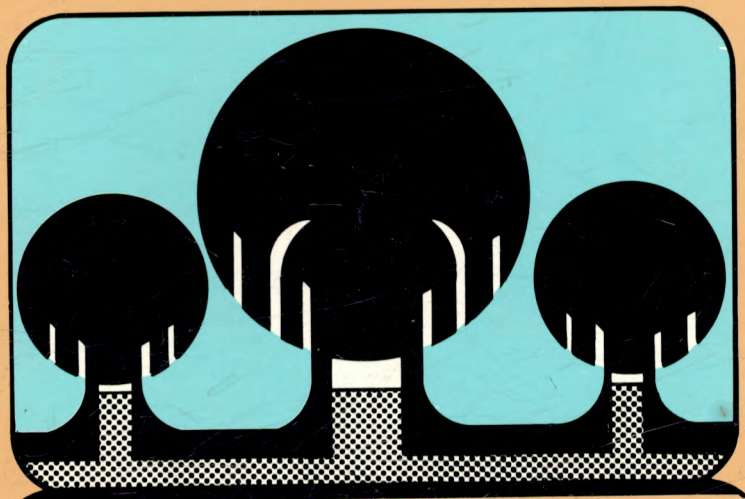
PROGRAMA SANIDAD VEGETAL



MOHO AZUL DEL TABACO

(*Peronospora tabacina* Adam)

una bibliografía parcialmente anotada

IICA

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INTRODUCCION

El "moho azul del tabaco", *Peronospora tabacina* Adam, es una fungosis que cada ciclo va adquiriendo mayor importancia en el continente americano, independientemente de la forma en que se cultiva la solanacea y abarcando una gama amplia de variedades cultivadas y aún silvestres. Su rango ecológico abarca límites, especialmente de temperatura, mayores que los que se habían reportado con anterioridad poniendo en peligro los tabacos de latitudes francamente templadas y tropicales.

Recientemente, y con el patrocinio de la FAO y la Dirección General de Sanidad Vegetal, SARH, de México, la Organización Norteamericana de Protección de las Plantas (NAPPO, Canadá-Estados Unidos-México), convocó a una reunión a la que asistieron países afectados, con el ánimo de analizar a fondo el problema, el conocimiento epifitiológico existente, las diversas tácticas de combate, las necesidades de investigación, predicción y legislación y la posibilidad de integrar un consejo para coordinar los trabajos contra tan importante plaga. Como resultado de esa reunión se publicó un informe en el que quedó evidente la necesidad de contar con un acervo bibliográfico, fundamental para emprender cualquiera de las tareas que el grupo de trabajo analizó y propuso en México.

El Instituto Interamericano de Cooperación para la Agricultura una vez más responde prontamente a sus fines de estimular y apoyar el desarrollo agrícola continental, aportando esta recopilación bibliográfica, que habrá de ser útil a las personas e instituciones privadas u oficiales dedicadas al cultivo de tan importante fuente de ocupación rural e industrial, el tabaco.

Las horas de selección y consulta que se invirtieron en este trabajo por parte del IICA, se convertirán en ahorro de valioso tiempo para los especialistas que habrán de consultarlo en todo el continente; sólo hará falta continuar enriqueciendo este índice y para ello solicitamos, de todos los interesados en el moho azul, que envíen permanentemente los títulos que generen en el desarrollo de sus investigaciones y trabajos prácticos.

Ing. Jorge Gutiérrez Samperio
Director General de Sanidad Vegetal
Secretaría de Agricultura y Recursos
Hidráulicos de México

San José, Costa Rica
Diciembre de 1982

METODOLOGIA

La compilación de esta Bibliografía sobre el Moho Azul del Tabaco, *Peronospora tabacina* Adam, por parte del IICA a través del Programa de Sanidad Vegetal y del Centro Interamericano de Documentación e Información Agrícola (CIDIA), tiene por objetivo principal difundir la experiencia realizada sobre este tema.

Los documentos presentados son el resultado de una búsqueda retrospectiva que no pretende ser exhaustiva, realizada en las siguientes fuentes bibliográficas:

- Abstracts on Tropical Agriculture
- Agrinter (Bibliografía Agrícola Latinoamericana)
- Bibliography of Agriculture
- CORESTA Information Bulletin
- Field Crop Abstracts
- Plant Breeding Abstracts
- Review of Plant Pathology
- Tobacco Abstracts

El período de búsqueda en los repertorios se realizó desde 1970 hasta la fecha, pero al revisar los documentos indizados, nos encontramos con que la bibliografía citada por los autores era importante para complementar la información documentaria ofrecida, e incorporamos estas referencias hasta 1968.

Los resúmenes presentados son: a) tomados de los propios documentos; b) de los repertorios bibliográficos analizados, con la indicación del volumen y número de la referencia; c) realizados por los compiladores.

La Bibliografía tiene 394 referencias bibliográficas, está organizada en orden alfabético de autor o título. Para facilitar el uso de este trabajo, se elaboraron índices de autores, materia y geográfico.

La Biblioteca Conmemorativa Orton en Turrialba, facilita el acceso a la mayor parte del material incluído en esta Bibliografía. Las referencias que están acompañadas de un asterisco (*) están al alcance de los usuarios a través del Servicio de Reproducción de Documentos del CIDIA.

Esperamos que esta publicación sea una herramienta de trabajo efectiva para el combate y erradicación del Moho Azul del Tabaco.

Turrialba, Costa Rica
Diciembre de 1982

MOHO AZUL DEL TABACO

(*Peronospora tabacina* Adam)

ABEDI, H. Contribution a l'étude des lignées virulentes de *Peronospora tabacina* A. Ann. SEITA-DEE, Sect. 2; 8:159-183. 1971. (001

Resumen también en francés.

Investigation on the behaviour of virulent strains of *Peronospora tabacina*, and on conditions favoring their occurrence evidences that: 1) Increase in *P. tabacina* pathogenicity is a progressive phenomenon the intensity of which is linked to the host metabolism. Occurrence of a virulent strain is favoured by the growth of the pathogen on a resistant plant whose hereditary character manifestations have been partially inhibited; this can be observed, for instance, in seedbeds when seedlings display a susceptibility related to their active growth rate; 2) *P. tabacina* pathogenicity does not increase indefinitely. When grown on *N. tabacum* hybrids with resistance derived from *N. debneyi* a virulent strain exhibits important variations of pathogenicity but it is not necessarily the most resistant host plant which gives rise to the most virulent strains; 3) Pathogenicity variations seem to be related to "mitotic recombinations". This hypothesis is supported, on the one hand, by the modes of appearance of the virulence which is a progressive phenomenon and, on the other hand, with the drastic decrease of pathogenicity under the action of UV radiation. (CORESTA Information Bulletin, no. 2:2710).

ABELENTSEV, V.I., SADOVNIKOV, V. I. y NAZAROVA, A. I. Fungicides against *Peronospora* on tobacco (En ruso). Zashchita Rastenii 4:35-36. 1974. (002

Polymarzin (0.28-0.35%), was highly effective when applied at the appearance of the first symptoms of *P. tabacina* on tobacco seedlings. Polycarbazine (0.26-0.33%) gave good results when applied at various states of seedling growth but were less effective at seedling emergence; 2 applications, one preemergence and the second one before transplanting into the field, are suggested. (Tobacco Abstracts 18:2826).

ADDITIONS AND corrections to the plant pests of importance to the Caribbean. Port of Spain, Trinidad and Tobago, FAO Caribbean Plant Protection Commission, 1972. 18 p. (003

Incluye *Peronospora tabacina*.

* AKEHURST, B.C. Tobacco. London, Longman, 1970. 551 p. (Tropical Agricultural Series). (004

Peronospora tabacina Adam: pp. 122; 161-162; 263; 322-324.

* ALCARAZ MIRA, E. La resistencia al *Peronospora tabacina* Adam de las variedades actuales de tabaco obtenidas por hibridación. Anales del Instituto Nacional de Investigaciones Agrarias. Serie Producción Vegetal, no. 1:125-147. 1971. (005

Resumen también en francés.

A review of observations made from 1965 to 1969 in various growing regions and breeding stations on the resistance to *Peronospora tabacina* of local and imported tobacco varieties, advanced resistant breeding lines (F8 in 1969), and F1 hybrids. The intensity of infection was very variable according to the year and the growing area. In cases of intense natural infection the index of infection of "resistant" hybrids (R) was lower than that of susceptible varieties (S). When the pressure of infection was low the indices of infection of (R) were closer to those of (S).

In 1967 and 1968, the pressure of infection was lower and the F6 and F7 resistant breeding lines were less resistant, which could be explained by the appearance of a new race of a less virulent pathogen having modified aggressivity, following massive introduction of resistant varieties (derived from *N. debneyi*) into the country. (CORESTA Information Bulletin, no. 1:2406).

ALTINYAY, S. Preliminary studies on the oospore formation of blue mold (*Peronospora tabacina* Adam) (En turco). Bitki Koruma Bülteni 14(4):227-234. 1974. (006

The experiments were conducted to study the oospore formation of blue mold. The diseased leaves were immersed in the tap water and the oospore was determined seven days after this process. These newly formed oospores had a thin and shiny pronounced membrane which thickened after the ninth day. Light yellow color of the oospores darkened and they attained a granular appearance internally. It has been observed that the oospores were deep brown in color and had a thick membrane and they reached the 40-42 µ in diameter at twelfth day. The oospore formation of the dry leaves having necrotic spots was earlier than that of the green leaves which newly went moldy. We could not observe the oospore formation on the diseased leaves which were placed in the soil media. It has been determined that the oospores occurred on the plucked leaves eight days after the mold development following the infection. The results could not be obtained in the experiments conducted to determine the infection power of oospores at the various stages and levels. (Tobacco Abstracts 20:827).

_____, OZKUTLU, M. y AYAYDIN, F. Research on strains of downy mildew (*Peronospora tabacina* Adam) of tobacco (En turco). Zirai Mucadele Arastirma Yilligi, no. 11:82-83. 1977. (007

No differences were observed in measurements or germination characteristics of conidia from different localities or in symptoms on tobacco. Varieties inoculated at the seedling and field stages retained their susceptibility or resistance when tested at different localities, indicating that different strains of the fungus do not occur in the Black Sea region of Turkey. The causal agent of mildew on surrounding weeds did not produce symptoms on tobacco. (Review of Plant Pathology 57:4131).

_____, OZKUTLU, M. y AYAYDIN, F. Determination of strains of *Peronospora tabacina* Adam, causal agent of tobacco downy mildew in the Black Sea region (En turco). Bitki Koruma Bülteni 19(2):79-95. 1979. (008

Indigenous and foreign varieties were inoculated at the seedling and field transplantation stages. There was little variation in conidial shape, size and percentage germination, or in the lesions formed. Susceptible and resistant varieties remained so at both stages. It is concluded that there is only one strain of the fungus in the region. (Review of Plant Pathology 59:5356).

ARKHIPOVA, V.D. Plant resistance to *Peronospora tabacina* according to their botanical classification and age (En ruso). Tabak 2:51-54. 1970. (009

Resumen también en francés.

Artificial infestation trials with about twenty tobacco varieties showed that their degree of resistance was very variable and increased with age, with the exception of a few varieties (Peremojec 83, Ostrolist 2747, Sobolchski, etc.) which proved to be very susceptible to *Peronospora*, at whatever age. *N. occidentalis* and *N. exigua* were the most resistant species. Disease symptoms were many and varied in the various species.

Generally speaking, plants are particularly receptive to *P. tabacina* at the cotyledon formation stage. It is therefore recommended that seedlings for test should be selected at this stage of growth, as the data relating to their resistance is then the most significant. (CORESTA Information Bulletin, no. 3-4:7855).

ARKHIPOVA, V.D. Simultaneous infection of tobacco by *Peronospora tabacina* Adam and *Septomyxa affinis* (Sherb.) Wr. (En ruso). Mikologiya i Fitopatologiya 4(4):346-348. 1970. (010

ASSAWAH, M. W. y EL-GOORANI, M. A. A note on tobacco peronosporosis in U.A.R. (Egypt). United Arab Republic Journal of Phytopathology 2:73-74. 1971. (011

Peronospora tabacina was observed for the first time in Egypt on tobacco and *Nicotiana rustica* at the experimental farm of Alexandria University during 1969-1970. (Review of Plant Pathology 52:1258).

* AVERSANO, B., AVIGLIANO, M. y SORRENTINO, C. Degradazione di ditiocarbammati dati al tabacco per il controllo della *Peronospora tabacina* A. attraverso l'impiego di vari tipi di cura. Annali dell'Istituto Sperimentale per il Tabacco 3:161-174. 1976. (012

The AA. refer on the trials with two dithiocarbamates: A) a mixture of zineb 42% a.i., ferbam 14% a.i. and B) propineb 70% a.i. Efficacy on the control of tobacco blue-mold at 200 g/hl doses, the number of treatments and their distances, the delay between the last treatment and the harvesting to reduce the residues on tobacco were tested. Efficacy of two curing systems and some physical methods to degrade the same products was assayed. The residues in ppm have been analyzed on tobacco air-cured, under plastic film cured and treated in a stove at 55°C for 48 hours. Both dithiocarbamates showed a good control of tobacco blue-mold. The residues of product (A) were found in much quantity on the bottom leaves air-cured and harvested 5 days after the last treatment. The degradation of the dithiocarbamates employed was as greater as larger the delay between the last treatment and the harvesting. The degradation of the product (A) was lower than (B) after three curing systems used. Efficacy of the treatment in stove for the product (A) was, generally, better than curing system under plastic film. The product (B) degraded well by three curing systems and the best degradation was obtained with curing system under plastic film.

* AVIGLIANO, M., VARDABASSO, A. y DANESE, V. Comparative effects of three fungicides on tobacco blue-mold (*Peronospora tabacina* A.). (Sumario). CORESTA Information Bulletin, no. 1:129-130. 1975. (013

Documento presentado en: CORESTA Symposium, Montreaux, Suisse, 1974.

Resumen también en francés.

Control trials of *Peronospora tabacina* A. were carried out on Burley 21 during the year 1973 in the experimental field of the Tobacco Experimental Station at Scafati, with three fungicies: Antracol, Daconil and Foltapet. Each product was used 2 and 3 times a week, for a total number of treatments respectively of 18 and 27. The treatments began at the end of May, 20 days after the tobacco transplanting, and ended at the end of July. The data of the leaf area diseased by *Peronospora tabacina* A. in % was noticed using a scale with degrees of attack from 0 to 5. The best results were obtained with Antracol (2 and 3 treatments/week) and then with Daconil dust and Foltapet. The filling value (cc/g), the fire holding capacity (mg/sec), and the nicotine content were determined

on cured tobacco. The filling value and the nicotine content were not influenced by the treatments. The mean values of fire holding capacity were statistically the same as for the control except for Foltapet with 3 treatments/week (fire holding capacity decreasing with a significative difference of 5%). Besides significative differences of 1% maximum were found among the different products.

* AVIGLIANO, M., CIMMINO, C. y SORRENTINO, C. Prima indagine sulla resistenza a *Peronospora* e Virosi di diverse varietà di tabacco coltivate in pieno campo. Annali dell'Istituto Sperimentale per il Tabacco 2:147-156. 1975. (014

The resistance to *Peronospora tabacina*, tobacco mosaic virus (TMV), cucumber mosaic virus (CMV), and necrotic Y virus (Y) of 76 european and extraeuropean varieties was tested at Scafati during 1975. Among Burley tobaccos, varieties Bursana, Askold, BB 30 and Senior are particularly resistant, except for CMV. Among tobaccos of type Bright, the varieties Polybryd LBZ, BK and 15, Lechia, Dominat, Cospaia Gigante x 11 b and T 106/68 are very resistant to *P. tabacina*. Tobacco varieties belonging to Maryland and Kentucky types and some undefined hybrids are fairly resistant to *P. tabacina* and TMV.

* _____, CIMMINO, C. y SORRENTINO, C. Indagine sulla resistenza alla *Peronospora tabacina* A. di diverse varieta di tabacco (Nota II). Annali dell'Istituto Sperimentale per il Tabacco 3:145-152. 1976. (015

During the year 1976 in the experimental field of the Tobacco Experimental Institute at Scafati, we carried on research on the resistance to *Peronospora tabacina* A. and 66 varieties of tobacco Burley and Bright were tested. In these groups, some hybrids have been found to have a great resistance to *Peronospora tabacina* A. with good agronomical qualities.

* _____, CIMMINO, C. y SORRENTINO, C. New experimental fungicides for the control of tobacco blue mold. (Sumario). CORESTA Information Bulletin, no. Especial:81. 1976. (016

Documento presentado en: International Tobacco Scientific Congress, 6th, Tokyo, 1976.

Resumen también en francés.

Three new experimental fungicides were tested for the control of tobacco blue mold on Burley Gran Reddito and compared with Propineb (70% a.i.) and Mancozeb (80% a.i.). These new products are DPX 3217 (2-cyano-N-ethylaminocarbonyl-2-methoxymino acetamide in an 80% a.i. formula and mixed with Mancozeb), SC_1 and SC_2 (formula containing 50% a.i.). These fungicides are used at 3 strengths and applied with a hand operated apparatus every five days (Propineb, Mancozeb, DPX) and once a week or fortnight (SC_1 and SC_2). Treatments were first applied when blue mold was observed in June and continued until July when middle leaf was harvested. Four observations were made using the CORESTA scale. The best results were obtained with 40 to 60 g/hl SC_1 and SC_2 sprayed once a week, phytotoxic symptoms being observed with 100 g/hl. DPX (at 28.4 g/hl) mixed with Mancozeb (at 250 g/hl) had a better fungicidal effect than Propineb or Mancozeb used alone. The systemic action of SC_1 and SC_2 was tested by watering each plant with 250 ml of a solution of these products twelve days after transplanting. No blue mold was observed with the largest doses but mild signs of phytotoxicity were observed on the lower leaves of plants which had received 1 g of fungicide.

* AVIGLIANO, M. y SORRENTINO, C. Un nuovo prodotto sperimentale per la lotta contro la *Peronospora tabacina* A. Annali dell'Istituto Sperimentale per il Tabacco 3:153-160. 1976. (017

During the year 1975 a new experimental fungicide, DPX 3217, was tested for the control of tobacco blue mold and compared with propineb and mancozeb. Good results were obtained and the DPX 3217 at maximum dose showed a better fungicidal effect than propineb or mancozeb.

* _____, AVERSANO, B. y TONINI, A. Residui di alcuni ditiocarbammati nella lotta contro la *Peronospora tabacina* A. su varieta tipiche di tabacco italiano. Annali dell'Istituto Sperimentale per il Tabacco 4:167-177. 1977. (018

Documento presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

También en: CORESTA Information Bulletin, no. Especial:P-18. 1978. (Sumario).

Further trials in order to study the efficacy of the blue-mold control of two dithiocarbamates and their residues were carried out on air-cured (cv. Burley G.R.) and sun-cured (cv. Erzegovina 5-94) tobacco. The dithiocarbamates Zineb 76 per cent a.i. and Maneb 80 per cent a.i. were used in two different doses: from June to July seven treatments were done every seven days. A good control of blue-mold was noticed, according to CORESTA scale. The residues of dithiocarbamates in ppm on cured tobacco showed a decreasing from the bottom to the top leaves either on Burley or on Erzegovina. In the tobacco Burley, the decreasing of the residues of Zineb and Maneb were very interesting, directly related to delay between the last treatment and the harvest.

* _____ y SORRENTINO, C. Un triennio di sperimentazione con prodotti sistemici nella lotta contro la *Peronospora* del tabacco (*Peronospora tabacina* A.). Annali dell'Istituto Sperimentale per il Tabacco 4:179-207. 1977. (019

During the years 1975-1976-1977 trials with experimental systemic fungicides from CIBA GEIGY were carried out for the control of tobacco blue-mold. The trials done on tobacco Burley showed no resistant to blue-mold either in the seed-bed or in the field. During these three years the results showed a very good possibility to control the development of tobacco blue-mold with only one treatment in the seed-bed and two treatments in the field. In the seed-bed first infection of tobacco blue-mold was noticed after 7-8 weeks after the treatment; in the field two treatments were necessary, respectively at transplanting and at earthing up of tobacco.

AYLOR, D.E. y TAYLOR, G. S. Aerial dispersal and drying of *Peronospora tabacina* conidia in tobacco shade tents. Proceedings of the National Academy of Science 79(2):697-700. 1982. (020

Blue mold of tobacco is caused by the fungus *Peronospora tabacina*. Its spores are released in the morning when the relative humidity falls, but they require free water for germination. Traditionally, the walls of the shade tents are raised to control the pathogen by drying leaves. It is shown that raising the walls does not materially speed drying. It does, however, increase the wind speed at least 20 m inside the tent and spread spores farther. Because germination is not reduced, raising the walls may actually spread blue mold. (Tobacco Abstracts 26:852).

BABAYAN, A. A. y GRIGORYAN, N. F. Growth of the conidia of *Peronospora tabacina* Adam on the leaves of tobacco varieties differing in resistance to downy mildew (En ruso). Armenian Biology Journal 23(6):21-25. 1970. (021

Resumen también en francés.

Germination was induced on the leaves of six resistant and three susceptible varieties of *Peronospora tabacina* conidia from the resistant Ostrolist 125 or from the susceptible Ostrolist 2747. Ostrolist 125 conidia germinated in similar proportions on all the varieties whereas those from the susceptible variety Ostrolist 2747 germinated in greater number on susceptible than on resistant varieties. (CORESTA Information Bulletin, no. 1:1474).

BAETS, A. DE. The increased virulence of *Peronospora tabacina* Adam. Mededelingen van de Faculteit Landbouwwetenschappen, Gent 37(2):559-566. 1972. (022

Presentado en: International Symposium on Phytopharmacy and Phytiatry, 24th, s.l., 1972.

Resumen también en francés.

Observations made in Belgium in 1971 on field-grown plants, young plants and in cotyledon tests, confirm the findings obtained elsewhere (Switzerland, France, Italy) with respect to an increase in blue mould virulence. (CORESTA Information Bulletin, no. 1:3555).

_____. y POLLET, H. Battle against blue mold (*Peronospora tabacina*) in Belgium (En alemán). Deutsch Tabakbau 53(5):34-35. 1973. (023

_____. Metalaxyl for the control of blue mold, *Peronospora tabacina*, of tobacco. Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent 44(2):477-486. 1979. (024

Resumen también en francés.

A weekly repeated treatment with mancozeb during the normal season was compared to a fortnightly treatment with metalaxyl and a soil treatment with metalaxyl at planting time followed by two fortnightly treatments in August with metalaxyl. In three other experiments, regrowth of tobacco was used and the treatments with metalaxyl and mancozeb or maneb were started in September when the blue mold already had appeared in Belgium in 1978. It could be concluded that metalaxyl at 250 g/ha in foliar spray or 3,000 g/ha for soil treatment was safe for tobacco. Neither growth differences nor differences in yield or quality were stated. Metalaxyl was very effective for the control of blue mold. No blue mold was found on plants and suckers one month after the latest treatment. (CORESTA Information Bulletin, no. 3-4:2541).

BARTOLUCCI, A. *et al.* Higher degree of aggressiveness of races of *Peronospora tabacina* Adam or increase of conidial pression (En italiano). Il Tabaco 74(736):4-12. 1970. (025

During several cotyledonal tests, independently of the degree of aggressiveness of conidia (of various provenances) the AA. have observed that the infectiveness pression had always a predominant influence in determining the degree of susceptibility to *Peronospora tabacina* Adam. This was not only ascertained on receptive cultivars, but also on F-1 hybrids or on hybrids of advanced generation, these last previously considered

as having a good resistance. By means of a test performed on 17,400 seeds (14,081 seedlings inoculated) the resistance of *N. debneyi* was reduced from 72.53% (1,438 conidia) to 6.29% (566,667 conidia per box having a diameter of 10 cm). (Tobacco Abstracts 15:875).

