satisfactory for the assessment of complete and incomplete resistance (Chapter 2). Resistance to coffee leaf rust appeared to be affected by light intensity and leaf age (Chapter 3 and 4). In general, coffee leaves were more resistant under low than under high light intensities. The effect of leaf age varied with the coffee genotype. In general, however, old leaves were more susceptible than adult or young leaves. From 1976 to 1980, seven new races of *H. vastatrix* were found in breeding plots in Campinas (Chapter 5). Four races overcome combinations of known resistance genes in *Coffea arabica* and three races overcome yet unidentified resistances from *C. canephora*. Three other rust genotypes were found with intermediate virulence to certain resistance genes. Possibilities for obtaining durable resistance based on major genes are discussed. In Chapters 6, 7 and 8 a characterization is given of incomplete resistance in *C. arabica*, *C. canephora* cv. 'Kouillou' and in the 'Icatu' population. Icatu derives from a cross between *C. canephora* and *C. arabica*. In *C. arabica*, the period between the onset of sporulation till leaf abscission (leaf retention period) appeared to be an important determinant of the disease level in the field. Significant variation for latency period and lesion density was observed, but results were fairly inconsistent. Disease level in the field was positively correlated with productivity. In 'Kouillou' large variation for incomplete resistance was found. Genotypes were detected with high resistance expressed by a low lesion density and a quite high reaction type. These genotypes may have value for obtaining durable resistance to coffee leaf rust. Incomplete resistance in Icatu was mainly expressed by heterogeneous reaction types. Components of resistance were related to reaction type. Incomplete resistance of varying degrees was

race-specific. In general discussion the relevance of the findings for coffee breedings and the links to resistance theories are pointed out.

** ESKES, A.B. Incomplete resistance to coffee leaf rust. In NATO Advanced Study Institute, Martina, Francia, 1981. Proceedings. New York, Plenu, 1983. pp. 291-315. (NATO ASI Series. Life Sciences v. 55). (587

Incomplete resistance to *Hemileia vastatrix* Berk. et Br. has been studied in Brazil under field, greenhouse, nursery and laboratory conditions. The following coffee populations were studied: breeding lines and cultivars of C. *arabica*, and C. *canephora* cultivars Kouillou, Icatu and Catimor. Results are presented on methodology, on the effect of environments, on leaf age and productivity, on the inheritance of resistance and on host-pathogen interaction studies. Indications for incomplete vertical resistance were obtained for the Icatu and Kouillou populations. Incomplete resistance to coffee leaf rust is often expressed by heterogeneous reaction types. The relation of the results to resistance theories is briefly discussed.

* _____. y CARVALHO, A. Variation for incomplete resistance to *Hemileia vastatrix* in *Coffea arabica*. Euphytica 32(2):625-637. 1983. (588

Variation for incomplete resistance to coffee leaf rust was studied in *Coffea arabica*. Disease level in the field was scored by a 0 to 9 scale. Components of resistance observed in laboratory and greenhouse tests were latency period (LP), lesion density (LD) and leaf retention period (LRP). LRP determines the duration of sporulation. Lines of 'Mundo Novo' and 'Catuai' showed relatively small but significant differences for disease level in the field. Heritibility was low (0.31) and part of the variance (34%) was explainable by a significant correlation between disease level and yielding capacity of the lines. The high susceptibility of 'Ibaare', in comparison to other cultivars, was best explained by longer LRP values for 'Ibaare'. Also its LP was generally shorter than that of other cultivars. Among coffee accessions from Ethiopia great variation was observed for disease level in the field. A significant part of the variance (35%) was explained by differences in yielding capacity. Variation for resistance components was observed between accessions, tested in the greenhouse and laboratory. However, results of the two tests were inconsistent. Transgressive segregation for incomplete resistance was observed in F2 populations of the cross between Agaro C1164-19 and 'Catuai', tested in the laboratory and greenhouse. Resistance was expressed by a longer LP, a lower LD, a certain percentage of non-sporulating lesions and, in some populations, by early necrosis of lesions. Prospects for breeding for incomplete resistance to *H. vastatrix* in C. *arabica* are discussed. Factors which may hamper selection progress are: a) the positive correlation between yield and disease level in the field, b) the relative small genetic variation for incomplete resistance among C. *arabica* cultivars and productive breeding lines, and c) inconsistency of results between resistance tests.

* ESKES, A.B. et al. Genetic studies on incomplete resistance to coffee leaf rust (*Hemileia vastatrix*). In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicaçoes. Oeiras, Centro de Investigaçao das Ferrugens do Cafeeiro, 1984. pp. 439-444. (589

* ESTRADA CASTILLO, C.F. et al. Primeros resultados de la prueba preliminar de campo entre catimor brote bronceado, catimor brote verde y caturra. Guatemala, Asociación Nacional del Café, Departamento de Investigaciones en Café, 1980. 21 p. (590

* También en: Revista Cafetalera (Guatemala) 5(199):26-28, 31, 33. 1980.

* _____. et al. Evaluación preliminar de variedades resistentes a la roya del café. Revista Cafetalera (Guatemala) 6(202):6, 8-13. 1981. (591

Reports the performance of 9 resistant or partially resistant varieties with respect to yield. Catimor T5269, reportedly resistent to all known races of leaf rust performed well.

* _____. y AZAÑON VALDES, L. Variedades de café resistentes a roya. Revista Cafetalera (Guatemala) 6(208):15-17, 24, 30-31. 1981. (592

In tests carried out in Guatemala the average percentage of germination of non-rust resistant coffee varieties was 56.60% compared with 43.83% for resistant varieties. Figures are given for all the varieties studied.

* _____. Evaluación de variedades resistentes a roya. In Simposio Latinoamericano sobre Caficultura, 4°, Guatemala, 1981. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 322. 1983? pp. 218-221. (593

* También en: Asociación Nacional del Café, Guatemala. Resúmenes de Investigación (81-82). Guatemala, 1984. pp. 41-48.

* _____. Datos sobre variedades resistentes a roya. Revista Cafetalera (Guatemala) no. 238:21. 1984. (594

* _____. Informe preliminar sobre porcentaje de fruto vano en líneas resistentes a roya del cafeto; otros datos de interés sobre derivados del híbrido de Timor. In Simposio Latinoamericano sobre Caficultura, 6°, Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 5-29. (595

Resumen en: Revista Cafetalera (Guatemala) no. 238:5. 1984.

* _____. Proyecto multiplicador de variedades resistentes a roya - PROMVAR. Revista Cafetalera (Guatemala) no. 247:26, 28-29, 31. 1984. (596

* FAZUOLI, L.C. et al. Seleçao do Icatu em Mococa. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, Río de Janeiro, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 178-181. (597

* FLORES BERRIOS, M. y RIOS LAZO, F. Adaptabilidad de variedades con diferentes tipos de factores de resistencia a la *Hemileia vastatrix* Berk. et Br. In Resúmenes de Investigación sobre el Problema de la Roya del Cafeto (*Hemileia vastatrix* Berk. & Br.). San Andrés, El Salvador, Instituto Salvadoreño de Investigación Agraria y Pesquera, IICA-PROMECAFE, 1982. pp. 44-45. (598

* _____. Evaluación de genotipos con resistencia a roya en condiciones de central altura en El Salvador. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 425-438. (599

El presente trabajo se refiere a la evaluación de adaptabilidad en condiciones de Central Altura (800-1200 msnm) que se realizó en Nueva San Salvador, El Salvador, durante 1976-1983 en plantas F_2 provenientes de la cruza Caturra Rojo x Híbrido de Timor y F_1 de Caturra Rojo x Híbrido de Timor hacia Catuaí, Bourbon, SL28 y SL14. El distanciamiento de siembra utilizado fue 2.0 x 1.5 m. La sombra permanente fue de *Inga punctata* Willd con una distancia de 10x10 m. Las plantas se manejaron a libre crecimiento para no interferir en su capacidad productiva. Los factores evaluados fueron producción/planta, altura, resistencia a roya, % granos vanos y caracol, defoliación, incidencia de flor estrella. No se utilizó diseño estadístico por ser poblaciones F_1 y F_2 sujetas a segregación, pero sí se compararon con el Testigo local cv "Pacas" recomendado para la localidad. Las características de suelo de la zona son de textura franco arenosa. Buen contenido de materia orgánica, alto contenido de fósforo, potasio y pH 4.5 ácido.

La precipitación promedio anual fue de 1870 mm, con temperaturas oscilando de 16.0 a 28.6 °C; las mejores producciones por planta se obtuvieron en la retrocruza de Caturra Rojo x Híbrido de Timor hacia Bourbon y Catuaí, con promedios superiores a un kilogramo oro por planta. La S.28, S.14, Mundo Novo, todas ellas cruzadas con Caturra x H. de Timor tuvieron un comportamiento similar al testigo cv Pacas. Las menores producciones se obtuvieron en H. de Timor con 0.28 kilogramos oro por planta. La incidencia de flor estrella fue manifiesta en plantas derivadas de Villa Sarchi x H. Timor.