BARTOLUCCI, A. *et al.* Il magnesio esalta e differenzia la resistenza della plantule a *Peronospora tabacina* Adam nei tests cotiledonari. Il Tabaco 74(737):6-26. 1970. (026

Improved determinations of relative field resistance to *Peronospora tabacina* were obtained by adding MgO at 250 mg/l to the water soaking the filter paper or the substrate in dishes containing inoculated seedlings. (Review of Plant Pathology 51:1894).

_____. *et al.* Magnesium increases and diversifies resistance of plantlets to *Peronospora tabacina* in cotyledon tests (En francés). *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. p. 189. (027

The authors, who are perfecting an improved method for carrying out cotyledon tests, describe four recent trials dealing with substrates, nutrition, the degree of virulence and infection pressure. The most efficient substrate consists of 3 layers of Whatman No. 1 paper. A sand substrate, which would be the best substrate, is ruled out owing to the great difficulty in obtaining an even distribution of the seeds and counting the plantlets. The authors stress the fundamental importance of using very young conidia with a minimum infection pressure of 50,000 conidia per dish. Apart from the resistance level of the cultivars being examined, cotyledon tests are valid provided the plantlets are fed on Mg solutions instead of pure water. This is the only way cultivars are differentiated with respect to their field resistance factor, and their behavior is perfectly consistent with the results of the tests. It is stressed that Mg nutrition provides conclusive results whether normal or virulent conidia are inoculated. The authors emphasize, however, that each test has a value in itself; consequently, if several lines with unknown resistance are to be compared and classified, they should all be examined simultaneously. This study could provide interesting prospects for the use of magnesium in the seedbed, and during the early post-transplantation period to protect susceptible cultivars from attacks by normal or virulent *Peronospora tabacina*. (Tobacco Abstracts 16:2151).

* _____. *et al.* Metodologia per la selezione in laboratorio di linee parzialmente resistenti a *Peronospora tabacina* Adam, a mezzo del test cotiledonare a Mg. Il Tabaco 75(741):1-8. 1971. (028

A methodology is referred concerning the choosing in laboratory of the variants partially resistant to *Peronospora tabacina* Adam. The following items are illustrated in detail: 1) setting for the test; 2) holding-boxes tables; 3) lighting; 4) holding-seed box; 5) holder for the seed; 6) seed to be tested; 7) the two tests; 8) completing substrata and seedling; 9) seedlings breeding; 10) breeding of infected material producing seedling; 11) observations before the inoculation; 12) withdrawing of very young (12-16 hours) 'normal' or 'virulent' conidia; 13) inoculation of the 'cotyledonal seedlings'; 14) observations after the inoculation.

BAZELYUK, F. M. The development of tobacco hybrids with complex resistance to downy mildew and tobacco mosaic virus (En ruso). Izvestiya Akademii Nauk Mold SSR Ser. Biol. Khim Nauk, no. 4:81-85. 1977. (029

Downy mildew and tobacco mosaic virus are the most harmful diseases of tobacco in Moldavia. The hybrids Moldavskii 17 and Moldavskii 18 combine increased resistance to both diseases. (Review of Plant Pathology 58:2392).

BEBIYA, E. A. Viability of the conidia of *Peronospora tabacina* Adam (En ruso). Mikologiya i Fitopatologiya 9(1):51-52. 1975. (030

Resumen también en francés.

The viability of *P. tabacina* conidia, responsible for tobacco blue mould, was studied *in vitro* and in the field under different conditions of rain, sun and wind. Generally speaking, blue mould conidia are not viable for longer than 48 h under outdoor conditions. When inoculated to tobacco plants in glass vessels these conidia remained viable for 113 days. (CORESTA Information Bulletin, no. 1:5871).

_____. Blue mould infection of tobacco seeds (En ruso). Mikologiya i Fitopatologiya 11(3): 238-239. 1977. (031

Tobacco seeds may transmit blue mould to the seedlings. Even when there are no visible symptoms the pathogen may still be present in the plants. In some experiments, however, seeds from infected tobacco transmitted no infection. (Review of Plant Pathology 57:1401).

* BENINCASA, G. y VARDABASSO, A. Confronto agro-merceologico di alcune linee Burley resistenti e non alla *Peronospora*. Il Tabaco 76(744):13-18. 1972. (032

A group of Burley tobacco lines, recently created and with good or high blue mold resistance, has been compared with another series of blue mold resistant and susceptible Burley cultivars, currently cultured in Italy or abroad. The aim of the experience was to determine the new lines real practical value. The following aspects have been examined: the more important biometrical data and yield per hectare; blue mold resistance level; the leaves physical characteristics; the leaves chemical characteristics; and, merceological evaluation of the product. By the results obtained, it is possible to affirm with enough certainty that three new lines, with good or sufficient blue mold resistance, have all characteristics to be cultured.

BISKUP, J. Studies on the possibility of growing Burley type tobacco in Poland. Wiadomości Tytoniowe 22(3):5-10. 1978. (033

In comparative investigations of 13 European and 8 American varieties of tobacco, Burley Slovatskii, of Polish origin, was the most productive and immune from blue mould and black root rot. (Review of Plant Pathology 58:4007).

BLUE MOLD disease of tobacco (En alemán). Deutsch Tabakbau 51(10):83. 1971. (034

Peronospora tabacina control in West Germany. (Tobacco Abstracts 15:1865).

BLUE MOLD of tobacco, 1971 (En alemán). Deutsch Tabakbau 51(12):100. 1971. (035

Incidence of *Peronospora tabacina*: Tunisia, Greece, Italy, Iran, Algeria, Yugoslavia, Bulgaria. (Tobacco Abstracts 15:2114).

BLUE MOLD to reduce tobacco exports in Caribbean; U.S. crop faces potential danger. Foreign Agriculture 18(4):33. 1980. (036

Serious outbreaks of blue mold disease indicate heavy tobacco crop losses in Honduras, Nicaragua, Guatemala, Dominican Republic, Cuba, and Jamaica. As a result, tobacco exports (leaf and products) from these countries are forecast to be well below normal in 1980. In fact, Cuba is not expected to export any tobacco this year because its crop - mainly cigar leaf - has been almost completely destroyed by the disease. In 1979, blue mold caused an estimated $250-million loss to U.S. and Canadian farmers and the disease again has been reported in Florida in early 1980. Farmers in most U.S. tobacco-producing regions have been warned to watch their tobacco seedbeds carefully because the disease is most efficiently controlled in the seedbed stage. Weather conditions during April-June will be the major factor in determining whether the U.S. crop will be damaged by blue mold in 1980. Blue mold is spread by airborn spores and can be carried by wind as far as 200 miles in a single day. (Tobacco Abstracts 24:1286).

BOGOYAVLENSKAYA, R. A. Unusual symptoms of blue mould of tobacco (En ruso). Mikologiya i Fitopatologiya 5(6):506-508. 1971. (037

Atypical symptoms of *Peronospora tabacina* included vein necrosis resulting in death of the midrib and lateral veins, leaf curl, stem swelling, bending and breaking, and retarded root growth and wilt. These symptoms usually appeared several days after the typical ones. (Review of Plant Pathology 51:2842).

_____. Symptoms of the manifestation of *Peronospora* in tobacco seedlings (En ruso). Sel'skokhozyaistvennaya Biologiya 9(5):688-693. 1974. (038

The results are presented of a study of the symptoms of *P. hyoscyami* in many varieties and hybrids. The typical form of the disease was preceded by an untypical stage of wilting without spore formation. The number of wilted plants varied from isolated ones in the most resistant variety Bel 61-10 to 50 per cent in the most susceptible, Bergerac S. (Plant Breeding Abstracts 45:2211).

* _____. Mode of displacement of *Peronospora tabacina* in relation to the form of pathogene development. (Sumario). CORESTA Information Bulletin, no. Especial:72-73. 1976. (039

Documento presentado en: International Tobacco Scientific Congress, 6th, Tokyo, 1976.

Resumen también en francés.

Two types of diseases were determined in tobacco: the typical disease, which included the forms developed with fungi sporulation and the non-typical disease, which combined the forms with latent development of the non-mycelium of the pathogene in tissues. The first type produced numerous circular spots on leaves, uniform discoloration on the leaf surface and infestation of the whole plant, causing a severe retardation of growth, shortening of internodes and mosaic coloration of leaves

at the rosette stage. The second type produced necrosis of the veins, differences in individual leaves, stem damage, stem fractures and curves, root infection, necrosis of flowers in mature plants and sandy and brown-colored spots of a parchment-like appearance similar to burns in seedling leaves. The non-typical development of the disease is due to the necrosis of cells, primarily cambium, phloem and xylem cells. Necrosis prevented normal formation of tissues, lignification of stem cells and total development of plants. Root infection is a more injurious form of the second type. Anatomical studies of plants have shown that the necrosis resulted from the hidden, non-mycelium development of internal pathogene infection in plants. Non-typical form can develop on plants independentely, but is often preceeded by typical fungi with sporulation. Filtrates from plant tissues with necrosis of cells without mycelium revealed the presence of spores, formerly unknown, now called 'goniospores'. The infected tissues, ground in a mortar, were filtered through dense paper filters to separate fractions of more than 1 µ and the filtrates were used for the preparation of hanging drops. The temperature was 20-22°C. In 7 days, sandy-colored granular clots were seen in the drops. On the 14th day, the clots were covered with a one-layer coat, forming angular spores of colorless granules of 15-18 µ or 9-12 µ. In a month, the second membrane was formed in the spores. Typical chlorotic spots were obtained in sporulation with *P. tabacina* fungi by goniospore inoculation of 3-4 tobacco leaves (5 leaves phase). The incubation was conducted at 18-19°C over a period of 7-9 days.

BOGOYAVLENSKAYA, R. A. Pathological process in host plants in obligate parasitism (the case of blue mould) (En ruso). Sel'skokhozyaistvennaya Biologiya 13(6):877-881. 1978. (040

An increase of air temperature to 28°C inhibited the development of *Peronospora tabacina* and led to recovery of tobacco plants. The disease appeared in early July and ceased at the end of July. Lower infected leaves of hybrid lines withered but newly developed leaves showed no symptoms. (Review of Plant Pathology 58:5502).

BOLSUNOV, I. New *Nicotiana* amphidiploid as a valuable starting material for the control of virulent blue mould lines (En francés). *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. p. 160. (041

The most pressing problem now facing tobacco breeders is that of finding new starting material with very highly increased resistance to dangerous diseases, especially to their virulent forms. In Europe, this starting material should be used for breeding hybrids with improved resistance, especially to the following diseases: blue mold (*Peronospora tabacina*), wildfire, various virus diseases (e.g. vein browning (PYV), cucumber mosaic (CMV), Lycopersicum Virus 3 (TSWV). The Furstenfield Station in Austria has bred several new types which are of considerable value for the control of virulent blue mold lines and some virus diseases. These types are of practical interest. Following studies of several lines of wild Nicotianae a line, *N. exigua* St. FF, has been discovered which has almost complete resistance to the virulent lines of *Peronospora*. It has greater resistance than other lines of *N. exigua* and the well known species *N. debneyi*, as well as other Australian Nicotiana species. It has not yet been possible to obtain a direct cross of *N. exigua* St. FF and *N. tabacum*. The Furstenfield Breeding Station has, therefore, to use the "bridge" method. A *N. rustica* cv. was found possessing good resistance to *Thielaviopsis* and some virus diseases which it was possible to cross with the said *Exigua* strain. By means of treatment with acenaphthene,

an amphidiploid of this cross was obtained, which has been called "N. diruex Bols." This amphidiploid matures very early, is very fertile and has a rapid growth rate. It can easily be crossed with *N. tabacum* and is a good starting point for further success in breeding tobaccos having very high resistance to blue mold and various virus diseases. (Tobacco Abstracts 16:2265).

BROD, G. y FISCHBACH, E.D. Residue problems with blue mold and aphid control in tobacco culture (En alemán). Deutsch Tabakbau 58(14):174-176. 1978. (042

_____. y FISCHBACH, E. D. Investigations on the clarification of residue problems of tobacco in connection with the control of blue mold and aphids (En alemán). Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz 87(3):161-175. 1980. (043

The results of experiments on residues of tobacco are reported which were carried out in 1974-1976 in connection with the control of blue mold and aphids at eight different locations. The experiments were conducted in order to clarify the question which residues (dithiocarbamate and phosphoric acid esters) are unavoidable in and on air-dried tobacco, if the rules of good agricultural practices are strictly observed. In addition, the determination of residues of chlorinated hydrocarbons in the soil (originating from eventual earlier applications) and in tobacco was also included. The following results were obtained: the determined residues of dithiocarbamate (propineb, calculated as carbon disulfide) reached differing values in the individual years depending on weather and varied in 1974 between not detectable (n.d.) and 79,0 mg/kg, in 1975 between n.d. and 15,8 mg/kg and in 1976 between n.d. and 10,9 mg/kg. Residue amounts of 50 mg/kg were exceeded only in the blue mold year 1974 with the maximum spraying programme at two of four locations. Besides the amount of compound applied, the temperature in the respective growing season exerted a decisive influence on the amount of dithiocarbamate residues in the harvested leaves. With an increasing number of hot days (days with 30°C and higher) a distinct reduction of the amount of residues could be observed. A direct relationship between natural rainfall and the amount of dithiocarbamate residue did not exist. In contrast to this, a reduction of the residue values could be found after additional irrigation under the weather conditions during 1975 and 1976. Application of the phosphoric acid ester preparations Metasytox R (oxydemetonmethyl), E 605 forte (parathion) and PD 5 (mevinphos) left behind no detectable residues in air-dried tobacco. The residues of chlorinated hydrocarbons detected in soil and tobacco were negligible and in many cases did not exceed the limits of the detection method. (Tobacco Abstracts 24:1476).

BRUCK, R.I., GOODING JUNIOR, G. V. y MAIN, C. E. Evidence for resistance to metalaxyl in isolates for *Peronospora tabacina*. Phytopathology 71(5):558. 1981. (044

Isolates of tobacco blue mold (*Peronospora tabacina* Adam) were collected from the Burley tobacco growing region of western North Carolina between 7/23/80 and 8/8/80. Collection areas were reported treated (2 qt/acre, preplant solid incorporation) with metalaxyl. Conidia were removed by swirling excised lesions in a test tube in 6 ml of sterile distilled water. Approximately 2 ml of conidial suspension (2,000 spores/ml) were atomized onto 4-leaf stage potted plants treated 24 hours prior to inoculation with metalaxyl (ranging from 0 to 200 g (a.i.)/ml). Three out of 14 isolates tested were able to form lesions, sporulate, and reinfect plants when recovered from hosts treated with up to 100 g (a.i.)/ml. No infection occurred in the other 11 isolates on

plants treated with as little as 25 g (a.i.)/ml. These data suggest that metalaxyl resistant silates may exist in nature. (CORESTA Information Bulletin, no. 2-3:3327).

BRUCK, R. I., GOODING JUNIOR, G. V. y MAIN, C. E. Evidence for resistance to metalaxyl in isolates of *Peronospora hyoscyami*. Plant Disease 66(1):44-45. 1982. (045

Isolates of the tobacco blue mold fungus (*Peronospora hyoscyami*) were obtained between July 23 and August 8, 1980 from areas of western North Carolina that grow Burley tobacco. Only fields treated with metalaxyl (4.7 l/ha, preplant soil incorporation) were sampled. Mass conidial suspensions from nine plants per field were obtained by swirling exised lesions in sterile distilled water. Potted tobacco plants in the four-leaf stage were treated with metalaxyl at 0-200 µg (a.i.)/ml and were inoculated 24 hours later with 2 ml of a suspension of 2,000 conidia per millimeter. Three of the 14 isolates screened were able to form lesions and sporulate on plants treated with $\leq$ 100 µg/ml of metalaxyl; the conidia produced on these plants were used successfully to infect other metalaxyl-treated tobacco plants. No symptoms or signs of infection were visible on plants treated with as little as 25 µg (a.i.)/ml and inoculated with the other 11 isolates. These data suggest that metalaxyl-resistant isolates of *P. hyoscyami* may exist widely in nature and that continued use of the fungicide should be carefully evaluated and monitored. (Tobacco Abstracts 26:854).

BRUIN, G. C. A., RIPLEY, B. D. y EDGINGTON, L. V. Metalaxyl: efficacy for blue mold control and persistence on tobacco. Tobacco International 183(26):134-136. 1981. (046

Two to three foliar sprays of 0.12 kg ha^{-1} of metalaxyl effectively controlled tobacco blue mold. Metalaxyl residues after flue-curing were low (<1 ppm). However, when leaf samples were flue-cured among leaves of a metalaxyl-treated crop, higher residue levels were found, even in leaves that had never received metalaxyl sprays. This indicates that metalaxyl was sufficiently volatile under kiln conditions to be redistributed among leaves. (Tobacco Abstracts 26:855).

BUMBIC, K. y NADAZDIN, M. Investigations on the resistance to nematodes and blue mold of the Veliki Hercegovac tobacco variety. *In* Duvanski Inst. Symp., Mostar, 1973. s.n.t. pp. 127-137. (047

Resumen también en francés.

The three varieties Ravnjak, Bubalovac and Veliki Hercegovac tested in the field reacted to nematode outbreaks in the same manner and can be classified in the category of very susceptible varieties. Under identical conditions of soil infestation and management practices, Veliki Hercegovac gave the best returns in crop value followed by Bubalovac; Ravnjak yield being lowest. Damage appeared to be less pronounced the higher the biological potential of the variety. Susceptibility to *Peronospora tabacina* was assessed by the cotyledon test; abundant fructification was observed on the entire leaf surface. Infected plants were very susceptible and died rapidly. Veliki Hercegovac and Ravnjak plants of an age to be transplanted showed identical susceptibility to the pathogen. Just after transplanting, the rosette shaped symptoms of the disease were less numerous on the first variety than on the second. At the rapid growth stage in the field and in the laboratory, symptoms of infection (diameter and number of spots, fructification, start of

necroses) were less severe on Veliki Hercegovac than on Ravnjk. (CORESTA Information Bulletin, no. 1:3531).

BUTTON, T. Blue mold spray program outlined. Canadian Tobacco Grower 28(3):53-54. 1980. (048

The applications of Ridomil, the fungicide recently registered for blue mold control, will be necessary to protect tobacco this year, according to technical and sales representatives in charge of the fungicide, but there will be enough of the chemical in Canada in time to treat the entire 1980 crop. It is emphasized that Ridomil is a preventive, not a curative treatment. Greenhouse treatments are made by applying one ounce of Ridomil (equivalent to eight level tablespoons) in 15 gallons of water to 3,000 square feet of seed bed. Since Ridomil needs time to penetrate plants, watering should be done before the application is made. Beds should not be irrigated again until the next day. Four field applications are recommended, the first coming 10 days after transplanting. Each application is made by mixing 20 ounces of Ridomil in 100 gallons of water. However, Ridomil can only move upward in the plant. As the plant grows bigger, more and more of the fungicide has to be applied to protect more and more plant tissue. Therefore, the first application is made by spraying 18 gallons of the solution per acre, but this amount becomes 36 gallons for the second, 54 gallons for the third, and 72 gallons for the fourth spray. (Tobacco Abstracts 24:1281).

_____. Modify your sprayer for Ridomil applications. Canadian Tobacco Grower 28(3):61. 1980. (049

Four field applications of Ridomil, are required as a preventive for blue mold treatment, with application rates varying all the way from 18 gallons per acre for the first spray, to 72 gallons for the last. Conventional spray booms will have to be modified to include drop pipes, each of which will have to have, not just one, but two sets of swivel nozzles. (Tobacco Abstracts 24:1282).

_____. Test alternative methods to control blue mould. Canadian Tobacco Grower 28(6):4B-4C. 1980. (050

Resumen también en francés.

Whereas the Ridomil label calls for four sprays with consecutive volumes of 18, 36, 54 and 72 gallons, researchers at the Delhi Research Station will evaluate spraying plants with consecutive volumes of just 10, 20, 30 and 40 gallons per acre. In other tests, plants shall be treated with just the first and third treatments while using the second and fourth treatments on other plots. Experiments are also designed to discover whether frequent foliar applications really are the best way of applying Ridomil. In other test plots, the chemical will be applied after fumigating is completed. In a third treatment, the fungicide will be mixed in with the planting water, and applied as a drench at planting. In the spore trap, normal air is forced through a small aquarium like container in which tobacco seedlings are growing. The trap is examined daily for visible evidence of blue mould, and once a week the seedlings are replaced. (CORESTA Information Bulletin, no. 3-4:2538).

B'YADOVSKII, G. S. Methods for the protection of tobacco (En ruso). Zashchita Rastenii, no. 10:54-55. 1978. (051

A series of complex measures recommended for protection against diseases including black root rot, tomato spotted wilt virus and blue mould in

the Crimea include disinfection of hotbeds with 40 per cent carbathion and of glasshouses with a 2 per cent solution of 40 per cent formaldehyde, seed treatment with the same formaldehyde solution, seedling treatment with 80 per cent zineb or 75 per cent polycarbacin, early planting and destruction of weeds and pests. (Review of Plant Pathology 58:4001).

* CAMMILLI, A. L'impiego dell'elicottero nella difesa antiperonosporica del tabacco; aspetti tecnici ed economici. Il Tabaco 75(739):39-52. 1971. (052

A test concerning the use of helicopter for controlling *Peronospora tabacina* was carried out on in Veneto in comparison with normal volume atomizer carried by tractor and by volume shoulder atomizer. Net profit was respectively of 127.000, 148.000 and 110.000 lires per hectare. On large areas where there are no natural or artificial obstacles for low flying height, helicopter presents many advantages: remarkable handwork saving, quick intervention and fast treatments on broad surfaces, also when soils are impracticable to other mechanical equipments for rain or watering. On areas inferior to 4-5 hectares, atomizer carried by tractor is more economically convenient. On areas inferior to 1 hectare, the only system economically convenient is the shoulder atomizer. A rapid and remarkable increase in the future use of helicopter is foreseen in Italy on tobacco growings too.

CHOLAKOVA, N. y EDREVA, A. A study of the activity and the molecular heterogenicity of some enzymes in obligatory tobacco parasites (*Erysiphe cichoracearum* DC and *Peronospora tabacina* A.). (Sumario). CORESTA Information Bulletin, no. Especial:92-93. 1978. (053

Documento presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

Resumen también en francés.

The biochemistry of the obligatory parasites is less studied than that of the facultative and saprophytic parasites; an investigation of two obligatory fungi parasiting tobacco leaves (*Erysiphe cichoracearum* D.C. and *P. tabacina* A.) has therefore been undertaken. Conidia and conidiophores of these fungi have been analysed. It has been shown that *E. cichoracearum* possesses a number of enzymes having oxido-reductive and hydrolytic functions as well as pentose phosphate pathway enzymes. *P. tabacina* has the same enzyme activities. The electrophoretic study of some of the enzymes proves their molecular heterogenicity in both pathogens. The difference between the two fungi consists in the presence of phenols and the key enzyme of the phenol biosynthesis-phenyalanine ammonia liase - in *E. cichoracearum* only, but not in *P. tabacina*. From these data the conclusion can be drawn that both fungi possess a developed enzyme apparatus. This enriches our knowledge of the biochemistry of the obligatory parasites, commonly considered as enzyme deficient organisms. Moreover, the vailability of hydrolases lends support to the hypothesis that fungus penetration in the host tissue may be effected in biochemical way.

COHEN, Y. Inhibition of powdery mildew development on blue mold diseased tobacco plants. Proceedings of the American Phytopathological Society 2:96. 1975. (054

* COHEN, Y., REUVENI, M. y KENNETH, R. G. Resistance to powdery mildew in tobacco induced by *Peronospora tabacina*. Phytopathology 65(11):1313-1315. 1975. (055

Tobacco plants (cultivar Michal) inoculated with *Peronospora tabacina* exhibited a complete resistance to *Erysiphe cichoracearum*. Eighteen days after exposure (at 20°C) to air-borne conidia of *E. cichoracearum*, 1.3 and 288.3 pustules of powdery mildew per plant developed on *Peronospora*-inoculated and on control (noninoculated) plants, respectively. It is assumed that the biochemical changes induced by *Peronospora* in tobacco plants protect them from a secondary infection with powdery mildew.

* _____. Interacting effects of light and temperature on sporulation of *Peronospora tabacina* on tobacco leaves. Australian Journal of Biological Sciences 29(3):281-289. 1976. (056

The interacting effects of light and temperature on spore formation of *P. tabacina* on tobacco leaves were investigated. The following points indicated that an enzymic build-up of an antisporulant during a wet light period and its enzymic decay over a dry dark period may explain the inhibitory effect of light upon sporulation, and its reversal by darkness: (1) Fluorescent blue light of relatively low photon flux density (3.7 $\mu E\ m^{-2}s^{-1}$) inhibited sporulation by 99% at 20°C. (2) Light level and temperature during the sporulation period determined spore yield of the pathogen: at high temperatures (in the range 8-24°C) sporulation was inhibited at low light level, whilst no inhibition occurred at much higher light levels at low temperatures. (3) Preceeding dry dark treatments given at 20°C considerably dimished the inhibitory effect of light, but not if given at 10°C. (4) The diffusion of an inhibitory compound from irradiated to unirradiated areas of detached leaves was demonstrated. (5) The continuing photosynthetic activity of the host in the light at 20°C, and the lack of sucrose following dark periods at 10°C, were not associated with the inhibitory effect of light. The similarity between the role of light in the present system and the role of light in activation and decay of phenylalanine ammonia-lyase is discussed.

* _____. Protection of tobacco against *Erysiphe cichoracearum* by *Peronospora tabacina*. Annals of Applied Biology 89(2):317-321. 1978. (057

To study the nature of this resistance the following points were investigated: is the induced resistance reciprocal, transferable or reversible, could it be induced by other pathogens or non-pathogens of tobacco, is it stable under various environmental conditions, and to what extent can it be affected by heat treatments. (Tobacco Abstracts 22:2350).

_____. y KUC, J. Infectivity of conidia of *Peronospora tabacina* after freezing and thawing. Plant Disease 64(6):549-550. 1980. (058

Resumen también en francés.

Conidia of *Peronospora tabacina*, the incitant of tobacco blue mold, attached to infected leaves or suspended in aqueous suspensions remained infective for more than 3 months at -20°C. Conidia on sporulating lesions survived after six repeated cycles of freezing (-20°C) and thawing (25°C), whereas conidia suspended in water survived after two such cycles. Conidia on sporulating lesions stored at 5°C (100% RH) survived more than 34 but less than 57 days. The possible epidemiologic implications of this feature of the pathogen are discussed. (CORESTA Information Bulletin, no. 2:2153).

COHEN, Y. y KUC, J. The effect of induced systemic resistance with *Peronospora tabacina* on the accumulation of phenolics and terpenoids in tobacco foliage. Phytopathology 71(2):209. 1981. (059

Resumen también en francés.

Leaves of tobacco plants infected by *P. tabacina*, accumulated phytuberin, phytuberol, solavetivone and scopoletin. Accumulation was associated with lesion development, reached a maximum in chlorotic lesions 7 days after infection, and declined thereafter. Accumulation of phenolics and terpenoids was not detected in stems or green tissue surrounding lesions. Plants systemically protected against blue mold by either stem injection or soil drench with conidia of *P. tabacina* accumulated capsidiol, diterpenes, scopoletin, and a number of unidentified compounds in the stems. Scopoletin, but none of the other compounds, increased in leaves of protected plants prior to challenge with *P. tabacina*. Protection was not due to the accumulation of fungitoxic terpenoids in foliage prior to challenge. (CORESTA Information Bulletin, no. 2-3:2949).

_____. y KUC, J. Evaluation of systemic resistance to blue mold induced in tobacco leaves by prior stem inoculation with *Peronospora hyoscyami* f.sp. *tabacina*. Phytopathology 71(8): 783-787. 1981. (060

Resumen también en francés.

Conidia of *Peronospora hyoscyami* f.sp. *tabacina* (which causes blue mold of tobacco) applied to stem-root interface zone of potted burley tobacco plants induced systemic protection of the foliage against the blue mold disease caused by the same pathogen. Neither heat-killed or sonicated conidia of *P. hyoscyami* f.sp. *tabacina*, nor untreated inocula of three other tobacco pathogens or three non pathogens induced protection against blue mold. Protection was associated with the necrosis that developed in the external phloem and cambium of the stem subsequent to the initial inoculation with *P. hyoscyami* f.sp. *tabacina*. Approximately two weeks was required for development of about 50% protection and three weeks for about 95%. Resistance in the leaves of protected plants was not confined to the epidermis; conidia infiltrated into leaf panels failed to produce normal lesions. (CORESTA Information Bulletin, no. 2-3:3331).

_____. y KUC, J. Induced systemic resistance of tobacco foliage to blue mold by conidia of *Peronospora tabacina*. Phytopathology 71(2):209. 1981. (061

Resumen también en francés.

Conidia of *P. tabacina* applied to the soil of potted tobacco plants induced systemic resistance in foliage against blue mold. At 1, 2, 3, and 4 weeks after the inducing inoculation, browning in the phloem and cambium of stems reached a height of 0, 4, 7, and 13 cm, respectively. Protection based on percentage of infected leaf area upon challenge was 0, 50, 90, and 98%, respectively. Plants challenged 2 or 3 weeks after induction produced small mostly non-sporulating lesions as compared to large sporulating lesions on control plants. Four weeks after induction, plants of cvs. Judy's Pride, K14 and K16 were stunted. Stunting was milder in Burley 21 and barely evident in B21 x L8. Ethrel caused stunting but did not induce resistance. Suckers from induced unchallenged plants were symptom-free, showed no browning in the stem, and were susceptible. Browning in cambium and phloem stem tissue is required for systemic resistance to develop in leaves. (CORESTA Information Bulletin, no. 1:2950).

COLENIA, A. Studies on the epidemiology of tobacco blue mould, *Peronospora tabacina* Adam, and resistance thereto (En polaco). Prace Naukowe Instytutu Ochrony Róslin 12(1):11-98. 1970. (062

Resumen también en francés.

First, a study on the epidemiology of blue mould by inoculation in the field, taking into account the climate, season and plant population (cv. Flandria very susceptible). Second, a study on the resistance of dozens of species or varieties of *Solanaceae*, notably certain *Nicotiana*. The effect of various crosses on the resistance of hybrids is noted, and the importance of hypersensitivity reactions to *Peronospora* is stressed. (CORESTA Information Bulletin, no. 4:1142).

CORBAZ, R. Ten years of control of tobacco mildew (En alemán). Revue Suisse d'Agriculture 2(4):90-92. 1970. (063

A review of work on *Peronospora tabacina* in Switzerland in 1960-1970, covering disease outbreaks and their effects, chemical and biological control, adaptation of the fungus and recommendations. (Tobacco Abstracts 17:529).

_____. Report on the collaborative trial to determine the virulence of *Peronospora tabacina* (En alemán). Berichte des Instituts für Tabakforschung 18(1):39-43. 1971. (064

Resumen también en francés.

The collaborative trial of 1970 permits to establish that in certain areas, such as the Balkans and Northern Europe in particular, the pathogenic power of blue mould has not undergone any changes since the appearance of *Peronospora tabacina* Adam in Europe. In some countries, where the resistant varieties represent the almost totality of the crops, outbreaks on resistant lines are recorded. The development of the disease on Bel 61-10, GA 955 and Chemical Mutant is, however, slowed down and the lower leaves still suffer the more severe attack. Against this increased virulence, the excellent behaviour in the field of the lines GA 955 and Chemical Mutant, should be noted. On the other hand, the complete breakdown of Florida 513 resistance should turn down this line as undesirable in breeding work. On the basis of the developments observed during the past three years, it is permitted to think that the present situation could only be modified by the progressive introduction in other areas of resistant varieties. The immediate consequence is the necessity of maintaining active the surveying and warning services, locally and internationally, as well as suitable means of direct control methods. (CORESTA Information Bulletin, no. 1:9-12).

* _____. Observations made on the blue mold trap collection in 1976. CORESTA Information Bulletin, no. 3-4:53-56. 1976. (065

También en francés.

Observations in 9 different countries were collected and reported; the values expressed in the old system of evaluation, the maximum degree of attack and the new system of marking (intensity x degree + systemic) are included. (Tobacco Abstracts 21:1583).

* CORBAZ, R. Observations made on the blue mold trap collection in 1977. CORESTA Information Bulletin, no. 3:17-19. 1977. (066

También en francés.

The results of the collaborative experiment show that the pathogenicity of *Peronospora tabacina* has not basically changed. The variety Chemical Mutant still provides the highest level of resistance. The other resistant varieties are less good and their degree of resistance in no way prevents the parasite from multiplying when the environmental conditions are favorable to it. These observations underline the limits now set for resistant varieties which can be used in practice, and stress the need to improve this level of resistance. (Tobacco Abstracts 22:1834).

_____. Evolution des quantités de fongicides utilisées dans la lutte contre le mildiou du tabac en Suisse. Revue Suisse d'Agriculture 10(5):155-157. 1978. (067

Resumen también en francés.

During the seventeen years of blue-mould control on tobacco, amounts of dithiocarbamates used per ha varied according to two different steps: the first one from 1961 to 1970 characterized by a continuous decrease, the second one from 1971 to 1977 characterized by a sharp increase followed by a slow decrease. This evolution was directly related to the spreading use of blue-mould resistant varieties, and then by the occurence of a new virulent race of *Peronospora tabacina*. The way fungicides were applied was also modified: initially, dusting represented 86.7% of treatment, but only 7.4% in 1977, spraying becoming more and more generally adopted. (CORESTA Information Bulletin, no. 3-4:9319).

* _____. Results of the 1978 collaborative experiment on *Peronospora* using the range of trap plants. CORESTA Information Bulletin, no. 3-4:40-43. 1978. (068

También en francés.

In 1978 there was no marked change in the virulence of tobacco blue mould in the countries taking part in the experiment. This stability is illustrated by the fact that the most resistant varieties remain in the order: Chemical Mutant, Bel 61-10, GA 955. Line T.I. 657, considered to be highly resistant in the USA was frequently attacked over here. This tends to corroborate the fact that populations of *Peronospora tabacina* are more virulent in participating countries than in North America. The example of Iran also shows the exact limits of resistance in the case of conditions very favourable to the disease. It is no longer possible to talk of immunity, because the most resistant lines may be badly infected. Control of blue mould cannot be obtained simply by growing highly resistant varieties, prophylactic measures and chemical control must also be used.

CREMASCHI, D. Treatment of tobacco for *Peronospora* and the reflex effects on production; experimental results (En italiano). Atti Giornate Fitopath. 1971:301-307. 1971. (069

Resumen también en francés.

Comparative trials were carried out in the field with tobacco variety Nostrano del Brente using Miceb (50% Zineb at 80 a.i. + 40% Maneb 100% a.i. + 10% wetting agent) at concs. 1.5, 2 and 2.5% and Tiezene

(97% Zineb at 80% a.i.) at a conc. of 4% for the control of *Peronospora*; spraying was effected 2-3 times a week from the 20th day after transplanting (20 treatments). As the season was unfavorable to the spread of blue mould, the difference in antifungal activity between the two products tested was not very marked, but Miceb, especially at the conc. of 2%, had a stimulating effect on plant growth (green weight and area of the 6th leaf, height of the topped plant). (CORESTA Information Bulletin, no. 1:1476).

CRUICKSHANK, I. A. M., PERRIN, D. R. y MANDRYK, M. Fungitoxicity of duvatrienediols associated with the cuticular wax of tobacco leaves. Phytopathologische Zeitschrift 90(3):243-249. 1977. (070

Diterpenediols isolated from leaf surfaces of healthy Virginia Gold tobacco accounted for >0.1 per cent of the leaf fresh wt., and at c. 20 µg/ml inhibited germination of *Peronospora tabacina* conidia up to 50 per cent. These results confirm that fungitoxic compounds associated with the cuticular wax may play a role in the epidemiology of the disease but not in the resistance of *Nicotiana debneyi*, which contained no diterpenoids. (Review of Plant Pathology 57:3098).

CSINOS, A. S. y ARNETT, J. D. Blue mold epiphytotic in Georgia. Plant Disease 64(11):1037. 1980. (071

Resumen también en francés.

Blue mold (*Peronospora tabacina* Adam) was first verified in Cook County, Georgia, on 10 March 1980, and the disease was subsequently reported in all tobacco growing areas. The occurrence closely matched descriptions of the 1931-1937 epiphytotics of the disease, although systemic infection appeared to be more prevalent in 1980. Whether the severity of the 1980 outbreak was caused by a new race of the fungus or by greater susceptibility of presently grown cultivars is not known. (CORESTA Information Bulletin, no. 3-4:2540).

CZARNIK, W. y STUDZINSKI, A. Comparison of the efficiency of thiocarbamate preparations against *P. tabacina* in tobacco (En polaco). Prace Naukowe Instytutu Ochrony Róslin 9(1):149-156. 1967. (072

Resumen también en francés.

In field trials 3 sprays with 0.3% F-10 (maneb formulation), 0.4% zineb, and 0.2% dithane M-22 gave good control. None of the preparations was phytotoxic. (CORESTA Information Bulletin, no. 1: 6062).

* DALE, W. T. y HARDWICK, N. W. Diseases of outdoor-grown tobacco. Plant Pathology 25(1):57. 1976. (073

In 1974 an outbreak of *Peronospora tabacina* was recorded for the first time in the United Kingdom since 1962, on a commercial tobacco crop in Surrey. In 1975 the first British field record of *Phytophthora nicotianae* occurred on this crop. In addition, in 1974 cucumber mosaic virus and potato virus Y were found in Surrey and CMV also in Kent; tobacco veinal necrosis virus was isolated from trial plots in Essex. All these diseases and tobacco mosaic virus were found in Surrey in 1975. (Review of Plant Pathology 55:4844).

DARMINI, M. Research development on the behavior of *Peronospora tabacina* in Umbria (En italiano). Perugia. Univ. Fac. Agr. Ann. 24:189-205. 1969. (074

The study of seasonal factors, in reference to disease behavior, has confirmed, also in 1967, that relative humidity is the most important factor of infection. It has in fact been seen that it is possible to have attacks also with temperatures above 30°C, when relative humidity is above 75% and lasts over 8 h per day. The incubation period appears very sensitive to variations of the highest temperatures; parasite latent period may oscillate between 8-11 days (with temperatures below 24-26°C) and beyond 20 days (above 30°C). Besides, the leaf, at least in the experimented varieties, gains a more and more considerable resistance (sometimes even an immunity), for the tissues growing. The most significant result, in 1967, is the greater susceptibility of treated plants by Maneb during a period of time. Susceptibility has been underlined by a greater number of diseased leaves, by much shorter incubation periods, by infections occurring in the most unfavorable seasonal conditions, and by much more abundant production of "conidiofori". (Tobacco Abstracts 16:1496).

DASHKEEVA, K. I. *et al.* Sources of false powdery mildew infection of tobacco under Moldovian conditions (En ruso). Infektsionnye Zabolevaniya Kul'turnykj Rastenii Moldavii, no. 7: 45-48. 1970. (075

At temperatures of -10 to 15°C undecomposed litter of tobacco plants with *Peronospora tabacina* produced infection on 60% of tobacco seedlings in the glasshouse. The importance of destroying all plant litter after harvest and of deep ploughing of tobacco fields is stressed. (Review of Plant Pathology 51:3823).

_____, BUZHORIANU, V. V. y BAZELYUK, F. M. Cytologic investigation of tobacco plants and *Peronospora tabacina* Adam. during their interaction (En ruso). Izvestiya Akademii Nauk Mold SSR Ser Biol. Khim Nauk 5:37-40. 1977. (076

Data are given on the structure of colourless intracellular components of healthy cells of tobacco plants, cellular components of *P. tabacina* and on the structure of infected tobacco cells varying in resistance to blue mould. (Review of Plant Pathology 57:5676).

DAVIS, J. M., MAIN, C. E. y BRUCK, R. I. Analysis of weather and the 1980 blue mold epidemic in the United States and Canada. Plant Disease 65(6):508-512. 1981. (077

Tobacco blue mold (*Peronospora tabacina*) occurred in major tobacco producing areas in North America during 1980. Blue mold in the field was first reported on 1 January in Cuba and Jamaica, 5 February in Haiti, 25 February in Honduras, 4 March in Nicaragua, 8 April in Florida, 28 April in South Carolina, 11 May in North Carolina, 30 May in Virginia, 10 June in Maryland and Tennessee, 8 July in Kentucky, 11 July in Pennsylvania, 13 July in Connecticut and Massachussets, 23 July in Indiana, 25 July in Ohio, and 5 August in Canada. Rainfall in the eastern United States was above normal from March through May and below normal from June through August 1980. Temperatures were below normal in March, April and June, slightly above normal in May, and well above normal in July and August. Compared with 1979, 1980 was generally warmer and drier but was cooler and wetter in March. Weather conditions were less favourable for blue mold development in 1980 than in 1979, therefore resulting in one-third loss from this weather-sensitive disease. (CORESTA Information Bulletin, no. 2-3:3332).

* DEAN, J. C. Some agronomic aspects of the use of maneb for blue mould control in flue-cured tobacco. Queensland Journal of Agricultural and Animal Sciences 27(3):269-278. 1970. (078

Three related experiments were conducted in south-eastern Queensland to determine the effect of manganese ethylene-1, 2-bisdithiocarbamate (maneb) on flue-cured tobacco leaf quality and saleable yields when used for blue mould control. Maneb was associated with an accelerated fall in leaf quality under conditions of nutrient stress such as exist following leaching rains. One experiment showed that nutrient stresses can be prevented by the application of adequate planting fertilizer and timely side-dressings. Maneb supplied from transplanting until topping maintained blue mould control. Maneb used for no longer than 6 weeks after transplanting (hilling time) was unable to maintain blue mould control and saleable yields were less than the no-maneb treatment. Control of blue mould during wet weather, especially when the disease occurred during the period of rapid growth prior to flowering, was better with higher frequency of maneb application.

* _____. Tobacco blue mould control. Queensland Agricultural Journal 96(4):255-258. 1970. (079

Blue mould causes 30-80% losses in non-treated crops in the Bundaberg district. In seedbeds the disease is controlled with benzol fumigation under air-tight plastic covers; in the field spraying maneb at 0.2 kg/l, every 5-7 days, prevent blue mould infection without impairing leaf quality. (CORESTA Information Bulletin, no. 3:845).

* DEVCIC, K. y KOZUMPLIK, V. Resistance to blue mould and agronomic characteristics of some flue-cured tobacco varieties in Croatia. (Sumario). CORESTA Information Bulletin, no. Especial: 88. 1978. (080

Documento presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

Resumen también en francés.

More severe damage of flue-cured tobacco by blue mould was recorded in Croatia in 1977, than in previous years. Infestation was mostly of the systemic type and, the signs of the disease appeared during the first half of August. Intensity of the disease infestation on various flue-cured tobacco breeding lines and varieties was recorded in the field and in the breeding nursery plant beds. Degree of the infestation varied from 0 to 5 (5 was the most severe damage) depending on the line or variety. The most resistant to the disease appeared to be the foreign introductions Beerwah GG, K 596, 17 L 66, C 1388, Tur, B5-55 and G 955, which were marked 0 - 1. Breeding lines of the Tobacco Institute Zagreb, GV_3 and DV_3 showed a lower resistance and were marked 1 to 2. Flue-cured tobacco hybrids Podravina and Zagreb, obtained in the Tobacco Institute Zagreb, showed a moderate resistance, marked 2 to 3. The hybrids resembled in their resistance more the less resistant parent. The lowest resistance to the disease in the field and in the nursery showed the foreign flue-cured tobacco introduction Coker 254 and some introductions of non flue-cured tobacco type, i.e. burley tobacco introductions Ky 10 and Phoenix, and Maryland tobacco introduction Maryland 10 (marked 4 to 5). Regarding the degree of the resistance, the results obtained in the nursery plant beds were similar to those obtained in the field.

DIMESKA, V. Testing of genetic resistance to *Peronospora tabacina* in Prilep, Yaka and Dzebel tobacco varieties by "cotyledon test" (En serbo-croato). Tutun 24(3-4):75-81. 1974. (081

* DUCOMMUN, Ph. y CORBAZ, R. Influence de traitements anti-mildiou sur la microflore des feuilles vertes de tabacs. (Sumario). CORESTA Information Bulletin, no. Especial:84-85. 1980. (082

Documento presentado en: International Tobacco Scientific Congress, 7th, Manila, Philippines, 1980.

Resumen también en francés.

The fungicides used were maneb and metalaxyl, sprayed respectively every 10 or 20 days on Burley tobacco. The standard plots did not receive any treatment. Two techniques were used for the analysis of the phylloplane mycoflora: 1) the print, and 2) the spore's fall. This for each priming and for both faces of the leaves. The predominant genera were: *Cladosporium, Alternaria, Epicoccum, Sporobolomyces, Tilletipsis* and *Aureobasidium*. The total microorganisms number was more strongly reduced by maneb than by metalaxyl; with technique number 2 this decrease was even more clear. The following genus were not affected by metalaxyl: *Sporobolomyces, Rhodotorula, Tilletiopsis* and *Torulopsis*. The number of *Cladosporium* colonies suffered a reduction of 70.7% on the upper leaf surface and 55.3% on the under surface by maneb, against 18.7% and 20.8% by metalaxyl.

EBRAHIM-NESBAT, F., ZALPOOR, N. y KEIVANI, A. New race of *Peronospora tabacina* Adam. Iranian Journal of Plant Pathology 5(3):27-30. 1969. (083

A new biotype of the blue mold fungus (biotype 2) was compared with an old one (biotype 1). Cotyledon tests were made with 2 tobacco cultivars, Virginia Hicks and Bel 61-10, known to be resistant to biotype 1. These 2 cultivars were completely susceptible to the new biotype. (Tobacco Abstracts 16:980).

EDREVA, A., BAJLOV, D. y NIKOLOV, S. Biochemical study of tobacco hybrids, resistant to blue mould (*Peronospora tabacina* Adam) (En ruso). Genetika i Selekcija 3(5):333-341. 1970. (084

The blue-mold-resistant hybrid combinations Nevrokop x F-70, Harmanliiska Basma 163 x F-81 and Virginia 1 x Hicks Resistant, developed by Bajlov and Palakarceva, were studied with respect to certain chemical components, related to the quality of tobacco, such as total and pure protein, nicotine, amino acids, sugars, pectins, chlorogenic acid, rutin, chlorophylls, xanthophyll and carotene. Within the scope of the chemical components studied, the hybrid combinations did not show lower quantities in comparison with the parent forms. On the contrary, they even exhibited lesser amounts of total and pure protein, commonly linked in an adverse manner with the quality of tobacco. Nicotine content proved lower only in comparison with the female parent; it was generally very low in the combinations. Components which have a favorable effect on the quality (sugars and phenols) in the hybrid combinations rose usually only in comparison with the parent that was poorer in these ingredients. As far as the nature of the combinations as hybrid forms was concerned, their intermediary position stands out as a most general regularity, which is manifested with respect to glucose, fructose, pectins, chlorogenic acid, rutin and nicotine. This corresponds to the intermediary character manifested in the morphological features of the combinations, as well as

in their mold-resistance. An interesting trend is present in the N-containing substances: the hybrid combinations are poorer in N than the parental forms. (Tobacco Abstracts 16:532).

EDREVA, A. Investigation on the isoenzyme composition of the peroxidase infection of tobacco with *Peronospora tabacina* and in the physiological disease Sharilka ("Aladja"). Nauch. Sess. Inst. Genet. Selek. Rast, 1971. pp. 293-300. (085

_____. A study of the isozyme composition of peroxydase and malatedehydrogenase in *Peronospora tabacina* Adam and its host *Nicotiana tabacum* L. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 5(2):121-125. 1972. (086

The similarity between isoenzymes of the pathogen and its tobacco host is described. (Review of Plant Pathology 52:489).