** FONSECA, S.E.A. Resistência não específica em cultivares de *Coffea arabica* L. e progênies de 'Catimor' a raças de *Hemileia vastatrix* Berk. et Br. Tese Mag. Sc. Viçosa/MG, Brasil, Universidade Federal de Viçosa, 1979. 42 p. (600

Manifestações de resistência não específica como "slow-rusting" e "late-rusting" têm sido constatadas durante o processo da patogênese, sobretudo nas ferrugens dos cereais.

Este trabalho, conduzido na Universidade Federal de Viçosa em condições de casa-de-vegetação, objetivou identificar manifestações de resistência não específica a *Hemileia vastatrix* Berk. et Br., determinando-se o período latente, o período de geração, o número de pústulas esporuladas por folha e a intensidade de ferrugem em mudas de *Coffea*.

Utilizaram-se mudas dos cultivares 'Catuaí Vermelho', 'Catuaí Amarelo', 'Mundo Novo', 'Acaiá', 'Caturra Amarelo', 'Caturra Vermelho', e 'Boubon Amarelo' tradicionalmente cultivados, inoculados con as raças I, II e III do patógeno.

As mudas das progênies de 'Catimor' UFV 2350, UFV 2352, UFV 2366, UFV 2568, UFV 2776, UFV 2790, UFV 2797, UFV 2799, UFV 3682, UFV 3746 e UFV 3748 que segregaram para susceptibilidade, foram testadas da mesma forma utilizada para com as mudas dos cultivares de *C. arabica*.

Observou-se diferentes graus de resistência nas mudas dos cultivares de *C. arabica*, constatando-se maior susceptibilidade no cultivar 'Catuaí Vermelho' (UFV 2144).

Verificou-se na população de 'Catimor', segregante para susceptibilidade, a presença de mudas nas quais o patógeno apresentou maior período latente, maior período de geração, menor número de pústulas esporuladas por folha e menor intensidade de ferrugem, como consequência da manifestação de resistência não específica.

A utilização do período de geração, associado ao número de pústulas esporuladas por folha ou à intensidade de ferrugem permitiu determinar o tempo requerido para o desenvolvimento da doença e a quantidade de inóculo produzida e, consequentemente, avaliar o nível de resistencia não específica presente nas mudas de cada cultivar ou progênie incluídas no ensaio.

As avaliações de resistência não específica com a utilização do período de geração e do número de pústulas esporuladas por folha, forneceram determinações mais práticas e rápidas. Esses resultados se confirmados em ensaios de campo, facilitariam os trabalhos de melhoramento genético do cafeeiro que visam resistência à ferrugem, permitindo a seleção de grandes populações em viveiros.

** GALLO, P.B. et al. Melhoramento do cafeeiro-observações sobre produção e outras características de café com resistência a *Hemileia vastatrix* em Mococa, SP. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 88-90. (601

* GASPAR, A.M., BETTENCOURT, A.J. y PONTE, A.M. DA. Estudo da adaptação de selecções de *Coffea arabica* L. e de híbridos sintetizados no CIFC, com resistência à *Hemileia vastatrix* Berk. & Br., as condições do Planalto Central de Angola. Garcia de Orta (Estudos Agronômicos) 5(1-2):37-42. 1978. (602

In 1964 the Instituto de Investigação Agronomica de Angola (IIAA) received from the Centro de Investigação das Ferrugens do Cafeeiro (CIFC) seed of 350 selections of *Coffea arabica* L. and of several hybrids with resistance to the races of *Hemileia vastatrix*. The coffee seedlings obtained from that seed were put up in field trials at the Centro de Estudos da Chianga in order to evaluate their yield as compared with selected progenies of the control cultivar Blue Mountain. The referred coffee introductions showed

poor adaptation to the new environment and quite a number of seedlings died. The surviving ones, showing a strong variability in their characteristics, were individually analysed in relation to vigor, yield, occurrence of empty fruits and resistance to the rust races prevalent in the area. The results obtained indicate that some introductions as follows below, presented good perspectives of being used in the future: IIAA 430 and 859 (Dilla & Alghe, CIFC 128/2), IIAA 436 (Caturra Vermelho x Geisha, F_2, CIFC 1019/1), IIAA 516 (K 7 x Híbrido de Timor, F_1, CIFC H 96), IIAA 547 (S 333 x Dilla & Alghe, F_1, CIFC H 101), IIAA 552 (KP 423 x Híbrido de Timor, F_1, CIFC H 71), IIAA 857 (Caturra Vermelho x Híbrido de Timor, F_2, CIFC HW 26/5) e IIAA 860 (Caturra Vermelho x S. 795, F_1, CIFC H 275). Considering this, new trials were established with the progenies of the most promising coffee trees and some of their seed was forwarded to the CIFC and to some experimental centers in Brazil.

* GONÇALVES, M. et al. Melhoramiento da cafeicultura em Timor face à *Hemileia vastatrix* B. & Br. Garcia de Orta (Estudos Agronômicos) 5(1-2):3-10. 1978. (603

The occurrence of *Hemileia vastatrix* B. & Br. has been a problem of great phytopathological interest and of large economic projection in Timor, as coffee production is almost the totality of the exportation of this territory; nevertheless, the 'discovery' of the 'Híbrido de Timor' and its remarkable resistance to the rust, is restraining the effects of the disease. Besides the selection of the 'Híbrido de Timor', showing an appreciable yield potential at its natural habitat, the improvement of coffee cultivation, regarding rust disease, includes the identification of ten physiologic races of *Hemileia vastatrix* - I, II, III, IV, XV, XXII, XXV, XXVI, XXIX, and XXX - and the introduction of some coffee cultivars and hybrids, total or partially resistant to these races. The field trials established allowed to admit that the 'Caturra Vermelho x Híbrido de Timor', due to its small size, good adaptation to the local conditions and mostly to its resistance to the *Hemileia vastatrix* and its yielding potential, is a promising material for the coffee cultivation in Timor.

* GUTIERREZ Z., G. Cafetos con resistencia a la roya. Noticiero del Café (Costa Rica) no. 234: 3. 1984. (604

* HENRIQUEZ CHACON, N. y BASAGOITIA M., C.R. Injertación de cultivares resistentes a roya del cafeto sobre patrones de especies *Coffea canephora* y *C. congensis*, etapa vivero. In Simposio Latinoamericano sobre Caficultura, 3°, Tegucigalpa, 1980. Trabajo. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 263. 1981. pp. 66-72. (605

The experiments in El Salvador grafting *Hemileia vastatrix* resistant cultivars on the 2 *Coffea* spp. did not produce incompatibility at the nursery stage. (Review of Plant Pathology 62(2):3872. 1983).

* HIDALGO UGALDE, O. Mejoramiento genético. Noticiero del Café (Costa Rica) 7(203):3-4. 1981. (606

An account of plant breeding and coffee cultivars in Costa Rica from the last century to the present. (ICO. Library Monthly Entries no. 13).

HOOGSTRATEN, J.G.J. et al. Research on incomplete resistance to coffee leaf rust. In International Scientific Colloquium on Coffee, 10th, Salvador, Brazil, 1982. Proceedings. s.n.t. pp. 517-521. (607

Results are presented of the IAC/FAO project on 'Durable Resistance to Coffee Leaf Rust (*Hemileia vastatrix*)' under execution at the Instituto Agronomico de Campinas, Sao Paulo, Brazil. Studies have mainly involved incomplete resistance, which could be more durable than complete, major gene resistance. Methods were developed to evaluate resistance in the laboratory, greenhouse and field. Incomplete resistance to coffee leaf rust is affected by light intensity, leaf age, productivity and soil humidity. The expression of resistance in several coffee populations is briefly indicated. Incomplete resistance of some genotypes proved to be race-specific. Possibilities for obtaining durable resistance by selecting for incomplete resistance are discussed.