_____. A biochemical study of tobacco blue mould pathogenesis. I. The activity of certain oxidative enzymes and chloroplast pigment content. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 7(2):73-76. 1974. (087

In tobacco plants infected by *Peronospora tabacina* chloroplast pigments were lacking in the necrotic zones. Green pigments were reduced more than yellow ones and chlorophyll a more than chlorophyll b. Increase in peroxidase and phenoloxidase activities was correlated with severity of symptoms and is considered to be a reaction of the plant connected with resistance. (Review of Plant Pathology 54:989).

_____. A biochemical study of tobacco blue mould pathogenesis. II. Changes in the pattern of phenolic compounds. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 7(3):17-21. 1974. (088

Resumen también en francés.

The infected tissue, adjacent tissue and surrounding healthy tissue of leaves from the middle stalk position of the blue mould susceptible var. VSP_{26} and Stanimashko pembe 536 were examined at three stages of development of the disease: early, intermediate and necrotic stages. Healthy leaves were used as controls. The phenol composition was determined with two-dimension paper chromatography. Four types of phenomena were observed: 1) a quantitative increase of certain phenol compounds as leaf damage increased and notably of scopoletine which predominated in the necrotized areas; 2) a decrease of other components until they disappeared completely at the necrotic stage; 3) an increase of certain phenols at the early stage of infection followed by a decrease at the intermediate and final stages of the disease (this was the case, notably, of chlorogenic acid and rutin); 4) the appearance of new phenols not present in healthy leaves. Examination of extracts of conidia and conidiophores of *Peronospora tabacina* did not show notable amounts of phenolic components. (CORESTA Information Bulletin, no. 1:4547).

_____. Biochemical study of tobacco blue mould pathogenesis. III. Mechanism of necrosis information. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 7(4):55-58. 1974. (089

Resumen también en francés.

Infection by *Peronospora tabacina* was studied on susceptible varieties and under the conditions previously described (article II). The brown pigments were determined, separated and analyzed by various methods

including column and paper chromatography and spectrophotometry (430 nm). The results obtained show that the brown pigments formed at the necrosis stage were polymers of chlorogenic acid and proteins at various degrees of polymerization. A decrease in the content of free amino acids and nicotine, which probably also plays a part in the formation of brown pigments, was also observed in necrotized tissues. Free tyrosine underwent practically no modification. The phytotoxic effect of chlorogenic acid in the presence of the pathogen appeared to be conditioned by its easy oxidation and interaction with the oxidized forms of the proteins of the host. Consequently this acid could act essentially as a substrate for necrotic reactions. (CORESTA Information Bulletin, no. 1:4548).

EDREVA, A. A biochemical study of tobacco blue mould pathogenesis. IV. Isoenzyme pattern of the peroxidase. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 8(1):23-26. 1975. (090

Resumen también en francés.

Infection by *Peronospora tabacina* was studied on a susceptible variety under the conditions previously described (see Changes in the pattern of phenolic compounds). After separation of the anionic isoforms of the soluble peroxidase by disc electrophoresis in polyacrylamide gel, and extraction removal of phenols, the protein content was determined by the Lowry method and the isoenzyme bands were visualized by the Ku & al. and Kovacky & Hampton methods. Scanning of gels was conducted on a ERI-10 densitometer. Development of the infection was accompanied by an increase in total peroxidase activity, but at no stage of development were new enzyme isoforms observed; the only qualitative change observed was the disappearance of certain minor components from the spectrum of isoenzymes. (CORESTA Information Bulletin, no. 3-4:5365).

_____. Biochemical study of tobacco blue mould pathogenesis. V. Isoenzyme pattern of the malate dehydrogenase and glutamate dehydrogenase. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 8(2):5-10. 1975. (091

Resumen también en francés.

Infection of *Peronospora tabacina* was studied on a susceptible variety under the conditions previously described, and the enzymes prepared by the methods also described elsewhere (see article IV). The isoenzyme components were visualized using the nitrotetrazolium method; scanning of the gels was effected on a ERI-10 densitometer. Development of the infection only caused quantitative changes in the isoenzyme composition of the GDH; on the other hand, quantitative and qualitative modifications were observed in the isoenzyme composition of MDH: production of new components which later became inactivated. (CORESTA Information Bulletin, no. 3-4:5366).

_____. A biochemical study of tobacco blue mould pathogenesis. VI. Some resistance factors. Comptes Rendus de l'Academie Agricole Georgi Dimitov 8(3):55-58. 1975. (092

Resumen también en francés.

Infection by *Peronospora tabacina* causes similar metabolic modifications in both resistant (Djebel 359 x *N. debneyi*x Djebel 359) and susceptible (line VSP_{26}) plants. In both cases increased peroxidase activity and metabolism of chlorogenic acid (accompanied by the formation of brown pigments) is observed. The essential difference between the two types of

plants is of a quantitative nature: 4-5 days after infection the peroxidase activity of the infected tissue in the resistant plant increases to 388% (compared with the healthy control) and to only 243% in the susceptible plant; similarly, the reduction in level of chlorogenic acid is more rapid in the resistant plant than in the susceptible one. This causes an earlier development of necrotic tissue in the former. As the pathogen is deprived of both phenols and peroxidase, these metabolic modifications can be considered as a reaction of the host rather than inherent to the pathogen. It has already been shown that the plant's chlorogenic acid level prior to infection is not a resistance factor. It can therefore be considered that peroxidase activity is one of these factors. Besides its role in necrosis which causes the pathogen to be isolated, peroxidase also causes direct lysis of the pathogen. (CORESTA Information Bulletin, no. 3-4:5367).

EDREVA, A. Diseases of tobacco (En búlgaro). Priroda 24(3):29-33. 1975. (093

Incluye *Peronospora tabacina*, downy mildew.

* _____. Biochemical study on tobacco blue mold pathogenesis. (Sumario). CORESTA Information Bulletin, no. Especial:73-74. 1976. (094

Documento presentado en: International Tobacco Scientific Congress, 6th, Tokyo, 1976.

Resumen también en francés.

The changes in peroxidase activity, the chlorogenic acid content and the phenol pattern were followed up in three stages of blue mold development, including the necrosis stage. It has been shown that the peroxidase activity increases paralleling the degree of tissue damage. The chlorogenic acid content increases in the first disease stages and decreases during necrosis. This decrease has been accounted for by brown pigment formation during tissue necrosis. Brown pigment has been isolated from the necrotic leaves and proved to be polymers of the chlorogenic acid and the proteins covering a wide range degree of polymerization (M.W. 3,000-80,000). These data point to the phytotoxic action of the chlorogenic acid in plant pathogenesis related to the tissue necrosis. The main characteristics of the resistant forms are the greater rate of peroxidase activity increase and chlorogenic acid consumption during necrosis. It may be connected with the higher peroxidase activity of the health resistant plants, this being a likely factor for the faster response of these plants to infection.

_____. y GEORGIEVA, I.D. Biochemical and cytochemical investigation of the acid phosphatase during infectious disease, physiological disorder and senescence of tobacco leaves. Comptes Rendus de l'Academie Bulgare des Sciences 30(8):1193-1196. 1977. (095

* _____. Comparative biochemical studies of an infectious disease (blue mould) and a physiological disorder of tobacco. Physiological Plant Pathology 11(2):149-161. 1977. (096

An infectious tobacco disease, caused by *Peronospora tabacina* A., and a physiological tobacco disease were compared to determine the degree of specificity of plant reactions to damage stimuli of pathogenic and non-pathogenic origin. Peroxidase, malate dehydrogenase and glutamate dehydrogenase isoenzymes, phenol pattern and mechanisms of necrosis formation were studied. Common shifts were established in the infectious and physiological diseases. In both diseases the process of necrosis involved an interaction of chlorogenic acid with cell proteins

and the formation of polymeric products-brown pigments, with varying molecular weights. These data point to the low specificity of plant responses to different factors which damage cell integrity.

* EDREVA, A. y GEORGIEVA, Y. Biochemical and cytochemical study of the aplha- and beta-glucosidase in an infectious disease (blue mould), physiological disorder and senescence of tobacco. (Sumario). CORESTA Information Bulletin, no. Especial:91-92. 1978. (097

Documento presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

Resumen también en francés.

The changes of the alpa- and beta-glucosidase activity in tobacco leaves have been studied in the following three cases: a) infectious disease - blue mould; b) physiological disorder "sharilka", due to water regime disturbances in sun curing; c) natural senescence. The aim of this comparative study is to establish whether the plant response to infection is specific in character or it is due to the tissue injury, independently of the causative agent. It was found out that *P. tabacina* invasion leads to a significant increase of alpha- and beta-glucosidase activity. This is most strongly manifested in the host cells adjacent to the fungus hyphae, as evidenced by the cytochemical investigations. Physiological disorder and senescence do not enhance enzyme activity. These results prove that the increase of alpha- and beta-glucosidase activity is not related to tissue damage, but is a specific plant response to the disease agent. Such a peculiarity has not been observed while studying some other hydrolitic enzymes and oxidoreductases. The enhancement of alpha- and beta-glucosidase activity in blue mould pathogenesis may be related to the break down of alpha- and beta-stereospecific glucosidic links, accompanying fungus penetration, as well as to the release of free aglycones, toxic for the pathogen. On this basis the observed phenomenon may be considered as a possible defense mechanism of the plant against blue mould infection.

_____., CHOLAKOVA, N. I. y GEORGIEVA, I. D. Biochemical and cytochemical study of some enzymes in *Erysiphe cichoracearum* D.C. and *Peronospora tabacina* A., tobacco parasites. Bulgarska Akadademiia na Naukite Doklady 33(8):1137-1140. 1980. (098

Erysiphe cichoracearum and *Peronospora tabacina* belong to the Erysiphaceae and Peronosporaceae families. These fungi, though taxonomically very different, are found to parasitize on the same host, tobacco causing the diseases powdery mildew and blue mold which are of great economic significance. The object of the study was the activity and the molecular-heterogeneous composition of a set of enzymes participating in different metabolic links, as well as their localization in the parasites, cytochemically investigated. The cytochemical approach is the only way to study enzymes in hyphae of these parasites. The parasites studied reveal a number of similar features: presence of the same enzyme functions, enzyme polymorphism, similar spectrum of some enzymes (PO, GDH, G6PDH), which may be associated with the fact that they parasitize on the same host. (Tobacco Abstract 25:791).

* _____. y GEORGIEVA, I.D. Biochemical and histochemical investigations of α- and β-glucosidase activity in an infectious disease, a physiological disorder and in senescence of tobacco leaves. Physiological Plant Pathology 17(3):237-243. 1980. (099

Activity of α- and β-glucosidase was compared in tobacco leaves (a) infected by *Peronospora tabacina*, b) having a physiological disorder

caused by excessive water availability (Sharilka), and c) senescing naturally. Only in *P. tabacina* infection was there an increase in glucosidase activity in the host tissues, especially in the cells adjacent to the hyphae of the fungus. Increase of glucosidase activity (possibly a defense mechanism of the tobacco plant against *P. tabacina* infections) is a specific response of the plant to the fungal infection.

EGERER, A. Investigations on the resistance of some *Nicotiana* species at the cotyledon stage to a virulent strain of *Peronospora tabacina* Adam (En alemán). Berichte des Instituts für Tabakforschung, no. 19:5-13. 1972. (100

Resumen también en francés.

Among the 31 *Nicotiana* species tested the best resistance was found in species of the *Suaveolentes* section. Contrary to that, all tested cultivars and breeding lines of *Nicotiana tabacum* were severly infected by the virulent strain of *Peronospora tabacina*. No correlation, however, was shown between those infection indexes and the resistance degrees of the respective test specimens to the common strain of *P. tabacina*. Likewise, it did not appear that, in cultivars and lines so far resistant to blue mould, the origin of resistance or the source material had any effect on their susceptibility to the virulent strain of *P. tabacina*. (CORESTA Information Bulletin, no. 1:2410).

EMIROGLU, U., EMIROGLU, S.H. y YILDIZ, M. Breeding blue mold-resistant Turkish tobacco cultivars (En turco). Ankara, Tarim Ormancilik, 1972. 36 p. (101

Since 1963, the selection, combination and mutation methods have been employed in order to obtain Turkish tobacco cultivars which are resistant to blue mold. A progress has been obtained with the combination method. The other two methods did not give any result. Four Ege 64, two Karabaglar, four Bursa and one Bafra cultivars have been developed from their hybrids with Hicks lea, which is resistant to blue mold, by the use of backcross method. These cultivars were advanced to the regional yield and quality performance tests. The combination breeding program will continue with Maden, Malatya, Tskenderun, Yaylakag and Trabzon cultivars. Interspecific hybrids of *N. debneyi* x *N. tabacum* cv. Ege 64 and *N. debneyi* x *N tabacum* cv. Bursa are at the BC_4 So and BC_2 S_0 generations, respectively. Both hybrid generations still show a great segretation. In recent years, blue mold resistant Bel 61-10, Hybrid 94, Furstenfeld 332, Chemical Mutant 53, GA 955, S. 392/3, S. 390/1 and Hybrid 295 cultivars were also included in this breeding program. Studies conducted in 1969 gave the impression that the resistance to blue mold may be monofactorial at the cotyledon stage and polyfactorial at the grown up stage. (Tobacco Abstracts 18:3150).

* _____. Registration of a low nicotine Aegean variety of tobacco resistant to blue mold. CORESTA Information Bulletin, no. 4:39-42. 1979. (102

The variety Izmir Incekara, bred by crossing Hicks Len 64 with Izmir 64 and back crossing to the former, is resistant to *Peronospora tabacina* and has a low nicotine content. (Plant Breeding Abstracts 51:1370).

* EVANS, L. T. Fifty years of plant research. Nature 261(5562):655-657. 1976. (103

An account is given of the evolution of the role of the Division of Plant Industry, CSIRO, and of research carried out by the Division over the past 50 years. The following are some of the achievements

which are mentioned: the transfer of resistance to *Peronospora hyoscyami* from wild Australian species of *Nicotiana* into cultivated tobacco; the introduction of crop plants, many of which have been used in breeding programmes; and the breeding of improved legumes and grasses including the development of varieties of *Phalaris tuberosa* with greater seed retention and seedling vigour and reduced tryptamine content. (Plant Breeding Abstracts 46:10810).

FINKBEIN, R. New law on the control of blue mold of tobacco (En alemán). Gesunde Pflanz. 30(8):200-202. 1978. (104

GAJOS, Z. Attempts to use hybrids of *Nicotiana tabacum* L. x *Nicotiana otophora* Gris. for breeding tobacco resistant to *Peronospora tabacina* Adam (PT-2) and other diseases (En polaco). Cent. Lab. Przem. Tyton. Builetyn 1(2):11-23. 1979. (105

In 1967 as a result of crossing Virginia Peyod and *Nicotiana otophora*, a hybrid was obtained. The sterility of F_1 generation was overcome by treating very young plants with 0.5% colchicine solution. Field, glasshouse and laboratory tests were carried out in which agricultural value and resistance of the hybrid to certain tobacco diseases were estimated. Besides, chemical compositions of cured hybrid leaves and both parents were compared to standard Virginia Izyda. It was found that the hybrid was an amphidiploid containing in somatic cells 72 chromosomes and crossing easily with *N. tabacum*. The hybrid plants were tolerant to infection by Y^N virus and quite resistant to *Peronospora tabacina* (PT-2). Besides, some lines of the hybrid were superior to the standard variety in respect of the number and size of leaves, as well as contained much less nicotine. The hybrid was characterized by slower growth rate of plants and longer, by 4 weeks, vegetation season, as compared with cultivated tobacco varieties. (Tobacco Abstracts 24:1582).

GAYED, S. K. Blue mold of tobacco - past and present. Lighter/Briquet 50(1):5-10. 1980. (106

Topics discussed include the process of infection by *Peronospora tabacina*, history of the disease in Canada and the USA, the 1979 epiphytotic and possible factors involved. (Review of Plant Pathology 59:5357).

_____. How to avoid blue mould. Canadian Tobacco Grower 28(3):22-24. 1980. (107

This article discusses the possibility of disease reoccurrence and how to avoid the blue mould in seedbeds and in the field in 1980. (Tobacco Abstracts 24:1287).

_____. The pattern of blue mould incidence and spread in the United States and Canada and losses incurred, 1979. Lighter/Briquet 50(3):14-16. 1980. (108

Resumen también en francés.

This article compares the dates when blue mould was first noticed in the tobacco-growing areas in the 1979 season. Although blue mold may have developed for several days prior to these dates in some tobacco-growing areas, these dates are relatively compared in this article in an attempt to trace the progress of the epidemic in the United States and Canada. This article also compares crop losses due to blue mold. Data in this article are based on those presented by the Tobacco Disease Evaluation Committee, F. A. Todd, Chairman, during the Blue Mold Symposium held at Raleigh, N.C., on December 4, 1979. (CORESTA Information Bulletin, no. 2:2158).

GENERAL REPORT about blue mold (*Peronospora tabacina*) epidemic on tobacco in 1972 (En alemán). Deutsch Tabakbau 53(5):36-37. 1973. (109

GEORGIEVA, I. y EDREVA, A. Cytological and cytochemical changes in the blue mould infected tobacco leaves. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 7(1):25-30. 1974. (110

Resumen también en francés.

Tissue from middle tobacco leaves was studied through the microscope at three stages of *Peronospora tabacina* development: first (chlorotic spots); second (dark yellow spots) and last stage (necrosis). These observations demonstrated absolute correlation between the development stage of the parasite and external signs of the disease. Cytochemically, the necrotic reaction was observed to induce a decrease in RNA, histones and DNA, and depolymerization of the last. *P. tabacina* hyphae were characterized by high RNA content. (CORESTA Information Bulletin, no. 3-4:4111).

GIAMMARIOLI, P. Ten years of *Peronospora tabacina* in Italy (1962-1971) (En italiano). Informatore Agricolo 29(2/3):11329-11333. 1973. (111

Resumen también en francés.

After a detailed assessment of the damage caused by blue mould to the Italian tobacco crop in 1961 (by regions and varieties), the economic impact of this disease over the last ten years (65% of the crop loss in 1961, 2.5% in 1971) is studied. The same figures given by varieties show the vulnerability of Burley and Beneventano and the relative resistance of Nostrano. The various methods of control now in use are briefly mentioned. (CORESTA Information Bulletin, no. 2:2713).

* GILLHAM, F. E. M., WARK, D. C. y HARRIGAN, E. K. S. Disease resistant flue-cured tobacco breeding lines for north Queensland. I. Resistance to blue mold, *Peronospora tabacina*. Australian Journal of Experimental Agriculture and Animal Husbandry 17(87):652-658. 1977. (112

Blue mould, *Peronospora tabacina* Adam, is the most serious disease of tobacco in north Queensland. Two cultivars were released in 1969 and one in 1972 which were resistant to the north Queensland strain of blue mould, APT1. During 1972 and 1973, a new strain of mould, APT2, became established in the area. The APT1 resistant cultivars, which carried resistance from *Nicotiana debneyi* or *N. goodspeedii*, were susceptible to APT2. Breeding lines carrying blue mould resistance from these species and from *N. exigua*, *N. velutina* or *N. excelsior* were introduced for screening for resistance to the new strain of mould. Some of these lines had been developed by backcrossing and selection, some from crosses between lines carrying resistance from different sources and others by following backcrossing by production of doubled haploids through another culture. Following the screening of these lines for blue mould resistance and for commercial attributes, three backcross lines, three double haploid lines and one line carrying resistance from two sources were selected for further screening as potential commercial cultivars.

* GILLHAM, F. E. M. y HARRIGAN, E. K. S. Disease resistant flue-cured tobacco breeding lines for north Queensland. II. Resistance to bacterial wilt, *Pseudomonas solanacearum* and black shank, *Phytophthora nicotianae* var. *nicotianae*. Australian Journal of Experimental Agriculture and Animal Husbandry 17(87):659-663. 1977. (113

Two soil borne diseases, bacterial wilt, *Pseudomonas solanacearum*, E. F. Smith and black shank, *Phytophthora nicotianae* (B. De Haan) var. *nicotianae*, cause economic harm to tobacco crops in certain parts of north Queensland. Host plant resistance is the main means of control for both diseases. During the period from 1969 until the closure of the Tobacco Research Institute at Mareeba in 1975, part of the plant breeding programme was directed towards combining black shank resistance and bacterial wilt resistance with resistance to blue mould, *Peronospora tabacina* Adam in a commercially acceptable cultivar. As a result of this programme, fourteen lines have been selected which have a good level of resistance to the three diseases and an acceptable commercial potential. Further improvement can be expected from selection. The development of a new strain of blue mould will preclude the general release of these lines for commercial production but they will be of value as breeding lines and for restricted release in areas where either of the soil borne diseases is a problem.

G''L''BOV, S. y PEEVA, R. An agrobiological and technological description of Dzhebel K237, a tobacco variety resistant to *Peronospora hyoscyami* (En búlgaro). Rastenievudni Nauki 11(8):36-45. 1974. (114

The new variety Dzhebel K237, obtained by crossing Dzhebel 174 x Hicks Resistant, exceeds the standard (Dzhebel 359) in the number, size and quality of its leaves, which have a slightly higher nicotine content than Dzhebel 359. This high-yielding variety has good resistance to blue mould. (Plant Breeding Abstracts 45:4759).

GOLENIA, A. Epidemiological studies on *P. tabacina* and the resistance of tobacco to it. I. The epidemic course of *P. tabacina* in relation to the time and distance of tobacco planting. Prace Naukowe Instytutu Ochrony Róslin 12(1):11-57. 1970. (115

Plants of the susceptible tobacco variety Flandria (White Burley) inoculated with *P. tabacina* at an early stage of development (transplanted late) were infected more severely than those inoculated at a later state (transplanted early). The infection rate was 1.7-9.2 times higher in plants which were younger at the time of inoculation than in old ones. Close spacing tended to increase infection; at 40 x 30 and 50 x 40 cm plants were less healthy than at 80 x 60 and 100 x 80 cm. Temperature <10°C and >24° and the absence of rain for a week or longer checked the disease. (Review of Plant Pathology 51:662).

_____. Epidemiological studies on *P. tabacina* and the resistance of tobacco to it. II. Reaction and features of the resistance (susceptilibity) of tobacco and some other Solanaceous plants to infection by *P. tabacina*. Prace Naukowe Instytutu Ochrony Róslin 12(1):57-98. 1970. (116

In inoculation tests *P. tabacina* was also pathogenic to *Nicotiana glutinosa*, *N. glauca*, *N. alata*, *N. megalosiphon*, *Capsicum annuum*, *C. frutescens*, tomato, eggplant, *Atropa belladonna*, *Solanum boerhavii* and *Nicandra physaloides*. Resistance or susceptibility depended on a combination of factors rather than on a single factor. Many breeding lines from *N. debneyi* (immune) x tobacco varieties were resistant or highly resistant. (Review of Plant Pathology 51:662).

GOLYSHIN, N. M., ABELENCEV, V. I. y DVUKSHERSTOV, M. G. Comparative efficiency of fungicides against *Peronospora tabacina* (En ruso). Tabak 2:54-55. 1970. (117

Resumen también en francés.

In 1965-67, trials of treatments for *Peronospora* were carried out with polycarbacine, polyram-combi, polyram-M (Maneb) and Zineb. Whereas in the control plots (no treatment) all the plants died, plants treated with polyram-M remained 100% unaffected. The other three products provided about equal efficiency: 41-55% of plants were infected. Polyram-M at conc. of 0.25 and 0.125% was toxic to plantlets of Ostrolist 2747; it should be used before and during the first stages of growth at a conc. of 0.05%. Later, a twice weekly spraying at a conc. of 0.25% did not negatively influence tobacco growth. The last application should be given before transplantation. (CORESTA Information Bulletin, no. 3-4:7858).