** _____., BRAGHINI, M.T. y ESKES, A.B. Avaliação de resistência à *Hemileia vastatrix* de introduções de *Coffea arabica* procedentes da Africa. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 109-110. (608

** _____., BRAGHINI, M.T. y ESKES, A.B. Influência da umidade do solo e umidade relativa do ar sobre a resistência do cafeeiro a *Hemileia vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 110-111. (609

** _____., BRAGHINI, M.T. y ESKES, A.B. Resistência à *Hemileia vastatrix* de plantas triplóides do cruzamento entre o cultivar Catuaí de *Coffea arabica* e cafeeiros do cultivar Kouillou de *C. canephora*. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 107-108. (610

** _____., BRAGHINI, M.T. y ESKES, A.B. Segregação para resistência a *Hemileia vastatrix* em Icatu e Catimor. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 79-81. (611

* INVESTIGAN VARIEDADES promisorias de café con resistencia a la roya. IICA Boletín Interno 40(1041):20. 1985. (612

* IRIGOYEN, J.N. y FLORES B., M. DE J. Adaptabilidad de variedades con diferentes genotipos de factores de resistencia a la *Hemileia vastatrix* Berk. & Br. Resúmenes de Investigaciones en Café (El Salvador) 5:45-48. 1983. (613

Este experimento tiene como objetivo, estudiar la adaptabilidad de variedades con diferentes factores de resistencia a la

royа del cafeto, en condiciones de estricta altura, mediante la evaluación de su capacidad de producción, características del grano y calidad de la bebida, así también mediante la observación de la incidencia de plagas y enfermedades.

* IRIGOYEN, J.N. y RIOS LAZO, F. Estudio comparativo de la F_4 del cruce 'Caturra roja' por híbrido de Timor en relación a tres cultivares comerciales. In Simposio Latinoamericano sobre Caficultura, 6a., Panamá, 1983. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 340. 1984. pp. 99-108. (614

* KAISER, A.A.P.G. y JACOMINI, I. Considerações sobre o padrão em esaios de variedades de café com fatôres genéticos que conferem resistencia ao agente da ferrugem. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 317-319. (615

LEGUIZAMON CAYCEDO, J. et al. Contribution a l'etude de la resistance partielle du caféier à *Hemileia vastatrix* Berk. et Br. In International Scientific Colloquium on Coffee, 10th., Salvador, Brazil, 1982. Proceedings. s.n.t. pp. 523-532. (616

* En español en: IICA. Publicaciones Misceláneas no. 458. 1983. 24 p.

* _____. et al. Contribution à la connaissance de la resistênce partielle du caféier à *Hemileia vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 445-471. (617

* _____. et al. Identificación de la raza 11 de *Hemileia vastatrix* Berk. y Br. en Colombia. Cenicafé (Colombia) 35(1):26-28. 1984. (618

* _____. Contribution à la connaissance de la résistance incompléte du caféier arabica (*Coffea arabica* L.) à la rouille orangée (*Hemileia vastatrix* Berk. et Br.). Institut de Recherches du Café et du Cacao. Bulletin no. 17. 1985. 123 p. (619

LOURD, M. y HUGUENIN, B. La rouille farineuse des caféiers, *Hemileia coffeicola* en Côte d'Ivoire. Etude de sa repartition et de son pouvoir pathogène. Garcia de Orta (Estudos Agronómicos) 9(1-2):71-82. 1982. (620

Hemileia coffeicola, the powdery rust of coffee, previously known in Central Africa, was found in Ivory Coast in 1975. Field investigations enabled us to determine the rust on wild plants in the forest: *Paracoffea ebracteolata*, *Psilanthus manii*, *Coffea humilis* and *C. liberica*; on *C. canephora* in *Coffea* estates and on some *Coffea* diploid species in the collection of the Research Station of Man. Inoculation tests showed that the pathogenicity of the rust was very wide on different species and cultivars of coffee plants. Laboratory tests showed that *Paracoffea* strain had a different pathogenicity range and that some host plants had an intermediate reaction after inoculation. Results were discussed on the basis of polygenic relationships between plants and pathogen.

* LOURD, M. Variations qualitatives et quantitatives du pouvoir pathogène de la rouille farineuse *Hemileia coffeicola* Maub. et Rog. en Côte d'Ivoire. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicaçoes. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 119-131. (621

Artificial inoculations were made on different hosts with 3 isolates of *Hemileia coffeicola* coming from diseased plants of *Paracoffea ebracteolata*, *Coffea canephora* and *C. humblotiana*. More than 100 different genotypes including 11 species of *Coffea*, interspecific hybrids *Arabusta*, *Paracoffea ebracteolata* and *Psilanthus mannii* were tested.

The *C. canephora* and *C. humblotiana* isolates were very similar according to the virulence while the *P. ebracteolata* isolate might be distinguished on this qualitative aspect with differencial pathogenicity on some *C. arabica* and *C. canephora* genotypes.

Moreover, quantitative differences might be observed among the *Coffea* tested, depending on the host genotypes and the isolates of the powdery rust. Six different reaction types were determined during the study of the infectious process.

* MACHADO, J.R.M. y ARAUJO NETTO, K. DE. Comportamento de progênies de *Coffea arabica* L. portadoras de resistência a *H. vastatrix* Berk. et Br. no nordeste do Ceará. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1981. pp. 138-140. (622

* MARQUES, D.V. y BETTENCOURT, A.J. Resistência à *Hemileia vastatrix* numa população de Icatu. Garcia de Orta (Estudos Agronômicos) 6(1-2):19-24. 1979. (623

In samples of the Icatu hybrid (*Coffea arabica* x *Coffea canephora*) population, analysed for resistance to *H. vastatrix*, several spectra of resistance to this parasite were identified, from resistance to all the physiologic races to almost total susceptibility. Some of the characterized spectra were identical to those so far detected only in Híbrido de Timor, another interspecific hybrid between *C. arabica* and *C. canephora*. A great variability in some of the associations host-rust isolate regarding latency period and infection type was also observed. The great genetic variability of this population in relation to the agronomic characteristics is also extended to the resistance to *H. vastatrix* which confers to it a special importance for the coffee breeding.

* _____. Resultados preliminares do estudo à resistência à *Hemileia vastatrix* Berk. & Br. de uma progênie F_5 de Catiflor. In Congresso Brasileiro de Pesquisas Cafeeiras, 8°, Campos do Jordão/SP, 1980. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1980. pp. 388-389. (624

* _____. Multiplicação de genótipos de *Coffea* através da cultura in vitro de embriões e subsequente indução de ramos ortotrópicos. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 513-521. (625

* MARQUES, D.V. Sistema de nomenclatura para o complexo *Coffea* spp.-*Hemileia vastatrix*; uma proposta. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 83-93. (626

MARTINS, E.M.F., BERETTA, M.J.G. y MORAES, W.B.C. Indução de proteção à *Hemileia vastatrix* em plantas de café suscetíveis, por bactérias não patogênicas ao cafeeiro. Fitopatología Brasileira 5(3):425-426. 1980. (627

Sólo sumario.

De acordo com os trabalhos anteriores é possível se induzir proteção (resistência) à *Hemileia vastatrix* em cafeeiros suscetíveis por meio do tratamento destes, com fungos patogênicos ou não, previamente à inoculação com o patógeno. No presente trabalho relatamos a indução de proteção por bactérias não-patogênicas ao cafeeiro.

Foram usadas as seguintes bactérias: *Bacillus megaterium*, *Bacillus subtilis*, *Bacteria* B.50 (código de laboratório de Fitopatología da Universidade Técnica de Hannover, RFA), *Alcaligenes faecalis*, *Xanthomonas manihotis*, *Pseudomonas rubrilineans*.

As bactérias *B. megaterium*, *B. subtilis*, B.50 e *A. faecalis* foram acrescidas em meio de Peptona, extrato de levedura e NaCl (10:3:5); a *X. manihotis* cresceu em meio de agar simples e a *Pseudomonas rubrilineans* em meio B de King. De cada cultura foi preparada uma suspensão de células bacterianas em solução salina 0,5%, na concentração de 1,0 x 10^8 bactéria/ml.

Como controle foi usada solução salina em meio de crescimento, sem as respectivas bactérias. Após 72 horas de aplicação em folhas de cafeeiro da suspensão bacteriana foi inoculada uma suspensão de *H. vastatrix* na concentração de 2 mg/ml em Tween 20, 0,2%. As plantas foram mantidas por 48 horas em câmara úmida, no escuro. A contagem das lesões foi feita 30-40 dias após a inoculação e o resultado foi avaliado em relação ao controle, como porcentagem de proteção.

Analogamente ao apresentado no trabahlo de indução de proteção por fungos, é possível também induzir proteção a *H. vastatrix* através do tratamento com bactérias não-patogênicas ao cafeeiro sendo que o grau de proteção varia conforme a bactéria usada.

* MELHORAMENTO GENETICO visando à obtenção de cultivares resistentes à ferrugem (*Hemileia vastatrix* Berk. et Br.). In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte, MG. Projeto café; resumos de trabalhos. Belo Horizonte, Brasil, EPAMIG, 1980. pp. 140-142. (628

* MONTES, S. Estudio del comportamiento agronómico de cultivares resistentes a la roya del café. Ciencia y Técnica en la Agricultura: Café y Cacao (Cuba) 2(1):5-14. 1980. (629

Presentado en: Seminario Científico del INCA, 2°, La Habana, 1979.