* GOVI, G. Diffusione e progressione in Italia di ceppi di *Peronospora tabacina*. Il Tabaco 75(738):1-3. 1971. (118

Documento presentado también en: International Tobacco Scientific Congress, 5th, Hamburg, 1970.

After having detected the occurrence in Italy (1965) of two lines of *Peronospora tabacina*, named the "Adriatic" strain and the "Campanian" strain according to their geographical origin, it was necessary to follow their development and territorial distribution in Italy every year, and to check on the possible appearance of other biotypes. At present, both lines have altered their pathogenic action and differ only in as far as the response of *N. velutina* is concerned, this being resistant to the "Campanian" strain and susceptible to the "Adriatic" strain. The present situation suggests that we are in the presence of a case of hybridization of two original strains, with the result that pathogenic effects intermediate of the two initial strains or ecotypes are observed. The variations in pathogenic affects are given below:

	Adriatic strain		Campaign strain	
	1965-66	67/69	1965-66	67/69
N. gossei	-	-	-	-
N. exigua	-	-	-	-
N. debneyi	-	-	-	-
N. velutina	+	+	+	-
A_2-2-27-2	+	+	+	+
Bel 61/9	-	+	+	+
Bel 61/10	-	+	+	+
Bel 61/11	+	+	+	+
Bel 61/12	-	+	+	+
F_1 (A_2 x Burley)	-	+	+	+
Burley	+	+	+	+

\+ susceptible

\- resistant

GROSSO, J. J. Reaction of diverse *Nicotiana tabacum* germplasm to blue mold. Tobacco Science 20:147-148. 1976. (119

También en: Tobacco Intelligence 178(20):52-53. 1976.

The 1018 Tobacco Introductions were screened for resistance to blue mold caused by *Peronospora tabacina*. The disease affected the plants with varying severity. The TI's were grouped in ten classes according to severity of infection based on ratings from 0-100. Only 12 TI's or 1.18 per cent of the total number were in the 0-10 class. They are of potential value as new sources of resistant germplasms. (Tobacco Abstracts 21:2496).

GROSU, A. Fungicides for the control of tobacco downy mildew (En ruso). Sel'sk Khoz Mold 12:32-34. 1977. (120

GUVENER, A., GUNAY, Y. y OTACI, C. Residual amounts of some dithiocarbamates which are used on tobacco against blue mold (*Peronospora tabacina*) (En turco). Bitki Koruma Bulteni 10(3):131-170. 1970. (121

Some dithiocarbamates used against tobacco blue mold (*P. tabacina*) were studied for their biological activity and the amount of their residue left in the tobacco. The redn. of residues is important in preventing health hazards caused by pyrolysis products (e.g. CS-2, H-2 S) and in improving the tobacco flavor. The residue content depends on the type of thiocarbamate used, number and frequency of its application, quantity of rainfall, the variety of tobacco, and the order of picking the tobacco leaves. The residual amounts of the fungicides increased in the order of Me, zineb, maneb and zineb but they were also influenced by the inert fillers of the formulations. The aspirations used in tobacco processing did not decrease the residue content significantly, whereas periodic humidification of tobacco during storage did. The addition of a spreader-sticker (sandovit) was ineffective. During the fermentation of tobacco, a decrease of the residue content up to 75 per cent was possible but depended on the extent of completion of the fermentation. (Tobacco Abstracts 15:1571).

HARRIGAN, E. K. S. Blue mould resistance, quality, yield and some morphological characters in eight advanced breeding lines of tobacco. Australia, C.S.I.R.O., Division of Plant Industry, Field Station Record 10:1. 1971. (122

HITIER, H. An enemy of tobacco: *Peronospora tabacina* Adam (En francés). Ann. Tab. Sect. 2. Special:73-83. 1977. (123

HOLLOMON, D. W. Protein synthesis during germination of *Peronospora tabacina* (Adam) conidia. Archives of Biochemistry & Biophysics 145(2):643-649. 1971. (124

The characteristics of an *in vitro* amino acid-incorporating system prepared from germinated *Peronospora tabacina* conidia are described. Material sedimenting at 20,000 g and at 117,000 g was found to possess significant amino acid-incorporating activity. Although germination is accompanied by an increase in the activity of both these fractions, if RNA synthesis is inhibited during germination, activity increases only in the 20,000 g fraction. Since germ tube formation occurs in the absence of RNA synthesis, it is suggested that the protein required for germ tube formation is largely synthesized by the 20,000 g fraction. The increase in amino acid-incorporating activity in this fraction begins

during the preparation of conidia at 0° and prior to the start of incubation at 15° and may result from the removal of some factor during washing. (Tobacco Abstracts 15:2617)

HOLLOMON, D. W. Protein synthesis during germination of *Peronospora tabacina* conidia: an examination of the events involved in the initiation of germination. Journal of General Microbiology no. 78:1-13. 1973. (125

Resumen también en francés.

The activation of protein synthesis early in germination does not seem to result from changes associated with the formation of aminoacyl-tRNA, or from changes in the peptide-chain elongation factors. Alterations appear in the attachment of particulate-bound ribosomes during germination, and a scheme is proposed which relates these observations to the possible events occurring at the initiation of germination. (CORESTA Information Bulletin, no. 1:3562)

HONARNEJAD, R. Situation of breeding for blue mold resistance in Iran (En alemán). Deutsch Tabakbau 22:269-271. 1980. (126

INCEKARA, F. Breeding blue mold-resistant Turkish tobacco cultivars. *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1972. pp. 161-162. (127

Breeding Turkish tobacco cultivars for blue mold resistance has started in 1963. Since then, the selection, combination and mutation methods have been employed. In the present study, only the results of combination studies are reported, because selection and mutation were not successful. The following genetic material was tested: intervarietal crosses between "Hicks Lea" which carries *N. debneyi* resistance genes, and nine commercial Turkish varieties; and interspecific crosses, in which first amphidiploids from the sterile F-1 s of *N. debneyi* x Ege 64 and *N. debneyi* x Bursa were obtained by applying colchicine in 1966. Cotyledon tests were applied. As a result of these tests, the completely resistant individual plant progenies were registered. (Tobacco Abstracts 16:2274).

_____., EMIROGLU, U. y AGAR, H. A comparative investigation on the resistance of tobacco to blue mould (*Peronospora tabacina*) in cotyledon tests and at the seedling stage (En turco). Ege Universitesi Ziraat Fak. Derg. 14(1):31-39. 1977. (128

In field tests in Turkey, following a severe natural infection, all seedlings of susceptible varieties died, whereas those of 17 hybrid strains which had showed 76-99 per cent resistance in the cotyledon tests were resistant. The percentage of seedlings showing some necrotic spots and sporulation on the lower leaves varied among strains and highest resistance occurred among strains in which it had been high at the cotyledonary stage. (Review of Plant Pathology 59:2909).

* IOAN, E., DASCALESCU, E. y BUTUC, I. Contributions to the improvement of semioriental-type tobacco to be resistant to *Peronospora tabacina* A. (Sumario). CORESTA Information Bulletin, no. Especial:89-90. 1978. (129

Documento presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

Resumen también en francés.

As a result of interbreeding Bel 61-10 and Ghimpati 357 and repeated individual selection, new genotypes of semioriental-type tobacco resistant to *Peronospora tabacina* A. were created. Our repeated trials distinguished Ghimpati RP 55 which is resistant to the Pt-2 strain of tobacco blue mould, 10-30 per cent more productive, and has superior quality view to Ghimpati L 357 which it has replaced in culture. The new cultivar is cultivated on 20 per cent of the area grown to tobacco in the plain and hill zones in the south of the country in the west part of Muntenia.

ISKENDER, G. Quantitative determination of alkaloids in Turkish blue mould-resistant tobacco. Journal of Fac. Pharm. 11(1):27-37. 1975. (130

The perchloric acetic acid method was used to determine the levels of total alkaloids, tertiary alkaloids (calculated in nicotine) and secondary alkaloids (calculated in nornicotine) in eighteen varieties of tobacco: six varieties Turkish tobacco susceptible to blue mould, their ten resistant hybrids obtained by crossing with three Australian varieties (Hicks 131, Hicks, Virginia Bright A_2-27-2), Hicks 131 and blue mould-contaminated tobacco (Duzce 985). Nicotine from the same samples was subjected to two methods of steam distillation and determined by two spectrophotometric techniques. No correlation was found between resistance to blue mould and the alkaloid contents of the various varieties, but the total alkaloid and nicotine contents were much lower in the blue mould-contaminated tobacco (Duzce 985) than in healthy tobacco of the same variety. (CORESTA Information Bulletin, no. 1:5880).

IVANENKO, B. G., VINOGRADOV, V. A. y BEBIYA, E. A. Registration of second race of blue mould of tobacco (En ruso). Zashchita Rastenii, no. 8:40. 1976. (131

Race 2 of blue mould was detected in Moldovia, Georgia and the Krasnodar region where it attacks varieties resistant to race 1. The disease was most severe in summer and on the lower leaves. (Review of Plant Pathology 56:1721).

IVANOVA, T. Z. *et al.* Study of varieties and wild species of the genus *Nicotiana* for resistance to the stem form of *Peronospora* (En ruso). Sb. Nauchno-Issled Rabot Vses Nauch-Issled Inst. Tabaka Makhorki 162:24-30. 1974. (132

JANKOWSKI, F. Changes in aggressiveness and pathogenicity of fungus *Peronospora tabacina* Adam in relation to resistant tobacco varieties (En polaco). Biuletyn Instytutu Ochrony Róslin, no. 47:369-379. 1970. (133

_____. Studies into pathogenic changes of the fungus *Peronospora tabacina* Adam; a novel highly virulent isolate of the pathogen (En polaco). Centr. Lab. Przm. Tyton, Builetyn no. 1/2:45-56. 1971. (134

Resumen también en francés.

Samples of an isolate (1) of *Peronospora tabacina* found on resistant varieties in 1970, were studied and compared with the common strain of *Peronospora tabacina* by cotyledon tests and the inoculation of adult plants in vegetation chambers with controlled atmosphere. (1) was observed to possess increased aggressiveness to resistant varieties and *N. debneyi* and high pathogenicity for 10-12 week old Bel 61-10 and Chemical Mutant plants, resulting in high levels of infection and necroses. The aggressiveness of (1) was not modified by 12 passages on susceptible varieties.

Supply of Mg did not significantly increase plant resistance. (1) appears to be a new, highly virulent biotype of the pathogen. (CORESTA Information Bulletin, no. 3-4:2123).

JANKOWSKI, F. y SLAWINSKI, A. The effectiveness of various fungicides for the control of a virulent strain of tobacco blue-mold (En polaco). Centr. Labr. Przm. Tyton. Buiietyn no. 3/4:41-48. 1972. (135

Resumen también en francés.

The effectiveness of the fungicides Dithane M-45, Cynkotox, activated Cynkotox and Sadoplon 75 for the control of *Peronospora tabacina* was tested in laboratory and field experiments. 0.2 per cent conc. of Dithane M-45 was the most effective for plantlet protection and Sadoplon 75 the least effective. Satisfactory results were obtained in the field by spraying tobacco plants with Dithane M-45 (conc. 0.3%) and Cynkotox (0.4%). Activated Cynkotox (0.3%) was less effective and Sadoplon 75 (0.3%) was inefficacious. (CORESTA Information Bulletin, no. 4:3323).

_____. Increase in parasitic ability of *Peronospora tabacina* (En polaco). Biuletyn Instytutu Ochrony Rőslin, no. 52:107-122. 1972. (136

Resistant tobacco (Hicks Resistant,Bel 61-10 and Chemical Mutant) and *Nicotiana debneyi* were severely attacked in 1971 by a new, virulent form of *P. tabacina*. Its virulence was not lessened by 14 passages through susceptible tobacco. (Tobacco Abstracts 18:1825).

_____. y MAZUR, M. Susceptibility of certain tobacco varieties to the virulent strain of *Peronospora tabacina* (Pt-2). Study at various growth stages of the plant (En polaco). Centr. Lab. Przm. Tyton. Buiietyn, no. 2/3:15-33. 1973. (137

Resumen también en francés.

The cotyledon test, the test in air conditioned chambers with artificial inoculation of plantlets at 4 growth stages (3-5, 6-7, 9-10 and 10-14 leaves), and field trials under conditions of natural infection were carried out on 12 varieties of flue-cured tobacco for cigarettes, 12 varieties of dark air-cured tobacco for cigarettes and Kentucky tobacco, to test their susceptibility to the new race of *P. tabacina*, Pt-1. The cotyledon test revealed a marked susceptibility of the varieties studied to the new race of the pathogen. Laboratory trials revealed severe symptoms of infection on the 3-5 and 6-7 leaf stages in all these varieties, the plantlets dying within 20 days after inoculation. In older plantas (73-76 days, 10-14 leaf stage), differences in susceptibility were observed which were confirmed in the field. Among the flue-cured tobaccos, Hicks Resistant, Virginia Krakowska 1, Virginia Izyda, LB-833, LB-838 and the lines 177 and 212 were the least susceptible. Among the dark air-cured tobaccos, Mocny Koszycki, Kentucky Nidzicki, Pulawski 66, Skroniowski Szerokolistny (improved variety) and the hybrid R x T no. 38-2/71 were the least susceptible to Pt-2. The usual prophylactic treatments in the seedbed and the field were nevertheless necessary for all these varieties and lines. (CORESTA Information Bulletin, no. 3-4:4112).

_____. Susceptibility of several *Nicotiana* species to *Peronospora tabacina* virulent race (PT2), during different crossing phases (En polaco). Cent. Lab. Przem. Tyton. Buiietyn, no. 29(1-2):27-37. 1973. (138

JANKOWSKI, F. y SAMEK, D. The assessment of the effectiveness of combined fungicides in the control of *Peronospora tabacina* Adam (En polaco). Cent. Lab. Przem. Tyton. Builetyn, no. 3/4: 9-28. 1978. (139

In trials against a virulent race of *P. tabacina* (PT-2) on tobacco 0.2 per cent Dithane M-45 and Dithane P were 100 per cent effective and 0.2-0.4 per cent Dithane Funaben 76 per cent. (Review of Applied Pathology 58:5014).

_____. y SAMEK, D. Effectiveness of combined fungicides for control of the fungus *Peronospora tabacina* Adam (En polaco). Cent. Lab. Przem. Tyton. Builetyn, no. 3-4:29-33. 1978. (140

JOHNSON, G. I. New systemic fungicide for tobacco blue mold control in Queensland. Australian Tobacco Growers Bulletin (26):31-33. 1979. (141

Recommendations for Ridomil use for control of blue mold caused by *Peronospora hyoscyami* on tobacco. (Tobacco Abstracts 23:1082).

* _____., DAVIS, R. D. y O'BRIEN, R. G. Soil application of CGA-48988, a systemic fungicide controlling *Peronospora tabacina* on tobacco. Plant Disease Reporter 63(3):212-215. 1979. (142

A fungicide, N-(2,6-dimethylphenyl)-N-(methoxyacetyl)alanine methyl ester (CGA-48988), with apoplastic systemic activity, controlled blue mold of tobacco (caused by *Peronospora tabacina*) for the entire crop life. Application as a single soil drench (0.125 g a.i./liter-3600 liter/ha) in the field at transplanting, with no further treatment, was a reliable alternative to weekly spray applications (0.0375 g a.i./liter) in providing excellent mold control. Strategic sprays applied after disease onset were unsatisfactory. Seedbed drenches provided no protection from mold after transplanting. Treatment of blue mold-resistant cultivars with transplant drenches of this fungicide ensured complete mold control.

JONES, J. L. Control disease and insects in the plantbed. Flue Cured Tobacco Farmer 16(2):7, 10, 42-43. 1979. (143

Includes control of blue mold, tobacco mosaic virus, *Epitrix parvula*, and *Myzus persicae*. (Tobacco Abstracts 23:910).

* KAMAL, M. y AGBARI, A. A. Revised host list of plant diseases recorded in Yemen Arab Republic. Tropical Pest Management 26(2):188-193. 1980. (144

La República Arabe de Yemen tiene una variedad de climas y los autores han dividido el país en áreas de acuerdo con las condiciones climáticas. Estas áreas son llanuras costaneras, los pie de montes y tierras interiores, las tierras montañosas centrales y las áreas orientales. Una variedad de cultivos se cosechan en esas diferentes áreas usando métodos tradicionales de agricultura. Los rendimientos son bajos y la incidencia de enfermedades es uno de los factores responsables. Anteriormente se han efectuado algunos reconocimientos para determinar las enfermedades de importancia económica para los cultivos y este artículo presenta los resultados de esos reconocimientos anteriores junto con otro llevado a cabo por los autores durante el período comprendido entre junio 1976 a junio 1978. Se presenta una lista revisada de enfermedades de plantas para varios cultivos e incluye registros nuevos no publicados anteriormente.

KAMPE, W. Ten years of experience in *Peronospora tabacina* control on tobacco (En alemán). Deutsch Tabakbau 53(12):103-104. 1973. (145

KANEVA, S. Use of heterosis in tobacco (En búlgaro). Bulgarski Tiutiun 21(11):31-32. 1976. (146

Two high yielding heterotic hybrids, Harmanli 163 x Krumovgrad 90 and K.90 x Haskova 816, were resistant to blue mould /*Peronospora tabacina*/ and tobacco mosaic virus. (Review of Plant Pathology 57:282).

* KESWANI, C. L. y CHAVEZ, H. B. Importance of pesticide research in the control of tropical plant diseases. World Review of Pest Control 9(2):59-72. 1970. (147

Incluye *Peronospora tabacina*: p. 67.

KIRYUKHINA, R. I. Study on the specialization of blue mould of tobacco (En ruso). Byulleten' Vsesozuznogo Nauchno-Issledovatelskogo Instituta Zashcity Rastenii 29(1):98-106. 1970. (148

All *Nicotiana* spp. and tobacco varieties tested were more or less susceptible to *Peronospora tabacina*. *N. debneyi*, *N. exigua*, *N. megalosiphon*, *N. occidentalis* and *N. rotundifolia* were the most resistant. (Tobacco Abstracts 16:421).

* KLINKOWSKI, M. Catastrophic plant diseases. Annual Review of Phytopathology 8:37-60. 1970. (149

Moho azul del tabaco: pp. 45-46.

KOBUS, I. Genetic and breeding studies on *Nicotiana tabacum* L. Genetica Polonica 16(1):1-28. 1975. (150

Eight breeding lines have been produced from crossing wild species of *Nicotiana* with amphitetraploid forms of the varieties BP210 and Kaznowski's Virginia obtained after cochicine treatment. The former was more susceptible to γ radiation which, in the latter, gave increased resistance in the M_2 to *Peronospora tabacina* (*P. hyoscyami*). The crosses between wild species and the amphitetraploid forms gave up to 95 per cent capsule set with some F_1 heterosis. The most promising of the eight lines derived from a complex cross involving Virginia Joyner, Kaznowski's Virginia and *N. exigua* and had a nicotine content intermediate between that of its parents. A back cross of amphitetraploid BP210 with *N. glauca* had resistance to *P. hyoscyami*, *Thielaviopsis basicola* and virus necrosis and had a higher nicotine content than its amphitetraploid parent. (Plant Breeding Abstracts 46:4547).

KOSMODEMYANSKII, V. N. y DEMCHENKO, T. I. Results of tobacco breeding for resistance to blue mould (*Peronospora tabacina* Adam). *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. p. 166. (151

The rapid spread of tobacco blue mold over the territory of the USSR made it urgently necessary to create varieties of tobacco for different tobacco growing zones which would be resistant to that disease. This paper gives characteristics of the productivity of new resistant varieties developed by the Tobacco Institute and its experimental stations. The results of the evaluation of these varieties are given as well as

the initial forms according to the degree of infection in different years at two places (Krasnodar and Pogar). Experimental data lead to the conclusion that a new race of *P. tabacina* (race B) has appeared in Krasnodar which infects all forms having a resistant capacity of the type "Resistant Hicks". The wild species *N. debneyi*, however, remains resistant, from which it is concluded that the new resistant varieties and initial forms (Resistant Hicks, Bel-61/9,-11, 12, etc.) do not possess the complete resistance ability of *N. debneyi*. (Tobacco Abstracts 16:2277).

KOVACS, A. y MALLEGNI, C. Influenza di erbicidi sulle malattie della piante coltivate. Notiziario sulle Malattie delle Piante, no. 92/93:239-252. 1975. (152

In the glasshouse inoculation of tobacco with *Peronospora tabacina* failed when plants had been treated with hormone herbicides. Powdery mildew on inoculated young wheat plants in the glasshouse was controlled on treatment with normal field dosages of DNOC and dinoseb. In a field trial on maize only 2 plants were attacked by *Ustilago maydis* in control plots and in those treated with atrazin. With atrazin + TCA and atrazin + maleic hydrazide there were 10 and 39 infected plants respectively. (Review of Plant Pathology 57:106).

KOVARI, V. y NAGY, G. Recent method to prevent blue mold (En húngaro). Dohanyipar (4):121-125. 1977. (153

KREXNER, R. Blue mold resistance test of new tobacco varieties (En alemán). Pflanzenarzt 24(8): 89-91. 1971. (154

Field and laboratory methods for testing varietal resistance to *Peronospora tabacina* are reviewed. (Review of Plant Pathology 51:1892).

_____. Further vigilance required with blue mold of tobacco (*Peronospora tabacina* (En alemán). Pflanzenarzt 27(5):46-48. 1974. (155

KROEBER, H. Longevity of conidia of several *Peronospora* species under different environmental conditions (En alemán). Phytopathologishe Zeitschrift 69(1):64-70. 1970. (156

Resumen también en francés.

The survival conditions of the conidia of 3 *Peronospora* species: *P. parasitica*, *P. farinosa*, f.sp. *spinaciae* and *P. tabacina* were studied both outside and within a cold chamber (constant temperature 5°C), and in each case in dry or moist air. Longevity of the conidia of the three species varied, it was always longest in the case of *P. tabacina* and shortest in *P. farinosa*, but all three reacted in the same manner to environmental conditions; cool temperatures and, above all, dry conditions, were favourable to survival. Under very favorable conditions it is possible that *P. parasitica* and *P. tabacina* can over winter in our regions as conidia. (CORESTA Information Bulletin, no. 2:528).

_____. Host-parasitic interrelationship in leaves of tobacco plants susceptible and resistant to blue mold. *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. pp. 194-195. (157

About 20 slides (5 x 5 cm) representing microphotographs (polarization-interference-microscope and electron microscope) of cross sections of leaves exhibit the penetration of *Peronospora tabacina* into young

tobacco plants susceptible and resistant to blue mold. The fungus invades the leaves of both varieties. Four days after inoculation the leaves of the susceptible variety are entirely penetrated with hyphae. At this stage of the disease only very few host cells and haustoria are visibly damaged; the attacked leaf tissue soon dries up. In the resistant variety all leaf cells with the exception of the epidermal cells are destroyed immediately after having been invaded by the fungus. The intercellular spaces of the invaded zone are filled by a mucilaginous substance. Already 12 hours after inoculation of the leaves many dead host cells, hyphae, and haustoria are recognized. Within both the host cells and the intercellular spaces the hyphae and the haustoria of the fungus appear in a homogeneously darkish color. In all cases the fungus remains confined to an area including only one or several host cells. According to microphotographs the resistance to blue mold of this resistant variety is due to the principle of hypersensitivity. Nevertheless, the fungus does not seem to be damaged by a shortage of nutritive material but rather by a toxic principle which is induced after the infection. Obviously the rapid necrotization of the invaded host cells is only a concomitant phenomenon of developing resistance. Therefore, this hypersensitivity is not a passive incident as it was thought for a long time, but it is in fact an active reaction of defense. (Tobacco Abstracts 16:2278).