Con el objetivo de estudiar su comportamiento agronómico fueron plantadas en una colección de variedades 29 cultivares de

café con genes de resistencia a *Hemileia vastatrix* Berk. y Br., en el Instituto de Ciencia Agrícola en el año 1972, sobre un suelo ferralítico rojo compactado. Los cafetos con un marco de plantación de 3 m x 3 m estuvieron situados a plena exposición solar. Se empleó un diseño de bloques completamente aleatorizados, y se evaluaron cinco individuos de cada cultivar. Se calcularon los rendimientos acumulados en kilogramos por planta de café cereza durante 1974, 1975, 1976 y 1977. La altura se evaluó una vez al año durante todo el período. Se calcularon correlaciones fenotípicas entre la altura y el rendimiento. Los cultivares que mostraron los mayores rendimientos entre 6 y 11 kg/planta fueron: 'F.840', 'H.66', 'H.1', 'S.795', 'F.840 Selftree', 'BA-10 CRRC', M.7846', 'E.497' y el 'No. 26'. Se encontró una correlación positiva y significativa al 5% entre el rendimiento y la altura con un valor de r = 0,40.

MONTES, S. Introducción y estudio en colección de variedades de cafeto resistentes a la roya. Ciencia y Técnica en la Agricultura: Café y Cacao (Cuba) 3(2):19-57. 1981. (630

* MORENO RUIZ, G. Avances en la obtención de variedades de café resistentes a la roya. In Taller sobre Roya del Cafeto *Hemileia vastatrix* Berk. y Br., Manizales, 1982. Trabajos. s.l., Federación Nacional de Cafeteros de Colombia, Centro Nacional de Investigaciones de Café, 1982. pp. 1-20. (631

* _____., CASTILLO Z., J. y OROZCO G., L. Estabilidad de la producción de progenies de cruzamientos de Caturra por Híbrido de Timor. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 375-398. (632

El área potencialmente apta para el cultivo del café en Colombia es extensa (4.000.000 has) y ecológicamente heterogénea. En estas condiciones, es de interés evaluar la estabilidad en el comportamiento de los nuevos genotipos mejorados. En este trabajo se analiza la estabilidad de la producción en 5 localidades, durante 3 cosechas, en una población experimental compuesta por 3 variedades comerciales y 16 progenies F_4 del cruzamiento de Caturra x Híbrido de Timor.

El análisis de varianza combinado de la producción mostró diferencias significativas para genotipos (G), localidades (L), cosechas (C), y para las interacciones de G x L, L x C y G x L x C. Las interacciones no estuvieron correlacionadas, lo cual supone que son de naturaleza diferente. La interacción más importante fue G x L, que aportó el 51% de la variación media de un genotipo.

La estabilidad de la producción se evaluó por medio de la ecovalencia de Wricke (Ei), la varianza de estabilidad de Shukla (Wi), la varianza genotípica (Vgi) y la técnica de regresión lineal de Eberhard y Russell (b y Vdi). Los parámetros de estabilidad separaron los genotipos en dos grupos: inestables y estables, en los que la contribución a la interacción de G x L estuvo en la proporción de 4:1. En los genotipos inestables la producción fue variable e impredecible (valores altos y significativos para Ei, Wi, Vgi y Vdi). En contraste, en los genotipos estables estos

índices fueron bajos y no significativos, pero su sensibilidad al ambiente fue variable. Dos genotipos, con b = 1, se ajustaron al concepto agronómico de estabilidad. En los demás casos no se apreciaron índices claros de estabilidad biológica, aunque 3 genotipos pueden ser considerados como poco sensibles a la variación ambiental.

* MORENO RUIZ, G. y CASTILLO ZAPATA, J. La variedad Colombia; una variedad de café con resistencia a la roya (*Hemileia vastatrix* Berk. y Br.). Centro de Investigaciones de Café (Chinchiná, Colombia). Boletín Técnico no. 9. 1984. 25 p. (633

* MULLER, R.A. La recherche de variétés de caféiers résistantes á la rouille orangée (*Hemileia vastatrix* B. et Br.). In Institut Français du Café et du Cacao. IFCC, 25e anniversaire 1958-1982. París, 1983. pp. 47-48. (634

* _____. Quelques réflexions a propos de la selection de variétés de caféiers resistantes a la rouille orangée (*Hemileia vastatrix* B. et Br.). Café, Cacao, Thé 28(1):17-42. 1984. (635

In the first part of this paper devoted to the vertical resistance of the coffee tree to *Hemileia vastatrix*, the reader will find: a summary of the present knowledge regarding this resistance, the facts enabling a research approach to be chosen with a view to breeding coffee trees with vertical resistance to *H. vastatrix* (schematic mechanisms of the diversification of the races of *H. vastatrix*, frequency of mutation, utilization of SH1, SH2, SH3, SH4, and SH5 genes utilization of the resistance of *Coffea canephora* and in particular that of the Catimor coffee tree). The author concludes that only the utilization of Group A varieties with the four V6 to V9 resistance genes of the Timor Hybrid can be recommended. The utilization of horizontal resistance, considered in the second part, should make it possible to breed coffee tree varieties with a stable resistance to rust. After summarizing the general characteristics of this type of resistance governed by many genes and manifesting itself by quantitative reactions, the author reviews the sources of horizontal resistance in the *Canephora* coffee tree (Kouillou, Icatu, Catimor) and in the *Arabica* coffee tree, in Brazil and Cameroon. A special study of horizontal resistance in *Arabica*, carried out in the laboratory, has enabled observations to be translated into the form of three specific variables (percentage of fructiferous spots, sporulation index, disease intensity index) and to study the changes in these three susceptibility criteria against time. Moreover, good agreement has been obtained between the overall results obtained in the field and those obtained in the laboratory. The search for horizontal resistance must be made in susceptible coffee trees in the vertical sense of the term and the varieties bred for their horizontal resistance should be used by adopting vegetative propagation.

* OWUOR, J.B.O. Selection for resistance to coffee rust *Hemileia vastatrix* B. et Br. in the breeding programme for resistance to coffee berry disease in Kenya. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 473-484. (636

PACHETTI, P. DE. y CHIARAPPA, L. Resistencia a la roya del café. Bogotá, Federación Nacional de Cafeteros de Colombia, Laboratorio de Investigaciones sobre la Química del Café y de los Productos Naturales, 1979. s.p. (637

* PEÑA, M. DE. Somatic embryo induction and plant regeneration from *Coffea canephora* and *Coffea arabica*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 493-512. (638

In order to have a system for clonal propagation of improved cultivars obtained in the regular breeding programmes, or to regenerate plants from protoplast fusion, one of the first steps of this work was to obtain plant regeneration. This result was achieved by cultivating mature leaf explants of *C. canephora* and *C. arabica* c.v. Mundo Novo in a nutrient solid medium for callus proliferation. Afterwards, tissues were subcultured in a liquid medium to start a suspension culture. Embryo formation was obtained eight weeks later under dark conditions. When the cotyledonary leaf started to develop, the embryos were placed under illumination and developed into green plantlets, which were then subcultured in solid medium until a new taproot was formed. Plants were transplanted in sterile scoria and kept in the growth chamber for a month, and then they were taken to the coffee growing areas where they were transplanted to sterile soil and maintained in an Environmental Room for two months. During this period, the height of the plants increased by three times. Then, the plants were transplanted in small bags with non-sterile soil, and placed under natural conditions. After three months, they developed the first plagiotropic ramification and a very good root system. The plants were then transplanted to the field in order to continue their evaluation. Up to now, the plants have exhibited normal growth, comparable to that of plants obtained from seeds. These preliminary results show that in vitro plant regeneration is a promising technique for the propagation of improved coffee cultivars.

* PEREIRA, A.A. et al. Comportamento de progênies de cafeeiros resistêntes à *Hemileia vastatrix* Berk. et Br. na zona sul de Minas Gerais. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Ribeirão Preto/RJ, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 5-9. (639

* _____. et al. Comportamento de progênies resistêntes à ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.) na Região de Ponte Nova, Zona da Mata de Minas Gerais. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Ribeirão Preto/RJ, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 48-52. (640

* También en: Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte/MG. Projeto café; resumos de trabalhos. Belo Horizonte/MG, EPAMIG, 1980. pp. 150-156.