KROEBER, H. y PETZOLD, H. Light and electron microscope studies of the host-parasite relationship of susceptible and *Peronospora* resistant varieties of tobacco and spinach (En alemán). Phytopathologische Zeitschrift 74(4):296-313. 1972. (158

In leaf tissues of susceptible varieties invaded cells and the fungus remained viable for 4 days after inoculation of tobacco with *Peronospora tabacina* and spinach with *P. farinosa* f.sp. *spinaciae* whereas in resistant varieties most invaded host cells were rapidly destroyed either before or after degeneration of the fungus, their contents appearing almost homogeneous within 12 h. It was concluded that the defense reaction is connected with the production of toxic substances and similar to that found in some hypersensitive hosts. Viable infected host cells and fungus were found occasionally at the margin of degenerated leaf tissue of young resistant plants 4 days after inoculation, suggesting that the hypersensitivity may not always be an 'all or nothing reaction' resulting in absolute resistance of the plant. (Review of Plant Pathology 52:2216).

* KUC, J. y HAMMERSCHMIDT, R. Acquired resistance to bacterial and fungal infections. Annals of Applied Biology 89(2):313-317. 1978. (159

Includes the protection of tobacco foliage against disease caused by *Peronospora tabacina* and tobacco mosaic virus by prior stem infection of *P. tabacina*. Also includes use of heat-killed cells of *Pseudomonas solanacearum* to prevent the hypersensitive reaction of tobacco leaves to subsequent inoculation with *P. solanacearum*. (Tobacco Abstracts 22:2354).

LAZARENI, A. Improvement of productivity and blue mould resistance of tobacco variety Roskovec by hybridization. Bul. Sh. Buj. 15(3):39-43. 1976. (160

Compared with Roskovec, the hybrid Roskovec x Fl. was nine times more resistant to *Peronospora hyoscyami* in the seed bed and three times more resistant in the field. Its chemical and technological indices were also better and its yield was 22.1 per cent higher. (Plant Breeding Abstracts 48:7863).

LEGENKAYA, E. I. On the specialization of *P. tabacina* in the central-chernozem zone of the USSR (En ruso). Byulleten' Vsesozuznogo Nauchno-Issledovatelskogo Instituta Zashcity Rastenii 29(1):91-97. 1970. (161

P. tabacina was found for the first time under natural conditions in this area on *Nicotiana affinis*, *N. rustica* and *Petunia hybrida* in July-Aug. 1962, and on *Capsicum annum* in July 1964. In laboratory tests isolates from *N. affinis* infected tobacco, *Capsicum*, tomato, petunia and eggplant. (Tobacco Abstracts 16:422).

* LEPPIK, R. A., HOLLOMON, D. W. y BOTTOMLEY, W. Quiesone: an inhibitor of the germination of *Peronospora tabacina* conidia. Phytochemistry 11(6):2055-2063. 1972. (162

A potent germination inhibitor of *Peronospora tabacina* conidia has been isolated from tobacco leaves infected with this pathogen. From consideration of its spectral properties, it is suggested that the structure of this inhibitor is 5-isobutyroxy-β-ionone. The effects of this inhibitor on the germination of *P. tabacina* conidia have been investigated.

LIGETI, L. y NAGY, G. Evolution of the virulence of *Peronospora tabacina* in Hungary over the past few years (En húngaro). Dohanyipar 20(1):1-8. 1973. (163

Resumen también en francés.

A report is made on an investigation carried out on blue mould within the framework of CORESTA. Experiments in the field or the results of cotyledon test show that the virulence of the pathogen has increased over the past few years in Hungary. The more virulent strains are morphologically similar to the others. The considerable propagation of the "systemic" form of the disease is correlated with increased virulence. (CORESTA Information Bulletin, no. 3:3014).

LISENKO, L., DJACHKINE, I. y BOROVSKAJA, M. The effects of blue mould on tobacco quality (En ruso). Selsk. khoj. Moldav. 19(8):30-31. 1974. (164

Resumen también en francés.

The variety Peremogetz was used to study the effects of the degree of blue mould infection (0, 25, 50, 70 and more than 70% leaves infested) on various chemical and physical indices determining tobacco quality: soluble carbohydrates, total nitrogen, protein nitrogen, nicotine, Shmuk index, leaf thickness, weight per unit leaf area, industrial yield of cured and shredded tobacco, mesh size. A graph shows the relationship between the degree of infection and the quality of the product obtained. (CORESTA Information Bulletin, no. 1:4556).

* LUCAS, G. B. The war against blue mold. Science 210(4466):147-153. 1980. (165

An epidemic of blue mold of tobacco unexpectedly attacked crops in the United States and Canada in 1979, causing an estimated loss of almost a quarter billion dollars. The disease, caused by a fungus, apparently started in Cuba where half the crop was destroyed in 1979 and 90 per cent in 1980. Control of blue mold is difficult and expensive. Resistant cultivars become susceptible within a few years. A therapeutic fungicide, metalaxyl, gives efficient control, but resistant strains of the fungus may soon appear. Blue mold is an international problem that will require the collaboration of scientists, governments, and industries for an adequate solution.

LUDERS, W. y RASTETTER, A. Can pesticide residues used for *Peronospora tabacina* control be reduced on tobacco leaves? (En alemán). Deutsch Tabakbau 54(11):81-86. 1974. (166

McKEE, C. G. Blue mold update. Tobacco Views News (1):1980. 4 p. (167

Tobacco blue mold (*Peronospora tabacina*) loss estimates in 1979 in the United States are given by type and state, and summary of the control program for 1980. (Tobacco Abstracts 24:570).

_____. Nematode survey and blue mold in 1980. Tobacco Views News (5):1980. 4 p. (168

Includes announcements concerning a nematode survey in Maryland, and occurrence of blue mold in the United States and Maryland during 1980. (Tobacco Abstracts 25:585).

_____. Blue mold in 1981. Tobacco Views News (5):1981. 2 p. (169

Blue mold was first reported in Maryland about the middle of June, however, it is estimated that the disease was present 2-3 weeks earlier. Some beds were destroyed and some infected fields were disked and replanted. Later, there was leaf spotting from field infection that resulted in some leaf loss. Weather conditions then turned generally dry and the disease seemed to disappear. However, active spores were again found on plants in the fall indicating the disease was still here. The County Extension Agents estimate loss from blue mold in Maryland this year to be about 1 per cent or roughly $500,000. (Tobacco Abstracts 26:862).

_____. Control of blue mold in tobacco beds in 1981. Tobacco Views News (1):1981. 2 p. (170

The control of blue mold in tobacco beds is the most important phase of stopping the spread of this disease. In 1980, principal losses from blue mold came from bed infections. The disease, in many cases, went into the plant (systemic) and these plants when planted in the field either died or did not grow properly. This type of loss was common in much of the tobacco producing area from Florida to Pennsylvania. If control of blue mold in the seedbed is done effectively, field losses will be reduced because: the disease will not go systemic in the seedbed. The seedbeds will not serve as a source of blue mold spores to infect field tobacco. Describes characteristics and application methods of ridomil; program for control of blue mold, anthracnose, and wildfire in plantbeds in Maryland for 1981; and assessment of the chances of the blue mold fungus becoming resistant to ridomil. (Tobacco Abstracts 25:1227).

McKEEN, W. E. y SVIRCEV, A. M. Infection of tobacco leaf with *Peronospora hyoscyami*. Phytopathology 71(8):894. 1981. (171

In a suitable environment the multinucleate conidium of *Peronospora hyoscyami* de Bary begins to germinate immediately. If the conidium is placed on a susceptible tobacco leaf, it produces a short lateral germ tube and a club-shaped appressorium which is surrounded by slime, but on glass and media the germ tube becomes long and branched. As the germ tube and appressorium develop, the protoplasm moves out of the conidium. A penetration tube emerges from the bottom of the appressorium and passes through a narrow hole in the epidermal wall,

usually near an anticlinal wall, sometimes within 2 hours after inoculation. All the cytoplasm from the conidium and most of the ctyoplasm from the appressorium flows into a spherical vesicle, prior to formation of a large plug in the penetration tube. The vesicle which is surrounded by host cytoplasm then produces a lobulate hypha or a secondary vesicle which may send branches into adjoining host cells prior to growing through the lower wall of the infected cell. Infection may be completed in 3 hours. (CORESTA Information Bulletin, no. 2-3:3337).

McKENNA, W. Canadians trying preventive chemical against blue mold. Tobacco Intelligence 182(7):39-40. 1980. (172

The use of Redomil is recommended to Canadian tobacco growers as a preventive of blue mold. It has been used effectively in Australia and West Germany. (Tobacco Abstracts 24:1290).

MAIN, C. E. *et al.* Small field plot epidemiological studies on blue mold of tobacco in North Carolina. Phytopathology 71(5):562. 1981. (173

Tobacco blue mold (*Peronospora tabacina*) occurred via natural inoculum at Clayton, North Carolina, on June 6, 1980. Lesion number, size, expansion rate, sporulation and disease progress were monitored in relationship to canopy microclimate and regional climatic events. Three fungicides, fungicidal rate and spray intervals were used to regulate the progress of epidemics in replicated 80-plant plots. Overhead irrigation was utilized to extend leaf wetness periods. Disease progress curves were well correlated with synoptic weather conditions. Disease persisted under conditions previously considered limiting (daytime temp. >85°F and few cloudy, rainy days) indicating the possibility of a temperature tolerant strain of the pathogen. Ridomil 2EC applied either by preplant soil incorporation (1 qt or 1 pt/acre) or by foliar spray (1 pt/acre) at 14-day intervals prophylactically and therapeutically controlled blue mold. Manzate 200 at 2.5 lbs (a.i.)/acre reduced disease while streptomycin SO_4 (Agri-strep type D) was ineffective in preventing disease progress. (CORESTA Information Bulletin, no. 2-3:3336).

* MANDRYK, M. Resistance of solaneous and non-solaneous species to *Peronospora tabacina* as shown by necrotrophic reactions. Australian Journal of Experimental Agriculture and Animal Husbandry 11(48):94-98. 1971. (174

Resumen también en francés.

The necrotic reactions of leaf discs (treated according to the method described in Australian Journal of Biological Sciences 20(6):1161-1168, 1967), classified in: a) no reactions; b) water-soaking of epidermal cells; c) browning of cells; d) black necrosis of cells, were compared to the degree of resistance of the plant ranked as follows: no lesions; small lesions and no sporulation; small lesions and slight sporulation; large lesions and dense sporulation. With a few exceptions, reactions (a) and (b) corresponded to resistant species for *Nicotiana* genus, such a relationship could be extended to other genera such as Petunia, Capsicum, Lycopersicon Hyoscyamus. (CORESTA Information Bulletin, no. 4:1147).

MANEX FOR blue mold control in tobacco. Tobacco Reporter 107(9):58-60. 1970. (175

Manex, a flowable maneb produced by the Griffin Corp. has received label clearance from the Environmental Protection Agency for use in control of blue mold in tobacco. Manex has been approved for foliar

application to plants in tobacco beds and in fields. It is a flowable mixture containing four pounds of maneb per gallon. (Tobacco Abstracts 24:2161).

MANOLOV, A., LESHCHEVA, D. y BALDZHIEVA, E. Newly developed tobacco lines of the Oriental type resistant to *Peronospora hyoscyami* (En búlgaro). Bulgarski Tiutiun 18(11):31-34. 1973. (176

Resistant lines with $2n = 48$ and a normal meiosis segregated in the progeny of *Nicotiana exigua* x *N. tabacum*. Particularly interesting were lines 40 and 51. By crossing *N. megalosiphon* with *N. tabacum*, such valuable resistant lines as 2, 570 and 957 were obtained in the F_8. (Plant Breeding Abstracts 45:6598).

* MARANI, A., FISHLER, G. y AMIRAV, A. The inheritance of resistance to blue mold (*Peronospora tabacina* Adam) in two cultivars of tobacco (*Nicotiana tabacum* L.). Euphytica 21(1):97-105. 1972. (177

Two blue-mold resistant cultivars of *Nicotiana tabacum* L. were crossed with each other and with the susceptible Israeli local cultivar Mikhal. F_1, F_2 and F_3 progenies of these crosses, F_1 and F_2 of backcrosses and the parental varieties were grown in a series of experiments, in which the seedlings were exposed to heavy natural infection with *Peronospora tabacina* Adam. The genetic basis of resistance was found to be identical in the two resistant strains Bel-61-10 and Chemical Mutant. A single dominant major gene determined the segretation of resistance versus susceptibility in the crosses of these strains with Mikhal. The level of resistance of resistant segregates was shifted by environment and by quantitatively modifying genes. The index of resistance, which was calculated as a weighted mean of the degree of blue-mold expression of the resistant segregates, differed in the generations of cross progeny. This could be explained by the different expected levels of the modifying genes in these generations. Heritability of the index of resistance was calculated by parent-offspring regression and it was found to be 0.542 in the F_3 and 0.227 in F_2 backcross progenies.

* MARCELLI, E. y DANESE, V. Reciprocita nell'inibixione tra TMV e *Peronospora tabacina* in piante di tabacco e di *N. glutinosa*. Il Tabaco 74(734):1-6. 1970. (178

The reciprocal influence of *Peronospora tabacina* and TMV with an inhibiting effect for the pathogen inoculated last, is evidenced. But where in leaves inoculated with TMV and successively with *P. tabacina* a reduction of chlorogenic acid content occurs and the oxidation of chlorogenic acid to quinone can explain the inhibiting effect on *P. tabacina* in the case of plants inoculated with *P. tabacina* and then with TMV, as no reduction of the chlorogenic acid content occurs, one must think that other mechanisms occur equally able to inhibit TMV.

* _____. y CORBAZ, R. Phytopathology study group: report on the collaborative trial to determine the virulence of *Peronospora tabacina*. CORESTA Information Bulletin, no. 1:4-8. 1972. (179

También en francés.

Includes varieties Bel 61-10, Bergerac C, Chemical Mutant, R x T : *N. rustica* x *N. tabacum*, Samsun, GA 955, and local varieties degree of resistance.

* MARCELLI, E. y VARDABASSO, A. Relazione sulla sperimentazione collettiva per la valutazione della virulenza della *Peronospora tabacina* - 1971. Il Tabacco 76(742):29-31. 1972. (180

* _____. y SCHILTZ, P. Report on the collaborative trial conducted in 1972 to assess the virulence of *Peronospora tabacina*. CORESTA Information Bulletin, no. 1:9-14. 1973. (181

También en francés.

In 1972, blue mold was rather virulent in Iran, Greece, East Germany and Switzerland. Attacks on resistant hybrids were more or less severe in Austria, Hungary and Italy (Scafati) and scattered in other countries. It should, however, be noted that the Trumpf variety has been the only one among resistant types to be attacked in Italy (Lecce) and Czechoslovakia. It should also be mentioned that susceptible varieties have been the only ones to be contaminated in Algeria and Turkey and that unusual symptoms (Bergerac C attacked to a lesser degree than resistant hybrids) have been reported in Austria and Bulgaria. Only two countries France and Morocco, have not reported any attacks of blue mold in their assortments. The five resistant hybrids tried out have not shown the same symptoms as established by the mean values attributed in 1972 to each of them: Bel 61-10: 2.56; Chemical Mutant: 2.13; R x T: 3.19; GA-955: 2.87; Trumpf: 3.75. In field trials, Chemical Mutant has been shown to be the most resistant variety, followed by Bel 61-10, GA-955, R x T and Trumpf. The latter hybrid of low resistance will probably be replaced by a new type in 1973. (Tobacco Abstracts 17:1845).

MARKS, C. F. Blue mold in Australia. Lighter/Briquet 50(2):5-7. 1980. (182

Resumen también en francés.

Two strains, APT1 and APT2, of the blue mold fungus, *Peronospora tabacina* Adam, were identified in North Queensland in 1972. However, it is believed that the two strains existed in South Queensland prior to 1972. Symptoms are similar with both strains although strain APT1 may sporulate less than APT2. Observations also indicate that although strain APT2 may be less damaging than APT1 it may be favoured more by cool conditions. Though limited work has been done on the formation of oospores, these structures have been found in APT1 but not in APT2. From 1963 to 1978 the dithiocarbamate fungicides were relatively effective except during prolonged periods of wet weather and high inoculum loads. Since 1978, Ridomil apparently has controlled blue mold quite effectively, both in the seedbed and in the field, in all of the areas. Several varieties that offer a reasonable degree of tolerance to strain APT1, e.g. Sirone, Sirogo, and Ovens 33, have been made available. In 1979 the variety Ovens 62, which offers a high degree of tolerance to both strains of the disease, was released from the Myrtleford Research Station. (CORESTA Information Bulletin, no. 3-4: 2549).

* MARTE, M. y CAPORALI, L. Le parasitisme du *Peronospora tabacina* Adam dans des apex végétatifs du *Nicotiana tabacum* L. Revue Générale de Botanique 81(965-967):277-298. 1974. (183

Histological and cytological sections of *Nicotiana tabacum* L. var. Bright 9 stems, attacked by *Peronospora tabacina* Adam, were examined on the purpose of detecting the parasitical fungus at the interior of vegetative shoot apices. The hyphae of *P. tabacina* grew in all parts of the apical meristem (initials ring, central

waiting meristem, rib meristem), as well as in the young leaves and pith; they generally followed an intercellular way and produced some globular or elongated haustoria. Being typically devoid of septa they built up a coenocytical mycelium whose structure was described. In the apical meristem, the presence of the fungus caused the interruption of the cell divisions, most of the host nuclei keeping their resting form. However, a few early prophases were sometimes observed. Moreover, as the fungus grew, the meristem cells died and their necrosis were followed by the death of the fungal hyphae being located at their level. Those phenomena were responsible of the growth-interruption occuring in the parasited stems. In the pith tissue, the fungus rarely caused necrosis. Its hyphae, as well as the host cells, kept alive even after the death of the apical meristem.

MASIAK, D. New strain of *Peronospora tabacina* infecting resistant varieties of tobacco (En polaco). Pamietnik Pulawski 49:169-174. 1971. (184

Numerous foci of *P. tabacina* were observed on resistant varieties in South Poland in August 1970. The isolated strain maintained increased virulence after several passages through the susceptible variety Zlotolistny IHAR and infected the completely resistant variety Bel 61-10. Local varieties, resistant to the pathogen, were also infected by the new strain. (Tobacco Abstracts 17:549).

_____. Occurrence of blue mold of tobacco (*Peronospora tabacina* Adam) over the years 1960-1969 in Pulawy in dependence on weather conditions (En polaco). Pamietnik Pulawski 40: 135-146. 1971. (185

The occurrence of blue mold on tobacco plants in Pulawy (Poland, region of Lublin) during 10 years (1960-1969) is presented on the background of weather conditions. It was found that there existed a strict dependence of the first appearance of blue mold and the intensity of its progress on the meterological factors. The disease was observed earlier and in a greater intensity if before it the south and west winds had blown. A great relative humidity, not very abundant rainfalls and a moderate temperature (20-25°C) were also favorable for the development of the infection. Low day temperatures (10-17°C) and frequent heavy rains caused a later appearance and slighter progress of blue mold. Conidial spores transported by winds were the main source of infection. Mycelium of *Peronospora tabacina* hibernating in seeds as well as the oospores did not play a significant role as the sources of infection due to prophylactic treatments. A considerable decrease of losses, caused by blue mold, observed since 1966, was the result of introducing resistant tobacco varieties into general cultivation. This work is based on the author's own observations as well as on the data from literature. (Tobacco Abstracts 15:1581).

_____. Observation of the susceptibility of tobacco varieties (*Nicotiana tabacum* L.) and of wild species of *Nicotiana* to a new race of *Peronospora tabacina* under field conditions (En polaco). Pamietnik Pulawski 60:155-175. 1974. (186

In the course of screeining 468 cultivated varieties and 84 wild *Nicotiana* species, no cultivars were found with immunity to the new race of *P. tabacina* (*P. hyoscyami*), but the varieties Diubek 44, Ostrokoniec 45, Albanensis, Latakie, Bel 61-10, Hicks Resistant, LB838, BB16, HE5170 and Ky5-49P_1 were strongly resistant. No symptoms of infection were found in the wild species *N. exigua*, *N. megalosiphon*, *N. maritima*, *N. rotundifolia* or *N. otophora*. (Plant Breeding Abstracts 46:1660).

MAZUR, M. Results of a study of tobacco cultivation and production in Poland. Tabak Journal International (2):93-94. 1978. (187

Results are shown of the research work on the breeding of new varieties that are resistant to dangerous diseases such as potato disease virus Y (PVY), *Peronospora tabacina* Adam (both strains PT-1 and PT-2) and the TSWV (Lycopersicum Virus 3). In Poland methods were worked out for testing the tobacco in the laboratory for its resistance to these diseases and then employing new varieties in industrial cultivation for the selection of the plants. On the basis of these methods the cultivation cycle of the new varieties was able to be shortened, and varieties were obtained which are resistant to PVY and *Peronospora tabacina* PT-1 and furthermore varieties with a low susceptibility to infection with regard to the strain PT-2. So far no success has been achieved in breeding varieties that are resistant to the TSWV virus disease. At present efforts are being made to reduce the nicotine content in raw tobacco in the Virginia variety and the condensate content in tobacco smoke. (Tobacco Abstracts 22:1935).

MERKER, J. y EGERER, A. "Trumpf", a high yielding cigar tobacco with resistance to *Peronospora tabacina* Adam and the virus Y (En alemán). Dresden. Inst. Tabakforsch. Ber. 18:5-38. 1971. (188

In this paper the recently bred cigar tobacco "Trumpf" which is released to growers in the German Democratic Republic since 1970 is presented. Description of provenience and breeding work is followed by the results of resistance breeding which show that good resistance to *Peronospora tabacina* and the virus Y has been obtained. Sensibility to both a root collar disease and Sclerotiana introduced by crossing is discussed. In the years 1966 to 1970 28 field experiments of the new breeding line "Trumpf" were carried out and compared to the hitherto grown cultivar "Remo". The following results were obtained: the vegetation period is 6 days longer. Based on the same number of leaves per plant the leaf yield is 25 per cent higher, the leaves being essentially larger and heavier. Technological evaluations of both cultivars revealed that the color index (commercial value), the weight per unit area and the hygroscopicity are approximately the same except the stem proportion of "Trumpf" which is about 1.3 per cent higher than that of "Remo". Combustibility, however, tends to be somewhat better with "Trumpf". Total alkaloid content of the leaves averages 1.0 per cent of d.m., thus being 0.5 per cent of d.m. lower than that of "Remo". There is no difference in total nitrogen contents. Smoke expertises did not reveal significant differences between the two cultivars. Commercial growing of "Trumpf" results in a profit of more than 2,500 M/ha. (Tobacco Abstracts 16:1098).

_____. The phytosanitary situation in tobacco growing in the GDR (En alemán). Nachrichtenblatt für den Pflanzenschutz in der DDR 30(12):240-244. 1976. (189

The world-wide problem of chemical residues on tobacco plants and the importance of breeding for resistance to the major diseases are discussed. In the section dealing with phytosanitary measures a description is given of tobacco diseases and their control during seedling production and in field crops, with special reference to *Peronospora tabacina*. (Review of Plant Pathology 56:2657).

MICKOVSKI, J. Morphology and biology of *Peronospora tabacina* (En serbo-croato). Tutun 21(7-8): 203-219. 1971. (190

MICKOVSKI, J. y POPOVIC, R. Results of investigations on tobacco resistance to *Peronospora tabacina* Adam (En serbo-croato). Tutun 21(9/10):259-294. 1971. (191

Resumen también en francés.

Lines which could be used as resistant parents were tested at Prilep from 1964 to 1970 with a view to breeding *Peronospora tabacina* resistant varieties. The following varieties were most resistant, in decreasing order: Bel 61-10, GA 955, AA 323, Florida 513, Chemical Mutant, Roman 1-13, Fixed A1, S01, S394-5s. Resistance varied from year to year as a function of weather conditions. Plants transplanted late were often the least diseased. (CORESTA Information Bulletin, no. 3-4: 2125).

_____. Effect of *Peronospora tabacina* on the quality of "Prilep" type tobacco (En serbo-croato). Tutun 22(9/10):291-301. 1972. (192

Resumen también enfrancés.