* _____., BARTHOLO, G.F. y CHAVES, G.M. Comportamento de cafeeiros da cultivar 'Cavimor', selecionados na região de Ponte Nova e Viçosa, Zona da Mata de Minas Gerais. In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte/MG. Projeto café; resumos de trabalhos. Belo Horizonte/MG, EPAMIG, 1980. pp. 157-160. (641

* PEREIRA, A.A., BARTHOLO, G.F. y CHAVES, G.M. "Sarchimor" - nova cultivar resistente a ferrugem do cafeeiro (*Hemileia vastatrix* Berk. et Br.). In Sistema Estadual de Pesquisa Agropecuária, Belo Horizonte/MG. Projeto café; resumos de trabalhos. Belo Horizonte/MG, EPAMIG, 1980. pp. 170-174. (642

* PEREIRA, J.B.D., ARAUJO NETTO, K. DE. y MIGUEL, A.E. Medidas biométricas e outras informações a respeito de seleções portadoras de resistência à *Hemileia vastatrix*. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Rio de Janeiro, Instituto Brasileiro do Café, 1981. pp. 32-36. (643

* PROGRAMA COOPERATIVO OFICINA DEL CAFE/MINISTERIO DE AGRICULTURA Y GANADERIA (COSTA RICA). Informe anual de labores 1982. San José, Costa Rica, Oficina del Café, 1983. 170 p. (644

Mejoramiento genético-resistencia a *H. vastatrix*: pp. 69-96.

* _____. Informe anual de labores 1983. San José, Costa Rica, Oficina del Café, 1984. 175 p. (645

Mejoramiento genético-resistencia a *H. vastatrix*: pp. 74-104.

** PROGRAMA COOPERATIVO PARA LA PROTECCION Y MODERNIZACION DE LA CAFICULTURA EN MEXICO, CENTRO AMERICA Y PANAMA. Desarrollo y reproducción de variedades resistentes a la roya. In _____. Sétimo informe de actividades, 1984. San José, Costa Rica, IICA-PROMECAFE, 1985? pp. 76-88. (646

* PROYECTO PARA el desarrollo y reproducción de variedades de café resistentes a la roya (*H. vastatrix* Bk. Br.). Boletín de PROMECAFE (Costa Rica) no. 12:2-3. 1981. (647

Details of a project to be co-ordinated from the CATIE in Turrialba, Costa Rica, but with research carried out in various Latin American countries. The 5-year project is designed to develop and multiply new coffee varieties resistant to leaf rust.

QUIJANO-RICO, M. et al. Química bioinorgánica del cafeto y de esporas de royas. El manganeso y el cobre. In International Scientific Colloquium on Coffee, 10th, Salvador, Brazil, 1982. Proceedings. s.n.t. pp. 193-218. (648

* _____. et al. Distribución y rol bioquímico del manganeso y del cobre en hojas de cafetos y en esporas de royas. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 237-258. (649

En nuestro laboratorio hemos realizado un programa de investigaciones sobre algunos aspectos de la bioquímica del cafeto y de *H. vastatrix*, dentro del marco de un acuerdo de cooperación con la Sociedad de Cooperación Técnica de la República Federal de Alemania, Eschborn (GTZ).

Los temas investigados están relacionados con la bioquímica inorgánica del cafeto y de esporas de dos royas *H. vastatrix* y *U. dianthi*. Esta última fue escogida para ser utilizada como modelo

de la primera en Bogotá. Además, con la actividad de enzimas seleccionadas en hojas de cafetos, las características físicas y químicas de las ceras cuticulares, la química de las fitoalexinas y técnicas de cultivos de tejidos para el cafeto.

En la presente comunicación se resume parte de nuestro trabajo en curso sobre la distribución y papel de algunos elementos trazas en hojas de cafetos y esporas de las royas mencionadas. Especialmente del manganeso y del cobre, los cuales por sus propiedades bioquímicas y antagonismo pueden proporcionar indicaciones útiles para la interpretación del rol y modo de acción del uno y del otro.

Sobresale la acción de estímulo de la germinación por el manganeso y el efecto de protección y recuperación que ejerce este elemento contra la inhibición (de la germinación) por el cobre. Son notables la sensibilidad y la reproducibilidad de la detección, usando como criterio la tasa de germinación de las esporas, con pequeñas variaciones en el suministro de estos elementos.

Los resultados obtenidos permiten proponer algunas ideas sobre los mecanismos de acción de dichos elementos en la germinación de esporas y el papel eventual que pueden jugar durante la interacción hospedero-patógeno.

* REBEL, E.K. Comparação entre cultivares já consagrados e seleções portadoras de fatôres genéticos que conferem resistencia ao agente da ferrugem. In Congresso Brasileiro de Pesquisas Cafeeiras, 9°, São Lourenço/MG, 1981. Resumos. Rio de Janeiro, Instituto Brasileiro do Café, 1981. pp. 24-27. (650

* REINA M., F.E. y OSORTO, J.J. Evaluación de introducciones de café, portadoras de factores de resistencia a la roya (*Hemileia vastatrix* Berk. et Br.). In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 137-143. (651

En 1981 se efectuaron nuevas introducciones de café, provenientes del CATIE, Turrialba, Costa Rica, que fueron sembradas para evaluación en el Centro Experimental Los Linderos, Santa Bárbara. El ANAVA determinó diferencias altamente significativas entre los genotipos evaluados que incluyen, CATIMORES, CAVIMORES, SARCHIMORES y MUNDOMORES, etc. Las líneas T-5299 y T-5316 descendientes del cruzamiento de Mundo Novo x Catimor; T-5296 Villa Sarchí x Híbrido de Timor y T-5267 Catuaí Rojo presentaron los mejores rendimientos con 4.44, 3.08, 3.01 y 2.72 T.M./ha de pergamino seco, respectivamente; en cuanto que las progenies T-5297, T-5317, T-5319 y T-5320 mostraron los rendimientos más bajos con 1.89, 1.85, 1.50 y 0.94 T.M./ha de pergamino seco. Se observaron plantas de la línea, T-5299, con anormalidad en la longitud de los entrenudos, lo cual puede ser debido a irregularidades en el proceso de la meiosis, considerando que uno de los progrenitores del CATIMOR es un Híbrido interespecífico entre *Coffea canephora* y *Coffea arabica*. En relación al porcentaje de frutos vanos (PFV) las mejores líneas presentaron un PFV, dentro

del límite establecido para selección (0-8%) las líneas T-5308, T-5319 y T-5306 presentaron un índice de incidencia de Cercospora, superior a 3, en cuanto que la T-5299, T-5298, T-5315 y T-5297 tuvieron un grado de infección inferior a 2.5, que se considera aceptable. En vista de que los resultados obtenidos provenían de la primera cosecha comercial, se recomienda esperar por lo mínimo 3 cosechas adicionales para emitir conclusiones firmes sobre el potencial de estos materiales.

* REIS, A.J. Observações sobre *Coffea canephora* cv. Guarini em Ribeirão Preto. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Ribeirão Preto/SP, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 40-41. (652

** RENA, A.B. et al. Fotossíntese è o depauperamento de algumas progênies de café resistentes à ferrugem. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 171-172. (653

** _____., PEREIRA, A.A. y BARTHOLO, G.F. Status mineral foliar a degenerescència precoce de algumas progênies de café resistentes à ferrugem. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. p. 170. (654

** _____., PEREIRA, A.A. y BARTHOLO, G.F. Teor foliar de minerais, conteúdo caulinar de amido e o depauperamento de algumas progênies de café resistentes a ferrugem. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 169-170. (655

** RIBEIRO, I.J.A. Avaliação da resistência horizontal a *Hemileia vastatrix* Berk. et Br. em cultivares de *Coffea arabica* L. em condições naturais de epidemia. Teses Mestre en Fitopatología. São Paulo, Brasil, Escola Superior de Agricultura "Luiz de Queiroz", 1978. 64 p. (656

Avaliou-se o nível de resistência horizontal a *Hemileia vastatrix* Berk. et Br. em três cultivares de *Coffea arabica* (harar, mundo-novo e catuaí-amarelo), em condições naturais de epidemia, utilizando-se para tal três diferentes métodos para avaliação da incidência da moléstia; porcentagem de folhas infectadas, pústulas por folha e pústulas por folha infectada. A avaliação do nível de moléstia foi feita mensalmente por um período de dois anos. O método de avaliação correspondente a pústula por folha infectada foi aquele que discriminou níveis de resistência horizontal em maior número de comparações. Por outro lado, o método baseado na porcentagem de folhas infectadas apresentou menor eficiência na discriminação das diferenças entre cultivares. Os cultivares mundo-novo e catuaí-amarelo apresentaram níveis semelhantes de resistência horizontal e o harar foi o que exibiu menor nível. Observou-se, ainda, nos cultivares mundo novo e catuaí-amarelo a tendência de não reterem folhas infectadas de um ano para outro, fato que acarreta um atraso no nível de epidemia neles, quando comparados com o harar. A não-retenção de folhas com pústula dos cultivares mundo novo e catuaí-amarelo caracteriza um tipo incomum, não descrito até aqui, de resistência horizontal em que a taxa de desenvolvimento da moléstia não e alterada e o início da epidemia é retardado.

* RIBEIRO, I.J.A., BERGAMIN FILHO, A. y CARVALHO, P.C.T. Avaliação da resistência horizontal a *Hemileia vastatrix* Berk. et Br. em cultivares de *Coffea arabica* L. em condições naturais de epidêmia. Summa Phytopathologica (Brasil) 7(1/2):80-95. 1981. (657

The horizontal resistance of *Hemileia vastatrix* Berk. & Br. was evaluated in three cultivars of *Coffea arabica* L. (Harar, Mundo-Novo and Catuaí) in epidemic natural conditions. Three evaluation methods were used: percentage of infected leaves, pustules per leave and pustules per infected leaves. The evaluation of disease levels was made monthly in two years. The pustules per infected leave method discriminated horizontal resistance levels in greater number of comparisons. The percentage of infected leaves method presented the smallest discrimination between cultivars. The Mundo-Novo and Catuaí cultivars presented similar horizontal resistance levels and the Harar cultivar presented the smallest level. In the Mundo-Novo and Catuaí cultivars there is a tendency to release infected leaves from one year to another. This phenomenon causes a delay in the epidemic level in those cultivars, when compared with the Harar one. The release of pustules leaves with rust characterizes an uncommon type of horizontal resistance, not yet described, that does not reduce the infection rate and causes a delay in the beginning of the epidemic.

* RIJO, L. y RODRIGUES JUNIOR, C.J. Processo de infecção da *Hemileia vastatrix* Berk. & Br. em cultivares susceptíveis e resistentes de *Coffea arabica* L. Garcia de Orta (Estudos Agronômicos) 5(1-2):23-24. 1978. (658

Only about the 3rd day after the inoculation of coffee leaves with *H. vastatrix* there starts to be differences in the infection process of the pathogen in susceptible and resistant varieties. At this stage of the infection, in both cases, the fungus is present in the substomatical chamber with mycelium resembling in the whole an anchor. In the susceptible varieties the mycelium grows then intercelullarly sending branches through the mesophyll and showing plenty of well visible haustoria. Uredosporic sori finally protrude like a bouquet through the stomata. In the resistant varieties the fungus growth stops, in general, at the anchor stage, although an occasional hypha might cross the mesophyll without any branching. Very few haustoria are observed. The possible relations between the arrest of the fungus growth and the production of toxic substances are discussed.

* _____. et al. Immunity on the coffee-orange rust association. Histopathological aspects. Garcia de Orta (Estudos Agronômicos) 9(1-2):101-104. 1982. (659

Coffee (*Coffea arabica* L.) leaves inoculated with avirulent races of the orange rust (*Hemileia vastatrix* Berk. & Br.) show symptoms characterized by chlorotic flecks associated with punctiform tumefactions. Sometimes, these fleck-tumefaction symptoms are, however, observed in a very small number over the whole inoculated leaf, and in between them no other symptoms are observed with the naked eye or even with a hand lens. The histopathological study of these immune areas has shown that some alterations can be observed on the

guard and subsidiary cells of some stomata, which sometimes extend to the adjacent and underlying cells. The affected cells present granular cytoplasm and aparently thicker cell walls. In connection with the affected areas the fungus development was observed to be arrested in very incipient stages of infection. Some of the observed alterations appeared to be produced even without any apparent penetration of the fungus.

RIJO, L. y COOK, R.T.A. A connection between weak spot and rust symptoms on *Coffea arabica*. Revista de Biología 12:171-178. 1983. (660

The microscopic and macroscopic appearance of weak spots on arabica coffee leaves resembled a resistance reaction to invasion by *Hemileia vastatrix*, the causal agent of coffee rust. Some of the larger spots bore spores of *H. vastatrix*. Such weak spotted lesions were more prevalent following decreases in minimum monthly temperature. The relevance of these findings to tonic effect of fungicidal sprays is discussed.

* _____. y VASCONCELOS, I. Formação de calose e de legnina em combinações incompatíveis *Coffea* sp.-*H. vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 267-281. (661

The formation of callose and of lignin in the infected areas of host-parasite combinations have been considered as possible active resistance mechanisms of the plants to the pathogens. With the purpose of shed some light on the resistance of *Coffea* sp. to *Hemileia vastatrix*, a search for these compounds was made under the optical and fluorescence microscopes by using adequate histochemical techniques.

Staining with aniline blue showed under the fluorescence microscope the presence of callose in the first stages of infection (up to 5-6 days after the inoculation) in the stomatic and mesophyll cells.

Punctiform and disseminated callose deposits reached the cell walls of the 3rd and 4th layers of the mesophyll surrounding the intercellular spaces where the fungal mycelium was present. Callose was also detected in the haustorium mother cells and around the haustoria.

Staining with aniline blue indicated in addition the presence of lignin or lignin-like compounds in the large cells of the tumefaction, therefore in a more advanced stage of the infection. The presence of lignin was confirmed by staining with phloroglucinol.

* RIOS LAZO, F.A. y FLORES BERRIOS, M. DE J. Ensayo de adaptación de híbridos y variedades introducidas con resistencia a *Hemileia vastatrix* Berk. & Br. Resúmenes de Investigaciones en Café (El Salvador) 3:64-65. 1980. (662

* También en: Simposio Latinoamericano sobre Caficultura, 5°, San Salvador, 1982. Trabajos. IICA. Ponencias, Resultados y Recomendaciones de Eventos Técnicos no. 323. 1983? pp. 147-156.

Los objetivos del presente ensayo son determinar la adaptabilidad de los híbridos y variedades de café en condiciones de media altura. Este experimento se instaló en la Estación Experimental del ISIC (955 m.s.n.m.) en Santa Tecla, El Salvador, en 1976 y finalizó en 1981. El distanciamiento de siembra que se usó fue de 1.5 x 2.0 m y los árboles de sombra sembrados fueron de *Inga punctata* Wild, distanciados a 10 x 10 m.

* _____. y FLORES BERRIOS, M. DE J. Prueba de adaptación de híbridos con resistencia a la *Hemileia vastatrix* Berk. & Br. Resúmenes de Investigaciones en Café (El Salvador) 3:65-66. 1980. (663

_____. y FLORES BERRIOS, M. DE J. Prueba de adaptación de híbridos con resistencia a la *Hemileia vastatrix* Berk. y Br. Resúmenes de Investigaciones en Café (El Salvador) 4:54-56. 1981. (664

* _____. y FLORES BERRIOS, M. DE J. Prueba de híbridos con resistencia a *Hemileia vastatrix* Berk. & Br. Resúmenes de Investigaciones en Café (El Salvador) 5:49-53. 1983. (665

RIVERA FERNANDEZ, A. y ESKES, A.B. Teste de adaptação da ferrugem do cafeeiro (*Hemileia vastatrix*) em *Coffea canephora* cv. Konillon com uso de discos de folhas. In Congresso Brasileiro de Pesquisas Cafeeiras, 6°, Ribeirão Preto/SP, 1978. Resumos. Río de Janeiro, Instituto Brasileiro do Café, 1978. pp. 132-133. (666

* _____. Evaluación de la resistencia a la roya del cafeto (*Hemileia vastatrix* Berk. et Br.) en variedades del Banco de Germoplasma del Instituto Mexicano del Café. Tesis Ing. Agr. Chapingo, México, Universidad Autónoma, 1981. 69 p. (667

* Resumen en: Chapingo (Nueva época) (México) no. 25-26:29-33. 1980.

El presente trabajo fue realizado en el Centro de Investigação das Ferrugens do Cafeeiro (CIFC), en Oeiras, Portugal. El motivo por el cual se efectuó este estudio en dicho país, es debido a que CIFC es el único centro de investigaciones que cuenta con todas las razas fisiológicas de la roya.

El objetivo de este trabajo, fue el de evaluar la resistencia de 51 variedades de cafeto a la roya anaranjada, de éstas 28 de la especie *Coffea arabica*, 2 de *C. arabica* x *C. canephora* (Híbrido de Timor), 12 de *C. arabica* x *Híbrido de Timor* y 9 de *C. arabica* x *C. liberica* ó *C. arabica* x (*C. arabica* x *C. liberica*), como progenitores. Para ello se seleccionaron 156 plantas sobresalientes dentro de estas variedades tanto por su alta producción como por presentar bajos niveles de frutos sin

semilla. De estas plantas se tomó semilla autofecundada y se envió al CIFC.

Para esta evaluación fueron tomadas más o menos 30 plantas por selección, las cuales fueron inoculadas con uredosporas de *Hemileia vastatrix*, bajo condiciones de invernadero. La inoculación fue realizada en el envés de las hojas, con la ayuda de un escalpelo y un pincel esterilizados. El tiempo transcurrido desde la infección de las hojas a los primeros indicios de esporulación (período de incubación), bajo las condiciones en que se trabajó, fue de 30 días aproximadamente. Razón por la cual fueron tomadas las lecturas de las reacciones tanto en plantas resistentes como en susceptibles de los 30 a los 40 días después de la inoculación.