Apart from its quantitative consequences on production, blue mould has a pronounced effect on the quality of tobacco harvested. Compared with healthy leaf, the average price of infected leaf is 5 to 10 per cent less for lower leaves and 27-70 per cent less for middle and top leaf. Remarkable changes in certain chemical indices of leaf are also observed: a decrease in carbohydrate contents ranging from 12.63 per cent for lower leaf to 18.83 per cent for middle-upper leaf, a decrease in polyphenols of 0.23-3.2 per cent, an increase in ash content of 3.22 to 7.95 per cent and a certain increase in nicotine, total N, albuminous N and albumine (lowest and lower-middle leaves). (CORESTA Information Bulletin, no. 4:3329).

_____. y POPOVIC, R. The response to *Peronospora tabacina* of various tobacco varieties from world trap assortment (En serbo-croato). Tutun 22(7/8):215-225. 1972. (193

Resumen también en francés.

On plants transplanted on May 17, the first *P. tabacina* outbreak was observed on June 21 on varieties Bergerac C and Samsun at the 6-17 leaf stage. On plants transplanted later (June 7) the initial infection was observed on July 9th, also on varieties Bergerac C and Samsun at the 8-16 leaf stage, Bergerac C being the most affected. Under the same conditions of transplanting the following varieties showed no signs of infection: Bel 61-10, Chemical Mutant, R x T and GA 955. Besides, TMV infection was observed on a limited number of Bel 61-10, R x T, Chemical Mutant, Samsun and GA 955 plants. (CORESTA Information Bulletin, no. 2:2723).

_____. Application of Antracol for the control of tobacco mildew (*Peronospora tabacina*) (En serbo-croato). Tutun 23(1-12):87-96. 1973. (194

_____. y POPOVIC, R. Reactions of some foreign tobacco varieties to *Peronospora tabacina* (En serbo-croato). Tutun 23(1-12):97-107. 1973. (195

Based on the results obtained with the investigations of 7 foreign tobacco varieties on the experimental field of the Prilep Tobacco Institute during 1972, the following statements can be drawn: the shortest growing period with the early and the late transplanting to budding and flowering was Samsun variety, while the longest one

was Bel 61-10 and Chemical Mutant. Bergerac C was highly susceptible to *Peronospora tabacina*. This variety had abundant fructification of spores on the lower side of leaves. It is characteristic for this variety that the disease, with the late transplanting, appeared as systemic infection on more than 80 per cent of the plants. Infected plants died out after a certain period of time. Samsun variety had its lower leaves damaged, while upper leaves had negligible infection. Chemical Mutant showed the highest degree of resistance followed by Bel 61-10, R x T, GA 955 and Trumph; where only negligible infection was noticed on the lower leaves, while the middle and the upper leaves were not at all infected. During the growing period of Bel 61-10, R x T, GA 955 and Trumph with the late and early transplanting bacteriosis (*Bacterium tabacum*) was registered on the lower leaves. (Tobacco Abstracts 18:2923).

MICKOVSKI, J. Determination of the pathogenic capacity of *Peronospora tabacina* (En serbo-croato). Tutun 25(7-8):273-283. 1975. (196

_____. Preliminary investigation on the degree of resistance in tobacco to *Peronospora tabacina* Adam (En serbo-croato). Zastita Bilja 26(134):315-323. 1975. (197

Of 18 varieties tested, Chemical Mutant, Bel 61-10, GA 955, WA 13 and Trumpf were highly resistant. (Review of Plant Pathology 55: 4849).

* _____., PETCHYARESKI, D. y NAJDOSKI, J. Application of potassium sorbate for tobacco mould control. CORESTA Information Bulletin, no. Especial:99-100. 1978. (198

Like all industrial substances of vegetative origin, tobacco, under certain ecological conditions, is susceptible to mould development that sometimes attains enormous proportions. Potassium sorbate applied at a concentration of 1 per cent protects tobacco from undesirable changes which are easily caused by tobacco mould. This product has shown an inhibitory action against saprophitic pathogens of tobacco. Soluble carbon and protein changes, as a result of the influence of saprophitic pathogens, have been noticed on untreated tobacco. At the end of the moulding process, 85.3 per cent soluble carbon is decomposed but the quantity of protein is increased by about 38.2 per cent. Since the moulds use the organic substances, the content of ash is increased. In the process of moulding however, the contents of nicotine remain constant. In relation to degree of tobacco moulding, tobacco elasticity is decreased about 1-3 per cent. At the end of the moulding process dry matter is decreased as well. The pH value however, increases from 5,44 to 6,41. In untreated tobacco the degree of moulding has been 100 per cent after 8-10 days.

* _____. Resultats obtenus par l'emploi de metalaxyl pour lutter contre le mildiou du tabac. (Sumario). CORESTA Information Bulletin, no. Especial:87. 1980. (199

Documento presentado en: International Tobacco Scientific Congress, 7th, Manila, Philippines, 1980.

Resumen también en francés.

During 1978 and 1979, metalaxyl was tested for the control of the parasite *Peronospora tabacina* Adam on seedlings and on planted tobacco. In tobacco seedbeds, effective protection of seedlings was achieved when metalaxyl was applied at a rate of 4.0 gr per 10 m^2 after sowing

the seed, followed by three foliar treatments of the seedlings, at a concentration of 0.12 per cent at intervals of 15 days. Tobacco plants treated with metalaxyl at rates of 0.08 per cent and 0.12 per cent were more resistant to Wild Fire (*Pseudomonas tabaci*), but were more susceptible to Powdery Mildew (*Erysiphe cichoracearum*) and to Damping Off (*Rhizoctonia solani*). Metalaxyl has been remarkably effective in the control of *Peronospora tabacina*, on planted tobacco when applied in a concentration of 0.12 per cent, at intervals of 14 days. In our conditions, metalaxyl has shown to be effective in combination with Antracol, when applied at intervals of 14 days, and at a rate of 0.12 per cent + 0.1 per cent, metalaxyl 0.12 per cent with Bayleton 0.05 per cent; metalaxyl 0.12 per cent with Rubigan 0.05 per cent; and metalaxyl 0.12 per cent with Dithane M-45 0.25 per cent. Metalaxyl has a positive effect upon the tobacco yield and gross income. Many positive chemical changes occur following the application of metalaxyl to tobacco.

MICKOVSKI, J., DIMESKA, V. y STOJKOV, S. Results obtained by application of Ridomil (Acylon) 25 WP and its combinations for the control of *Peronospora tabacina* Adam (En serbo-croato). Tutun 30(9-10):35-50. 1980. (200

MIKHAILOVA, P. Dynamics of conidia dispersal of *Peronospora tabacina*. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 5(3):217-224. 1972. (201

Resumen también en francés.

Conidia dispersal was recorded by means of spore-traps suggested by Hristov. They were placed at heights of 0.5, 1.0 and 2.0 m in the tobacco plots. The slides, smeared with vaseline, were changed every morning at the same hour and in some experiments replaced also at the end of the working day. Above all, there is a considerable difference in the amount of conidia in the air from year to year. If the conidia dispersal curve is compared with the temperature curve, a certain relationship, even though rather slight, is observed between them. Generally speaking, the peaks of the curve of the spore catch appeared most often after the end of warm periods. The relationship between air r.h. and rainfall on the one hand, and the amount of airborne conidia, on the other, showed that spores were more numerous in days with low air humidity. Rainfall and high air r.h. are favourable for mass spore-formation but unfavourable for spore release and dispersal. In periods of high r.h., outbreaks of the disease are drastic, but of a local nature. In dry periods, which come after damp ones, large amounts of spores are released. Borne by air currents, they may cause widespread infections at great distances from the initial foci. (CORESTA Information Bulletin, no. 1:2421).

_____. The use of spore traps for indicating the first treatment in the control of tobacco mildew (En búlgaro). Rastitelna Zashchita 22(4):25-27. 1974. (202

Mildew /*Peronospora tabacina*/ spores were trapped in several tobacco growing districts in S. Bulgaria at a height of 1-2 m. Observations on spore dispersal to determine spraying times should start from the beginning of April; during the test period the earliest spores were trapped on April 20. (Review of Plant Pathology 54:555).

MIKHAILOVA, P. Method of forecasting downy mildew of tobacco (En búlgaro). Rastitelna Zashchita 24(7):38-41. 1976. (203

Conditions optimum for the disease /*Peronospora tabacina*/ are 10 consecutive days with mean RH at 7 a.m. >90 per cent, temps. 12-18° C, maximum temperature <25° and total rainfall >10 mm. An index of 80 indicates moderate development and 150 an epiphytotic. (Review of Plant Pathology 55:5917).

_____., IVANCHEVA-GABROVSKA, T. y PAMOUKOV, I. Changes in the pathogenicity of *Peronospora tabacina* Adam, under the condition of Bulgaria (En búlgaro). Rasteniev''dni Nauki 14(2): 123-132. 1977. (204

Resumen también en francés.

Blue mould attack in the north-eastern tobacco growing region in Bulgaria (CES-Czar Kroum) was observed for the first time in September 1970 on plants of the tobacco cultivars Bel 61-10, S 394-5 and Hicks Resistant. Following studies under greenhouse conditions pointed to a new more virulent strain whose pathogenicity was similar to that of strains reported from other European countries. The response of tobacco species and cultivars was experimented both in cotyledon phase and on plants in the field. Plants for cotyledon test were raised in a sterilized soil under greenhouse conditions. Infections were detected on AA 323, Bel 61-12, E1, F 94, GA 955, Hicks Resistant, S 392-3, S 394-5, *N. debneyii*, *N. exigua*, *N. goodspeedii*, *N. megalosiphon*, *N. rosulata* and *N. velutina*. High-resistant *Nicotiana* spp. react mainly by cotyledon deformation which is overcome later on. Single conidiospores or a slight fur were observed on attacked cotyledons in resistant tobacco lines and cultivars. Spots occurred in open field in Hicks Resistant, S-394-5, Bel 61-10 and F 94. The first two cultivars were more strongly affected in both years on record, 1970 and 1972 and in two remote localities. The new strain was discovered in 1971 in other country's regions. Differences of percentage and velocity of germination in conidia between the more virulent strain and the strain from the previous population of the fungus could not be ascertained. (CORESTA Information Bulletin, no. 2:7512).

* _____. Modelling of blue mould epidemics. (Sumario). CORESTA Information Bulletin, no. Especial:90. 1978. (205

Documento presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

Resumen también en francés.

Some models of blue mould development in Bulgaria from the appearance of the disease are given, using van der Plank's equation. The analysed period comprises various levels of blue mould attacks, from epidemics to depression. It is found that the infection rate (r) differs according to the cultivar and by means of that criterion the plant reaction to the fungus can be estimated. The infection rate is different for each season or month. The blue mould development model and the corresponding infection rate are obtained by means of the equation $y = f(x)$ and its first derivative $y' = f(x)$. The modelling could be used for blue mould forecasting.

MILDIOU EN Sarladais. Voix Cultures 26(231):5-10. 1973. (206

Resumen también en francés.

A report on conditions in a tobacco growing district in south-west France which suffered severely from blue mould in 1973 (estimated losses 20-30%). The various causes of this widespread outbreak are reviewed: weather conditions favorable to *Peronospora* in early summer; insufficient treatments by some growers both at the seedbed stage and in the field; in certain cases, too late harvesting despite the advice given by the commission of experts and agronomic staff. (CORESTA Information Bulletin, no. 4:3344).

MILHOLLAND, R. D., LUCAS, G. B. y DAYKIN, M. Histological examination of *Peronospora tabacina* in flue-cured tobacco. Tobacco International 183(23):52-53. 1981. (207

Large intercellular hyphae were observed in the leaf lamina with numerous slender, nonbranched haustoria within the parenchyma and epidermal cells of field grown flue-cured tobacco plants (Speight G-70) systemically infected with *Peronospora tabacina*. The phloem, cambium, and xylem parenchyma cells were severly affected by the blue mold fungus as it progressed through the vascular tissue of the leaf vein and petiole. Hyperplasia and hypertrophy of the cambium and xylem parenchyma were associated with necrotic areas in the vascular tissue of the stem resulting in underdeveloped xylem. (Tobacco Abstracts 26:426).

* _____., PAPADOPOULOU, J. y DAYKIN, M. Histopathology of *Peronospora tabacina* in systemically infected burley tobacco. Phytopathology 71(1):73-76. 1981. (208

Field-grown burley tobacco plants (KY-14) systemically infected with *Peronospora tabacina* were examined histologically. The fungus was confined primarily to the vascular tissue in the stem, but caused severe necrosis of all tissues in diseased roots. The fungus progressed through the tissues intercellularly causing the host cell walls to collapse and eventually become necrotic. Intracellular hyphae were observed in xylem vessels and parenchyma cells. Single and branched haustoria also were observed. The fungus caused vascular plugging, hyperplasia of cambium and phloem, xylem disintegration, and the formation of vascular cavities. Infected stem and leaf tissues both contained mature oospores.

MODIFIED BOOM for better anti-blue mold treatment (En francés). Voix Culture 29(337):18. 1975. (209

The modification consists in placing alongside a conventional low pressure (10 bars) boom a plasticized cloth ventilation sheath supplied by a 80 m^3/h fan and fitted with special ducts corresponding to the nozzles of the boom. This device makes it possible to obtain an improved distribution of the fungicide: 75 per cent on the upper surface of the tobacco leaves and 25 per cent on the lower face. (Tobacco Abstracts 20:1286).

* MOGER, J. y KANDRA, G. Degats causes par le mildiou en hongrie pendant les deux dernieres Decennes. (Sumario). CORESTA Information Bulletin, no. Especial:86. 1980. (210

Documento presentado en: International Tobacco Scientific Congress, 7th, Manila, Philippines, 1980.

Resumen también en francés.

The object of this study was to assess the extent and control of blue mold disease and to develop a method for predicting the timing and nature of control measures to be applied. Blue mold first occurred in Hungary in 1960 and since then control has been regulated and well organized. During the last 19 years the Hungarian Tobacco Industry has refunded expenses for control each year. The amount has corresponded to the state purchase of 7,000 tonnes of cured tobacco, calculated at recent prices. The relationship between climatic factors and blue mold infection has been examined and a prediction method was derived. An "infection danger index" suitably predicts the dangerous period and evaluates the extent of the damage to be expected. This method represents a new technique for predicting the frequency and extent of blue mold damage. Experimental data from the last two decades and long-term meteorological data shows that there were three years in a ten-year period when blue mold damge was considerably more than average.

NADAZDIN, M. Phenomenon of conidial proliferation in *Peronospora tabacina* Adam (En serbo-croato). Zastita Bilja 22(112-113):61-64. 1971. (211

The apparent proliferation of conidia of *Peronospora tabacina* and anomalies in the development of conidiophores are described. Anomalies in the conidiophores were observed with respect to their size, mode of branching and position of sterigmata. Conidia were changed in relation to their size and shape. This observation relates to naturally infected plants and the development of the pathogen in the host plants under normal conditions. (Tobacco Abstracts 16:726).

_____. Comparative study on the control efficiency of several organic fungicides against blue-mold (En yugoslavo). Duvanski Inst. Symp., Mostar, 1973. pp. 215-221. (212

Resumen también en francés.

On the basis of a three year comparative investigation, it can be concluded as follows: Dithane M-45 used in 0.3 per cent concentration gave the best results; Zineb used in 0.3 and 0.4 per cent concentrations, had satisfactory efficiency; Dithane M-22 in 0.2 and 0.25 per cent concentrations was not effective against blue-mold. The investigated fungicides did not show any phytotoxicity on transplanted tobacco plants. Fungicides applied as dusts (Zineb P-8, Dithane P-5) were more effective than those applied as sprays. No significant effect was discovered on chemical composition and smoking characteristics of treated tobacco. (CORESTA Information Bulletin, no. 1:3567).

_____. Reaction of some Herzegovinian and foreign tobacco varieties to blue mould (P.t.A.) during 1969-1973 (En serbo-croato). Tutun 25(9/10):313-330. 1975. (213

On the basis of five years' observations it is concluded that the foreign varieties Bell 61-10, Florida 513, Chemical Mutant, Romana 1-13, R x TW13 and Trumpf are resistant to *Peronospora hyoscyami*. GA 955, though showing mild symptoms in 1971, was otherwise highly resistant. Of the Herzegovinian varieties tested, Veliki Hercegovac was resistant, and Seginovac had some resistance. (Plant Breeding Abstracts 48:601).

NADAZDIN, M. Appearance of the higher pathogenicity of *Peronospora tabacina* Adam on tobacco test sortiment in Herzegovina during 1975 (En serbo-croato). Zastita Bilja 27(136):127-132. 1976. (214

During the growing period of 1975, the higher pathogenicity of the fungus *Peronospora tabacina* was observed on tobacco in the field. The strongest attack was evident on the previously resistant foreign varieties: Bel 61-10, GA 955 and Wa 13, while Chemical Mutant and R x T were resistant. Samsun and Bergerac C demonstrated the standard reaction, the higher degree of pathogenicity was not recorded on the domestic varieties Velike Hercegovac and Ravnjak, nor on the other varieties cultivated in the region of tobacco production. (Tobacco Abstracts 21:1949).

NAGY, G. Data on the virulence of *Peronospora tabacina* Adam (En húngaro). Dohanyipar 22(4): 148-150. 1975. (215

Includes data on the following varieites: Bel 61-10, Bergerac C, Chemical Mutant, R x T, Samsun, GA 955, WA-13, Trumpf and Szabolcsi. (Tobacco Abstracts 19:2999).

_____. Experiences in forecasting blue-mold (En húngaro). Dohanyipar 23(4):126-129. 1976. (216

* _____. Experimental data concerning the forecasting of blue mold outbreaks on tobacco. CORESTA Information Bulletin, no. 3-4:57-64. 1976. (217

También en francés.

NESMITH, B. Recognizing tobacco diseases in the field. Tobacco Yearbook 1981:34-35. 1981. (218

Includes identification and control methods for black shank, black root rot and blue mold diseases. (Tobacco Abstracts 25:2122).

NESMITH W. C. Strategy for using metalaxyl in controlling blue mold of burley tobacco. Phytopathology 71(8):897. 1981. (219

Broadcast (0.56, 1.12 and 2.24 kg/ha), transplant water (0.28 kg/ha) and single and multiple foliar sprays (0.28, 0.56 and 1.12 kg/ha) were compared. One set of foliar sprays began July 5 when blue mold first appeared in Kentucky, while a second was initiated August 5 when blue mold first appeared in the site. Transplant water and single foliar applications of less than 0.56 kg/ha did not provide acceptable control. Blue mold appeared in plots treated with transplant water, 0.56 kg/ha broadcast and foliar applications at the same time it appeared in controls. Acceptable control was obtained by the broadcast treatment (1.12 or 2.24 kg/ha) and multiple foliar applications. Blue mold was active in all plots within 10 days of harvest, regardless of the rate or method of application. This observation indicates conditions may be conducive for selecting Ridomil tolerant strains of the pathogen late in the season unless additional precautions are taken. (CORESTA Information Bulletin, no. 2-3:3340).

A NEW TREATMENT for blue-mould: the use of an endotherapeutic fungicide "Acylon-Tabac" (En francés). Voix Cultures 32(375):4. 1978. (220

Resumen también en francés.

A new fungicide, also known as Ridomil, appears to have a direct action not only on the pathogen but also on plant cells which can no longer harbour the fungus. In seedbeds, applications to the soil carry a risk of being phytotoxic, so it is advisable to spray the above-ground parts of seedlings every fortnight at a concentration of 40 g a.i./hl stage, with 40 g a.i./hl and 1 1/10 m^2. In the field the cost of soil treatment with the product would be prohibitive at effective doses (2 g a.i./ m^2) and spraying plants every fortnight at a concentration of 40 g a.i./ hl is also recommended. This product is said to be very effective against *Peronospora tabacina*, and is not very likely to be leached by rain. It is easy to use with simple equipment. However, its very high specificity to tobacco may throw off balance the microflora on the surface of the plant, and it may also make plants more susceptible to attackes by powdery mildew and anthracnose. (CORESTA Information Bulletin, no. 1:155).

NICARAGUA: BLUE mold outbreak. Tobacco Reporter 107(6):14, 16. 1980. (221

An outbreak of blue mold in tobacco crops has been reported in Nicaragua. A blue mold outbreak has also been reported in Honduras. In Nicaragua, a serious outbreak of blue mold is reported in burley and cigar types in the Jalapa Valley, affecting some 1,000 acres. (Tobacco Abstracts 24: 2162).

NORTH QUEENSLAND TOBACCO EXTENSION AND ADVISORY COMMITTEE. End of season thoughts. Australian Tobacco Journal 14:4-5. 1973. (222

Crop residue disposition, *Peronospora tabacina* control and crop rotation. (Tobacco Abstracts 19:3246).

NOVAK, J. y NOVAKOVA, J. The influence of *Peronospora tabacina* Adam upon the growth rhythm of *Nicotiana tabacum* cv. Samsun (En alemán). Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene Ii Naturwiss Abt. 133(5):444-450. 1978. (223

The cinematrographic method was used for studying the changes of the growth rhythm of the leaves in *Nicotiana tabacum* cv. Samsun after the inoculation with *Peronospora tabacina*. The leaves were screened only at the maturing phase when displaying characteristic disturbances of the growth rhythm. The leaves of a healthy plant show a regular growth rhythm, with regular amplitudes of growth spirals and growth rate. The growth spiral increments are elongated regularly and evenly up to the mature stage of the leaf. In *Nicotiana tabacum* cv. Samsun the original regular growth rhythm was kept for 130 hours after the infection with the conidia of *Peronospora tabacina*. When the first symptoms of the disease appeared on an inoculated leaf (approximately after 20 hrs), fructification of the mold occurred, the growth rhythm was retarded and, after the necrotization of spots, the leaf died away. (Tobacco Abstracts 23:674).

* O'BRIEN, R. G. Tobacco blue mould (*Peronospora tabacina* Adam) in North Queensland. IV. Fungicide time and method of application experiments. Queensland Journal of Agricultural and Animal Sciences 27(1):137-146. 1970. (224

Similar standards of blue mould control were achieved when bisdithiocarbamate fungicides were applied as mists (8 gal/ac), as medium-volume sprays (90 gal/ac) or as high volume sprays (180 gal/ac). The protection afforded by fungicidal dusts was inadequate during weather conducive to the disease. Various criteria were used as guides for the timing of fungicide applications. None of these was as effective as the standard weekly treatment. Chemical analyses and quality appraisals of cured leaf from these trials failed to detect any consistent differences due to fungicide application.

_____. Changes in pathogenicity of *Peronospora hyoscyami* in North Queensland. (Sumario). Australian Plant Pathology Society Newsletter 2(1):2. 1973. (225

Resumen también en francés.

Profusely sporulating circular lesions of blue mould (*P. hyoscyami* (*P. tabacina*)) appeared on the previously resistant tobacco cvs. Sirone and CSIRO 40T in July. In September, some crops of these cultivars were destroyed by blue mold with no evidence of any remaining tolerance. It is suggested that between these dates the pathogen overcame all resistance in these cultivars. (CORESTA Information Bulletin, no. 3-4:5378).

* _____. Tobacco diseases and their control. Queensland Agricultural Journal 101(1):51-57; 101(2):205-215. 1975. (226

Peronospora hyoscyami: pp. 51-55..

Resumen también en francés.

Various foliage diseases of tobacco in Australia, viz. blue mould (*Peronospora hyoscyami*), frog-eye leaf spot (*Cercospora nicotianae*), brown spot (*Alternaria alternata*) and Ascochyta leaf spot (*Ascochyta arida*) as well as their symptoms, the sources of infection, the spread in the field, the use of resistant varieties and methods of control are discussed. (CORESTA Information Bulletin, no. 3-4: 5379).