En base a los resultados obtenidos, es posible seleccionar algunos materiales con factores de resistencia en condición homocigótica que pueden ser usados para multiplicación. Las plantas, principalmente aquellas que se manifestaron como resistentes a todas las razas fisiológicas de la roya, podrán usarse para transferir sus factores de resistencia a las variedades comerciales. Pues en general las selecciones más resistentes son las menos productivas y presentan serios problemas para la selección directa.

Este trabajo pretende ser la base para un programa de mejoramiento del cafeto para resistencia a la roya anaranjada.

* RODRIGUES JUNIOR, C.J. Resistance in arabicoid coffees to the orange rust. Coffee-orange rust interactions. In Seminario de Estudios sobre la Lucha Contra la Roya del Café, Paipa, Colombia, 1977. Informe. Eschborn, GTZ, 1979. pp. 55-62. (668

_____. Resistance to *Hemileia vastatrix* Berk. Br. of some Mozambicoffea coffee species. In International Scientific Colloquium on Coffee, 9th, London, 1980. Proceedings. París, 1981. pp. 663-665. (669

Some of the Moxambicoffea coffee species such as *C. eugenioides*, *C. racemosa*, *C. kivuensis*, *C. zanguebariae* and *C. salvatrix* have been inoculated at Oeiras with different physiologic races of *Hemileia vastatrix*. The screening tests of *C. eugenioides* and *C. racemosa*, the best represented species regarding the number of accessions received and the number of plants inoculated, have shown that the former presents most of the plants with resistance, and the latter most of the plants with susceptibility. The finding of *C. racemosa* plants showing reactions of resistance to *H. vastatrix* is contrary to the generalized idea of its fully susceptibility. The single plant of *C. zanguebariae* tested was apparently resistant. *C. kivuensis* showed some plants susceptible and some with resistance. As to the *C. salvatrix* seedlings tested, some were susceptible and others indefinite in view of the inconsistency of the reactions presented.

** _____. Coffee rust races and resistance. In Fulton, R.H., ed. Coffee rust in the Americas. St. Paul, Minn., American Phytopathological Society, 1984. pp. 41-58. (670

* RUBIO C., A. y OSORTO, J.J. Evaluación de 16 genotipos promisorios por su alta producción y resistencia a la roya del cafeto (*Hemileia vastatrix* Berk. et Br.). In Seminario Nacional de Investigaciones en Café, 3°, San Pedro Sula, 1984. Memoria. Tegucigalpa, Instituto Hondureño del Café, 1984. pp. 127-136. (671

En 1979, por intermedio de PROMECAFE se introdujeron 16 materiales genéticos seleccionados en el Banco de Germoplasma del CATIE por su alta producción y posible resistencia a la roya, los cuales fueron sembrados en 1980 en el Centro Experimental Los Linderos, Santa Bárbara, ubicado a 1100 m.s.n.m. y con una precipitación de 2100 mm. La primera cosecha comercial se obtuvo en 1983/1984, donde se evaluó la producción individual de cada planta dentro de cada genotipo, y previo a la cosecha se recolectaron datos de vigor (VG), Porcentaje de Frutos Vanos (PFV), e incidencia de Cercospora (CE). El análisis de varianza para el carácter producción, nos indica que hay diferencias altamente significativas (0.01); entre variedades siendo que las líneas T-5175, T-5159, T-2308, T-5269 y T-5155 ocuparon los primeros lugares con 4.94, 4.56, 3.46 y 3.34 T.M./ha de pergamino seco, respectivamente. Los híbridos sintetizados en el CATIE: TH-219, TH-217, TH-163 y TH-164 con 2.11, 1.48, 1.20 y 1.03 ocupan las últimas posiciones en cuanto a rendimiento, lo cual es un índice de pobre adaptación a las condiciones locales. De acuerdo a la prueba de rango múltiple de Duncan al 5% de probabilidad no existen diferencias significativas en cuanto a rendimiento entre las variedades comerciales: Caturra Rojo, Catuaí Rojo y Amarillo, Mundo Novo y Geisha y las líneas experimentales con factores de resistencia a la roya: T-5175, T-5155, T-5159 y T-5269. En la evaluación de PFV se observó un rango desde 3.4% para Caturra Rojo hasta 13.5% para el Híbrido TH-345. En general, los cultivares que tuvieron mejor productividad, presentaron PFV inferior al 8%, que se ha establecido como límite máximo de selección. Considerando, que los resultados obtenidos provienen de la primera cosecha comercial, no se pueden emitir conclusiones definitivas, respecto a los mejores genotipos, para lo cual se requerirá efectuar un análisis combinado de producción y caracteres agronómicos por lo mínimo de las primeras cuatro cosechas.

* RUST AND CBD - proof coffee tree seeds sought by Kenyans. World Coffee and Tea 22(7): 16-18. 1981. (672

Kenyan and Dutch scientists at the Coffee Research Station in Ruiru have developed hybrid coffee seeds which will yield arabica plants resistant to both coffee berry disease and leaf rust. The breeding program, which involved crossing resistant varieties with Kenyan coffee plants to maintain the quality of the beans, is almost completed. The new plants also combine compact growth with good productivity, which will enable high potential land to be released for food and crop production.

* SERA, T., CARDOSO, R.M.L. y ANDROCIOLI FILHO, A. Melhoramento do cafeeiro para resistência à ferrugem *Hemileia vastatrix* nas progênies derivadas do cruzamento entre cultivares de *Coffea arabica* e o híbrido de Timor, no estado do Paraná, Brasil. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 407-413. (673

SIEVERS, S. et al. Relationship between genetics and chemistry in the system *Coffea* spp./ *Hemileia vastatrix*. In International Scientific Colloquium on Coffee, 9th, London, 1980. Proceedings. París, ASIC, 1981. pp. 671-680. (674

Basic knowledge of plant (leaf) composition could be prerequisite to study resistance against leaf rust (*H. vastatrix*) and the phenomena of plant-pathogen interaction. Comparing healthy leaves from different coffee genotypes with physicochemical, biochemical and plant physiological methods, we try to establish correlations between genetics and components of leaves. The possibility of using pyrolysis-mass spectrometry to establish characteristic pyrolysis patterns of healthy leaves from susceptible and resistant coffee genotypes was studied. Also some races of *H. vastatrix* and leaf samples from different genotypes at different stages of infection were compared with this technique. Bioelement contents of coffee leaves were estimated using plasma optical emission spectrometry and thermal neutron activation instrumental analysis. Volatile compounds of coffee leaves were separated and will be identified using gas chromatography - mass spectrometry. Oxidative enzyme activities were estimated comparing leaf extracts from different coffee genotypes. Tissue culture methods have been established and will provide us with homogeneous plant material grown under controlled conditions.

* _____. Obtenção do líquido de lavado intercelular (IWF) de folhas de cafeeiro para o estudo do mecanismo de resistência à *Hemileia vastatrix*. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 217-235. (675

The intercellular spaces of healthy young, but totally expanded leaves from coffee plants growing at Cenicafé (Caldas, Colombia) were studied using a technique developed by H. Lehmann - Danzinger (University of Goettingen, West Germany) for bean leaves after slight modifications. Leaf samples from *C. liberica*, *C. canephora*, *C. racemosa* and *C. arabica* which show different reactions against leaf rust (physiological groups A, P, F and E), were compared with respect to average fresh weight - leaf area - intercellular space volume relationships. After infiltration of the leaf samples with destilled water, they were centrifuged at ~2500 x g, mostly without any injury being observed. The intercellular washing fluids (IWF) were recovered from the bottoms of the centrifuge tubes and immediately frozen on dry ice after determining the volumes. The presence of proteins with peroxidase-, polyphenoloxidase-, protease-, phosphatase-, esterase- and invertase-activities as well as sugars (saccharose, glucose and fructose) and in some cases caffeine could be shown. No catalase-activity was found in the analysed IWFs of coffee leaves. Studies about changes in IWF composition after inoculation of *C. arabica* leaves with *H. vastatrix* in compatible and non-compatible combinations are being performed at the I.B., Sao Paulo, Brazil.

** SOBRINHO, J.B., CARVALHO, A. y FAZUOLI, L.C. Melhoramento do cafeeiro - comportamento de progenies e populações derivados de híbridos com fatores de resistência a *Hemileia vastatrix* em Pindorama, SP. In Congresso Brasileiro de Pesquisas Cafeeiras, 10°, Poços de Caldas/MG, 1983. Anais. Río de Janeiro, Instituto Brasileiro do Café, 1983. pp. 87-88. (676

* SRINIVASAN, C.S. y VISHVESHWARA, S. Selection in coffee: some criteria adopted and results obtained in India. Journal of Coffee Research 10(3):53-62. 1980. (677

In India nine selections in arabica and three in robusta coffee were evolved through pure line selection, mass selection, pedigree selection and backcross breeding. The selections have helped to preserve and perpetuate genetic variability in this important perennial seed crop. The selection criteria have been for yield, resistance to leaf rust, low fruit and bean abnormalities, dwarf habit (in selection 7) and good cup quality. Data on shifts in yield levels following advancement of selection at Central Coffee Research Institute are presented. Selection pressures being applied in seed plots of these selections maintained in various zones are enumerated.

* TIBURZY, R., MARTINS, E.M.F. y MORAES, W.B.C. Visualization of *Hemileia vastatrix* structures in coffee leaves by fluorescence microscopy. Fitopatologia Brasileira 8(3):461-466. 1983. (678

Leaves of *Coffea arabica* cv. Mundo Novo and cv. C-1122 inoculated with *Hemileia vastatrix*, races II and I, were stained with fluorochrome Diethanol. Ascorbic acid was used to prevent browning of the leaf tissue during fixation. Yellow auto-fluorescence was observed in the subsidiary cells of the stomatal complex and mesophyll cells that had become necrotic in response to the infection. Necrotic subsidiary cells reacted positively to the lignin tests with phloroglucinol-HCl and the chlorine water-sodium sulfite test to lignin. The fluorochrome technique was found to be suitable for investigating both fungal development and host cell reaction simultaneously.

* VARIEDADES RESISTENTES a la roya del cafeto. Carta Informativa ISIC (El Salvador) 3(5):2. 1982. (679

** VARZEA, V.M.P. Avaliação do nivel de resistência horizontal a *Hemileia vastatrix* em plantas de *Coffea arabica*. Lisboa, Universidade Técnica de Lisboa, Instituto Superior de Agronomía, 1985. s.p. (680

VENEZUELA TO plant rust-resistant coffee. Reuter Coffee Newsletter no. 216/84. 1984. s.p. (681

According to Agriculture Minister Felipe Gómez Alvarez, Venezuela plans to plant 20 million rust-resistant coffee trees in 1985. (ICO. Library Monthly Entries 53:10. 1984).

* VOSSEN, H.A.M. VAN DER y WALYARO, D.J. The coffee breeding programme in Kenya: a review of progress made since 1971 and plan of action for the coming years. Kenya Coffee 46(541): 113-130. 1981. (682

Coffee berry disease (CBD) and to a lesser extent coffee rust are the major constraints to economic production of arabica coffee in Kenya. A breeding programme for disease resistance was started in 1971. Progress was considerably enhanced by the development of efficient methods of preselection for CBD resistance and selection for yield, quality and resistance to coffee rust. Not only has it been possible to combine resistance to both diseases with good yield and quality as well as compact growth, but also such material can now be produced through hybrid seed, which evades the problems inherent to vegetative propagation. Large-scale seed production of this new material is expected to start in 1985 after completing a programme of field testing of the new material and establishing the necessary seed production orchards. The benefits of the introduction of this new disease resistant and compact-type coffee plant material are: 1) considerable reduction in production costs, which will stabilise the cash income for the smallholder and guarantee continued profitability for the large estates; 2) a doubling in yield per unit area through close spacing and therefore drastic reduction of the hectarage of land required to produce the export quota of coffee. This means that gradually some 50,000 ha of high potential land could be diversified from the coffee sector to food production.

WALYARO, D.J. et al. New varieties to combat old problems in Arabica coffee production in Kenya. In Advancing agricultural production in Africa; Scientific Conference, Arusha, Tanzania, 1984. Proceedings. Edited by D.L. Hawksworth. Farnham Royal, GB, CAB, 1984. pp. 146-151. (683

A breeding programme initiated in 1971 to produce *Coffea arabica* varieties resistant to *Colletotrichum coffeanum* and *Hemileia vastatrix* is outlined. Germplasm screening was followed by the development of elite breeding populations. Ancillary fundamental research was conducted into selection methods and the nature of disease resistance, quantitative characters and hybrid varieties of *C. arabica*. Work is reported on the multiplication of new disease resistant and compact varieties with a view to making the first batch of seeds available in 1986 and the first seedlings for field planting by growers in 1987. (Horticultural Abstracts 55(2):1591. 1985).

* WONDIMU, M. y MEXIA, J.T. Indirect measure of coffee genetical variability in Ethiopia. In Simpósio sobre Ferrugens do Cafeeiro, Oeiras, Portugal, 1983. Comunicações. Oeiras, Centro de Investigação das Ferrugens do Cafeeiro, 1984. pp. 399-405. (684

The incidence of coffee leaf rust was studied in 35 sub-districts of Ethiopia. These sub-districts could be grouped according to the system of coffee management, into the semi-wild (forest), the mixed and the garden coffee groups. The first of these groups includes the sub-districts nearer to climatic conditions and the last those more far away from those conditions. In the present paper, we introduce an indirect measure of genetical variability based on space-series and study its relation with the management system. Our results support the well known hypothesis that the nearer you are to climatic conditions the greater genetical variation you may expect.

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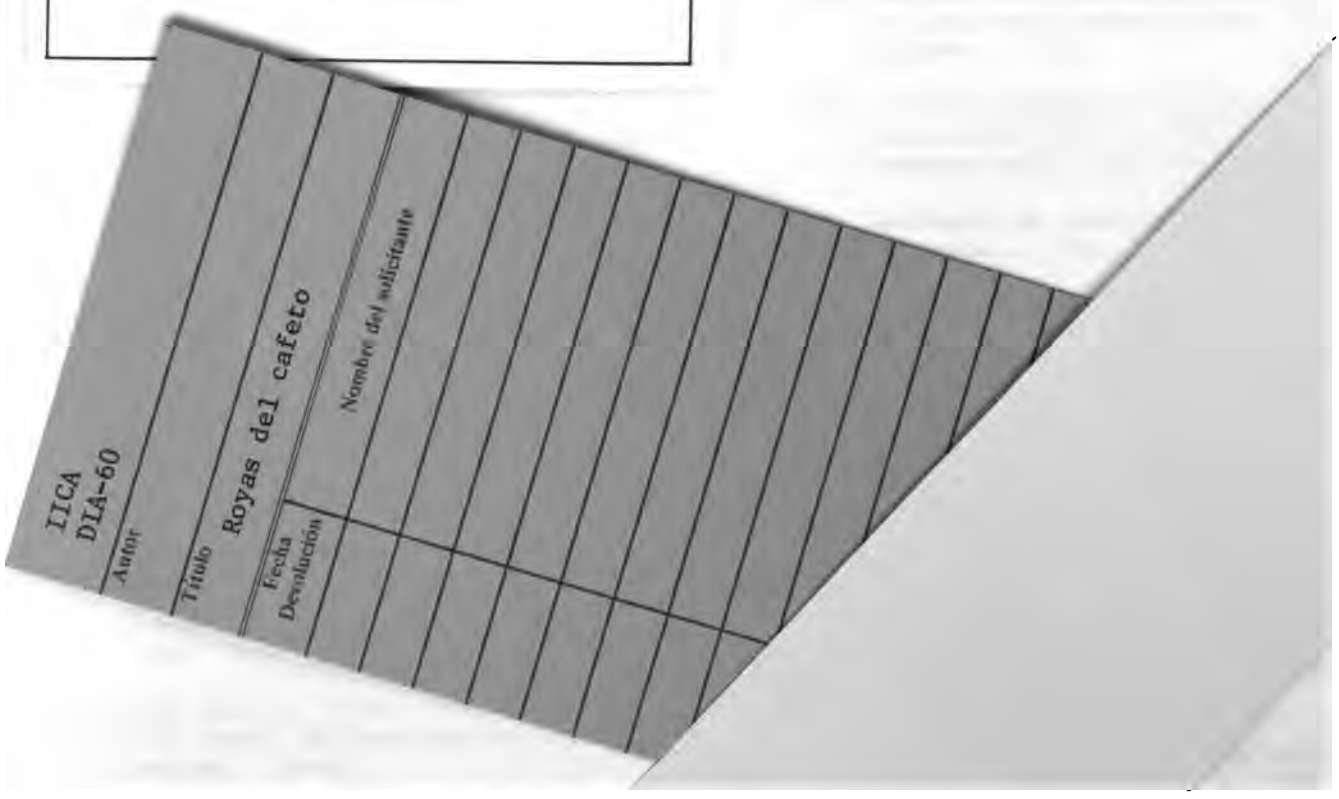

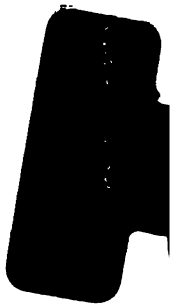

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