* _____. Systemic chemicals for tobacco blue mold control. Plant Disease Reporter 62(3): 277-279. 1978. (227

The experimental chemical methyl N-(2,6-dimethyl-phenyl-N-furoyl-(2)-alaninate (CGA-38140) showed a high level of forward (apoplastic) systemic activity against blue mold of tobacco, caused by *Peronospora tabaci*. Weekly applications of foliar sprays containing 0.075 g a.i./liter controlled the disease in seedbed and field trials. A single drench (0.5 g a.i./m^2) at germination effectively prevented the establishment of the disease in seedbeds for a period of 6 weeks. A second fungicide,2 cyano-N-(ethylaminocarbonyl)-2-(methoxyimino) acetamide (DPX-3217), was comparatively ineffective in the seedbed trial.

OCZOS, A. Influence of nitrogen nutrition on the course of vegetation, yield quantity and the degree of susceptibility of tobacco plants belonging to two varieties (resistant and susceptible) to *Peronospora tabacina* Adam (En polaco). Pamietnik Pulawski 49:149-167. 1971. (228

Two varieties of *Nicotiana tabacum* were used: Zlotolistny IHAR, susceptible to *Peronospora tabacina*; and the genetically resistant Bel 61-10. Results indicate that nitrogen nutrition has a considerable influence on tobacco susceptibility to *Peronospora tabacina* and that the form in which this element is introduced into the nutritious medium plays here a significant part. Plants nourished with nitrates were considerably less susceptible to infection by this pathogen than those nourished with ammonium. Ammonium salts drastically lowered the resistance of plants, including those of the genetically resistant variety to a lesser extent. Urea proved to be a somewhat better source of nitrogen than ammonium, from the viewpoint of resistance to *Peronospora*. However, the method of application had an additional effect: introducing urea through the roots resulted in a much lower degree of infection compared to the method of introduction through the leaves. Plants fertilized by nitrates simultaneously showed the most rapid growth rate and gave the highest yield of vegetative matter. Similarly, urea had a favorable effect on the production of vegetative matter of both tobacco varieties. (Tobacco Abstracts 16:1516).

_____. Investigations on the importance of nitrogen metabolism in the resistance of tobacco to *Peronospora tabacina* Adam (En polaco). Pamietnik Pulawski 43:99-125. 1971. (229

Greenhouse experiments concerning the dependence of the degree of tobacco resistance to *Peronospora tabacina* on the conditions of nitrogen nutrition and the transformations of that component were carried out over the years 1967-1968. Two tobacco varieties, the resistant to *Peronospora tabacina*, Bel 61-10 and the susceptible one Zlotolistny IHAR constituted the object of the investigations. The investigations gave evidence of different reactions of the resistant and the susceptible varieties to the nitrogen nutrition. In the genetically resistant plants the nitrogen transformations were much faster. These plants were characterized, as a rule, by a higher content of total and protein nitrogen while in the fraction of free amino acids there were greater amounts of arginine, lysine, methionine and proline. Plants of the greater susceptibility to *Peronospora tabacina* showed a relatively low content of proper protein with a simultaneous accumulation of nitrogen in non proteinic form as well as of acid amino acids and monosacharides. Moreover, it was found that nitrogen fertilizing is one of the important factors deciding about the degree of susceptibility of tobacco to the mentioned disease. From among the investigated nitrogen compounds the nitrates had the most favorable effect from the view-point of tobacco resistance to *Peronospora tabacina*. The course of metabolic processes in these plants was also regular as it was confirmed by the analyses of plant material. The content of the soluble nitrogen fraction was in these plants distinctly lower than in those fertilized by ammonium salts and urea, on the other hand, the content of proper protein was higher. (Tobacco Abstracts 15:2633).

_____. Respiration and oxidation-reduction potential in tobacco varieties resistant and susceptible to *Peronospora tabacina* Adam (En polaco). Pamietnik Pulawski 56:115-132. 1973. (230

During the development of seedlings of 7 susceptible and 4 resistant varieties of tobacco and of the resistant species *Nicotiana debneyi* and

N. exigua the peak of oxygen intake occurred later in the resistant forms. In response to infection the resistant forms passed through a short period of increased respiratory activity, then returned to normal, while in infected seedlings of susceptible varieties respiration fell to c. 50 per cent of normal and remained at that level. (Review of Plant Pathology 54:554).

ORAMAS, A. Ante un nuevo ataque del moho azul. Cuba Tabaco 2(33):12-19. 1980. (231

Information is given on: (a) the nature of and damage caused by the blue mould fungus, *Peronospora tabacina*, on tobacco; (b) the history of its spread, and (c) the methods used on a large tobacco enterprise in Cuba to fight the disease. Hygiene in the nursery, keeping the plants in vigorous condition, inter alia, by irrigation, and timely control by fungicides are essential. It will take a long time to develop resistant varieties resembling, in aroma and taste, the presently cultivated ones Carojo, Criollo and Pelo de Oro. A new fungicide (name not given) is very promising. (Abstracts on Tropical Agriculture 7:35515).

OSORIO, J. A. Some non-existent diseases in Venezuela of plant quarantine importance (En español). Caracas, Dirección de Sanidad Vegetal, 1978. 83 p. (232

Includes tobacco as host of *Pseudomonas angulata*, *Colletotrichum tabacum*, *Peronospora tabacina*, *Pythium deliense*, *Thielaviopsis basicola*, Witches' broom virus and geographical distribution. (Tobacco Abstracts 22:2609).

OZBAS, H. Breeding of blue mould resistant tobacco in Turkey. *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. pp. 162-163. (233

The Institute of Agricultural Research in Yesilkoy drew up a detailed breeding project and began the experiments in 1962. In order to reach the goal, the methods of selection, combination and mutation were used simultaneously. It was realized, as the research proceeded, that the foreseen aim could be achieved faster and in a more definite manner through the application of the combination method. The combination method was found suitable: first pedigree, then backcrossing and selfing, and afterward selection were applied. In the BC_1S_2 and BC_1S_3 generations 14 pure lines were obtained, resistant to blue mold and morphologically identical to their respective susceptible parent. These pure lines were tested comparatively with their susceptible parents in their original areas, for yield and quality. Statistical analysis of the yield of each plot showe that resistant varieties gave a higher yield than their susceptible parents. The quality assessments and smoking tests conducted by an authoritative commission proved that resistant varieties have a more attractive, bright color, are more flexible, and have a higher quality. Smoking tests pointed to an increase in quality, the resistant varieties being stronger, more satisfying, milder, sweeter, and having a more definite aroma. No rawness was observed and mature smoking quality was established. It was also noted that they were chemically adaptable to their respective regions. It should be kept in mind, here, that the susceptible varieties have a distinct rawness. During 1969 seed crops of the 14 resistant varieties were developed. Due to the initial shortage of elite seeds, the production did not exceed one ton of original seed, which was totally distributed to growers. (Tobacco Abstracts 16:2287).

OZBAS, O. Studies on blue mould of tobacco (*Peronospora tabacina* Adam) which have been carried out from 1962 to 1967. Turk. Tarim. Bakanligi. Zirai Mucadele Arastirma Yilligi 4:222-223. 1970. (234

_____. *et al.* Research on possibilities of controlling tobacco mildew (*Peronospora tabacina* Adam) (En turco). Bitki Koruma Bulteni 14(4):249-272. 1974. (235

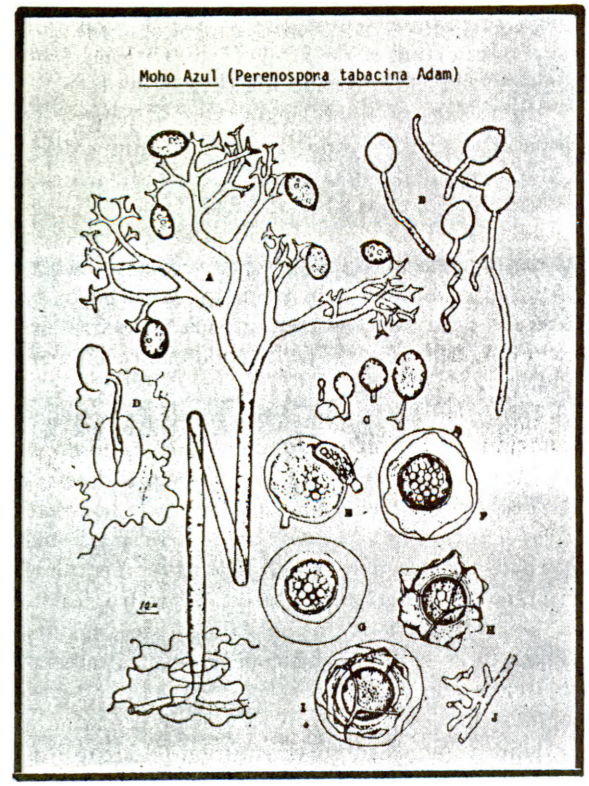
Incidence was high on the pure Turkish lines tested at the cotyledon and seedling stages, but very low on resistant breeding lines. (Review of Plant Pathology 54:5077).

* PADDICK, R. G. Comparison of spray warning systems used in the control of blue mould (*Peronospora tabacina*) of tobacco in Victoria. Australian Journal of Experimental Agriculture and Animal Husbandry 10(45):506-510. 1970. (236

Reports the results of experiments designed to compare the efficacy of spray-warning systems as indicators for fungicide application for the control of blue mold. Possible interaction between dithiocarbamate preparations and spray-warning systems was investigated in preliminary experiments and results are given. These experiments were conducted at the Tobacco Research Station, Myrtleford, in all seasons from 1961 to 1967. (Tobacco Abstracts 15:77).

* PADILLA, N. El moho azul. Agro (Rep. Dominicana) 8(81):7-8, 36. 1980. (237

El autor indica la aparición de la enfermedad en los Estados Unidos, al Norte de Florida, su distribución posterior en el país, así como su diseminación en el Caribe. Da la descripción del hongo, explica las condiciones favorables para su desarrollo e indica el tratamiento para su control.



A. El hongo en forma de arbusto.
B. Esporangio germinado.
C. Diferentes estados de desarrollo de "esporangia" en las puntas de las ramas.
D. Tubo de germinación del esporangio.
E. F. G. H. e I. Estados de formación de espóras.
J. Retículo del hongo enseñando forma en que se alimenta de las células de la hoja del tabaco.

PALAKARCHEVA, M. y BAILOV, D. Results from hybridization between the species *Nicotiana tabacum* and *N. debneyi*. Nauch. Sess. Inst. Genet. Selek. Rast., 1971. pp. 59-70. (238

As a result of ten years of breeding work, lines of an Oriental type, which are highly productive, possess a high quality and are blue mold-resistant, were obtained for the first time in this country. They are of significance for tobacco production. Three of these lines, differentiated already as varieties, have been submitted to the State Plant Certification Commission for approbation. (Tobacco Abstracts 18:1035).

_____. Results of studies on blue molds and powdery mildew resistance of interspecific *Nicotiana goodspeedii* x *N. tabacum* hybrids. Nauch. Sess. Inst. Genet. Selek. Rast., 1971. pp. 71-79. (239

Tobacco lines of an Oriental type were obtained from the hybridization between the species *N. goodspeedii* and *N. tabacum*. They possessed a cytoplasmatic male sterility. Some of the lines were immune to powdery mildew and highly-resistant to blue mold. (Tobacco Abstracts 18:1036).

_____. Disease-resistant hybrids and varieties of tobacco obtained from interspecific hybridization (En búlgaro). Rasteniev''dni Nauki 13(9):35-42. 1976. (240

Amphidiploids from crosses between *Nicotiana goodspeedii* and Oriental tobacco varieties were immune from mildew, wildfire and tobacco mosaic virus and highly resistant to blue mould. They are valuable in breeding new tobacco forms and varieties with complex resistance to diseases. Crosses between the amphidiploids and tobacco varieties gave promising lines of large-and small-leaved tobacco resistant to blue mould, mildew and wildfire. Several varieties developed from crosses between tobacco and *N. debneyi* were resistant to blue mould and mildew. (Review of Plant Pathology 56:3705).

PAMUKOV, I. y DRAGIEV, D. Stem form of tobacco blue mold (En búlgaro). Rastitelna Zashchita 18(11):14-19. 1970. (241

Resumen también en francés.

Heavy rain in July and August caused outbreaks on stalks. Blue mould caused tobacco stalks to soften, lodge and often break. The more susceptible the varieties are to blue mould outbreaks on leaves the more they will be on the stalk. Broadleaf varieties are generally more susceptible to blue mould attacks on stalks than varieties with smaller leaves. Blue mould resistant varieties 'Resistant Hicks', Bahespho and S-394-V and their hybrids will be resistant to outbreaks on stalks. (CORESTA Information Bulletin, no. 2:1768).

_____. Successful control of downy mildew (En búlgaro). Bulgarski Tiutiun 21(6):18-20. 1976. (242

PASHCHENKO, I. N. y DEMCHENKO, N. A. Breeding tobacco for *Peronospora* resistance (En ruso). Tabak, no. 3:45-47. 1973. (243

Resumen también en francés.

Trials conducted at the Ukraine experimental station to establish the relation between the degree of *Peronospora* resistance and the age of

the plant, demonstrated that older plants were less susceptible than relatively young plants. At the 'small cross', 'ears' and 8-10 leaf stages the 3 varieties tested had a constant response to infection according to their susceptibility. It should be noted that, at the 12-leaf stage, the very resistant hybrid Prilukski 10 was totally unaffected despite the 2 inoculations of *Peronospora* it had received. (CORESTA Information Bulletin, no. 4:3334).

PASHCHENKO, I. N. Activity of oxidative enzymes as an indicator of tobacco resistance to blue mold (En ruso). Mikologiya i Fitopatologiya 9(1):66-68. 1975. (244

Penetration of the pathogen /*Peronospora tabacina*/ into tobacco cells causes substantial changes in enzyme activities. Peroxidase sharply increased (almost 2.1-2.5 times) in severe infections. Polyphenoloxidase initially increased by 42 per cent and then at the end of the process sharply decreased. Resistance to tobacco should be assessed on the basis of these activities. (Review of Plant Pathology 54:5076).

_____. New virulent races of *Peronospora* in tobacco (En ruso). Sel'skokhozyaĭstvennaya Biologiya 10(1):140-142. 1975. (245

In a study of four resistant and three susceptible varieties, high resistance was shown by GA 955, Florida 513 and Gibrid 10, but the previously resistant Bel 61-10 was infected. A study of the racial composition of the pathogen revealed a new race, PT2, which differed from the existing PT1 in length of incubation period, rate of sporulation, and virulence. (Plant Breeding Abstracts 45:6600).

_____. Tobacco diseases and parasites in Ukraine. Methods of control (En ruso). Tabak 1:45-48. 1975. (246

The tobacco diseases most often met with in Ukraine are reviewed: *Phytophthora parasitica, Thielaviopsis basicola, Peronospora tabacina,* white streak "bronzing", as well as the main tobacco parasites. The chemical and agricultural measures taken to control these pests are described. (CORESTA Information Bulletin, no. 3-4:5381).

_____. Aggressive race of the pathogen of blue mould of tobacco (En ruso). Zashchita Rastenii, no. 2:54. 1976. (247

In field and glasshouse trials of 100 varieties and hybrids (Russian and foreign) and of 17 wild sources several were highly resistant to the aggressive race 2 of blue mould. Among prophylactic measures used, zineb and polycarbacin showed good results. (Review of Plant Pathology 55:3286).

_____. Initial breeding material resistant to widespread disease and pests (En ruso). Tabak, no. 1:54-56. 1977. (248

In trials during 1967-75 all cultivated tobacco varieties and hybrids were highly susceptible to blue mould /*Peronospora tabacina*/. Those resistant to white variegation and tomato spotted wilt were selected for breeding. None of them was resistant to a complex of these three diseases. (Review of Plant Pathology 57:4124).

PASHCHENKO, I. N. The role of phenols in the resistance of tobacco to blue mold (En ruso). Mikologiya i Fitopatologiya 12(4):343-346. 1978. (249

Extracts from resistant varieties infected by *Peronospora tabacina* were more inhibitory to spore germination than those from infected susceptible varieties. Extracts from healthy tissues of both resistant and susceptible varieties had no effect. Polyphenol oxidase activity in nectrotic tissues of resistant varieties increased by 2.2 times and the number of phenol substances increased by 42 per cent. In susceptible varieties, infection had hardly any effect on polyphenol oxidase activity. (Review of Plant Pathology 58:1390).

* PEYROT, J. General survey on tobacco blue-mould epidemic in 1972. CORESTA Information Bulletin, no. 1:5-9. 1973. (250

También en francés.

The year was characterized by the epidemic which was widely spread over four contiguous countries of Central Europe. The occurrence of virulent strains was ascertained. Chemical treatments generally insured a good protection but were in-effective in case of massive outbreaks of the pathogen; in this case losses can locally amount up to 80 per cent of the crop. The systemic disease can occur on susceptible varieties as well as on resistant ones; it is mainly due to the evolution of weather conditions during the period which follows a heavy infestation of the plants. When tobacco crops were severely menaced by the disease, growers multiplied fungicide treatments and sometimes applied up to 20 field treatments during the season, which is a real concern from the point of view of pesticide residues. (Tobacco Abstracts 17:1853).

PLANT DISEASE. Focus. Plant Diseases 65(1):10. 1981. (251

Tobacco blue mold (*Peronospora tabacina*) in major production areas in North America during 1980 was reported. The disease was found in Cuba and Jamaica in January; Haiti and Honduras in February; Nicaragua in March; Florida and South Carolina in April; North Carolina and Virginia in May; Maryland and Tennessee in June; Kentucky, Pennsylvania, Connecticut, Massachusetts, Indiana, and Ohio in July; and Canada in August. Prevailing winds favored movement of the pathogen as the epidemic spread northward. Tobacco ringspot virus and tobacco mosaic virus have been detected in both green and white ash in New York; neither virus has been reported previously on green ash. The viruses were detected with the latex particle agglutination technique. Tobacco Abstracts 25:1025).

POPIVANOV, I. The degree of infection of Oriental tobacco by blue mold (En húngaro). Bulgarski Tiutiun 22(6):33-39. 1977. (252

Assessment of 40 varieties and 30 selected lines and hybrids of tobacco grown in the Sandanski district was made under severe infection by blue mould in 1976. Petrich 84, Struma 75, Rila 544 and 8 lines and hybrids were among the most resistant. (Review of Plant Pathology 58:880).

_____. A study on the extent of blue mould infection on oriental varieties of tobacco and the injuries caused in the complex experimental station in Sandanski (En búlgaro). Rasteniev''dni Nauki 14(6):112-119. 1977. (253

Resumen también en francés.

Air temperatures ranging between 16 to 18°C, continuous cloudiness and rainfalls, and presence of a compact infectious pressure of conidiospores, all contributed in 1976 from mid-May to mid-June to the creation of conditions favouring the development of blue mould (*Peronospora tabacina* Adam) in its three forms: leaf, stem and top. All aboriginal varieties and lines of Oriental type were affected to a very great extent amd the caused injuries reached 50 to 70 per cent of the expected crop. Only tobaccos in the development of which resistant varieties and lines had been incorporated displayed a high field resistance. Their yield was normal in size and quality. (CORESTA Information Bulletin, no. 4:8189).

POPOVIC, R. Blue mould resistance in broad leaf tobacco varieties in 1969 (En serbo-croato). Tutun 21(1/2):3-7. 1971. (254

Resumen también en francés.

The results of trials were as follows: blue mould resistant: Burley B 2 and Florida 513; susceptible: Stolac 17 and Virginia Golden cure; very susceptible: Burley 21 and Zlatolisty. TMV resistance: Burley 21 (16% diseases plants) and V. Golden cure (10%) were susceptible; Florida 513 (5%) and Burley B2 (2%) were slightly susceptible. (CORESTA Information Bulletin, no. 1:1487).

___ ____. y BOGDANCESKI, M. Creation of large leaf tobacco varieties resistant to blue mold (*Peronospora tabacina*) (En serbo-croato). Tutun 21(5-6):147-163. 1971. (255

_____. y BOGDANCESKI, M. An investigation of the resistance to *Peronospora* of the F_2 generation of crosses between large-leaved tobacco varieties (En serbo-croato). Tutun 22(3/4): 87-103. 1972. (256

Results are presented of a comparison of morphological and physiological characteristics and of resistance to *Peronospora tabacina* in several large-leaved varieties and the F_2 of various crosses made among them. (Plant Breeding Abstracts 44:7946).

* QUEENSLAND. DEPARTMENT OF PRIMARY INDUSTRIES. Annual Report, 1972-1973. Brisbane, Australia, 1973. 63 p. (257

Incluye *Peronosorpora hyoscyami*.

Components of the population of blue mould (*Peronospora hyoscyami*) on tobacco have evidently changed in North Queensland; races virulent on 2 formerly resistant varieties were detected in two areas. (Review of Plant Pathology 54:653).

RACOVITZA, A. The effect of pesticides on the morphology and virulence of *Peronospora tabacina*. Industr. Aliment. 22(8):461-463. 1971. (258

Blue mold susceptible tobacco plants Molovata 72 grown in the greenhouse were treated with the herbicide 2,4-D, or with the insecticides Nuvan 100 EC (Dichlorvos, fumigation 10 g/m^3), Solvirex 5% (granular disulfoton 40 kg/ha), Anthio 40% (formothion, spraying 2%), Tinox EC 25% (demeton-dimethyl spraying 1%) or Ultracide 40% (medathion, spraying 1%), then inoculated with *Peronospora tabacina* at various dates after

these treatments. At the concentration non-toxic to tobacco (0.1 x 10^{-4}), 2,4-D was not phytotoxic to *Peronospora* conidiophores and conidia. The insecticides, and notably the systemic types, induced modifications in the morphology of the conidial germ tubes; the phytotoxic effect of pesticide residues persisted for about 10 days. The percentage of spore germination was temporarily reduced by certain treatments (Nuvan 100 EC), but the virulence of the inoculum was not abolished. However, if it is desired to inoculate tobacco plants with *Peronospora* it is preferable not to treat them with an insecticide within 10 days of inoculation. (CORESTA Information Bulletin, no. 1:1488).

RADOMYSHENSKII, V. L. The restoration of cigar tobacco growing under tents (En ruso). Tabak, no. 4:40-44. 1977. (259

The use of crossbred hybrids of cigar tobacco, resistant to blue mould /*Peronospora tabacina*/ is recommended for cultivation under tents in the Abkhaz ASSR, Georgia. (Review of Plant Pathology 58: 4008).

RAMSON, A. y EGERER, A. The occurrence of a new race of the pathogen of blue mold of tobacco (*Peronospora tabacina* Adam) in the German Democratic Republic (En alemán). Nachrichtenblatt fur den Pflanzenschutzforschung in der DDR 27(5):112-115. 1973. (260

A report on the occurrence in 1972 of an aggressive form of the fungus, causing various degrees of infection on all varieties, including those previously resistant, and breeding lines. Comprehensive sanitary and chemical methods of control are described. (Review of Plant Pathology 53:1546).

* RAY, P. General report on the 1973 tobacco blue mould epidemic. CORESTA Information Bulletin, no. 3:11-17. 1973. (261

También en francés.

Data on the first outbreaks of blue mold in various countries of Europe and the Middle East are given.

_____. Cumulative report of blue mold epidemic in 1973 (En alemán). Deutsch Tabakbau 54(7): 49-51. 1974. (262

The first outbreak of *Peronospora tabacina* in 21 countries was studied with regard to climate and variety selection. (Tobacco Abstracts 18: 1526).

* _____. General report on the 1974 tobacco blue mould epidemic. CORESTA Information Bulletin, no. 3-4:19-25. 1974. (263

También en francés.

Includes dates of the first blue mould outbreaks (in the seedbed and field) in the various countries collaborating with the blue mould warning service.

_____. Blue mold 1975. General report on epidemiology (En alemán). Deutsch Tabakbau 55(24):256-258, 263-264. 1975. (264

* RAY, P. General report on the 1975 tobacco blue mold epidemic. CORESTA Information Bulletin, no. 3-4:3-11. 1975. (265

También en francés.

Includes dates of the first blue mold outbreaks (in the seedbed and the field) in the various countries collaborating with the blue mold warning service.

* _____. General report on the 1976 tobacco blue mold epidemic. CORESTA Information Bulletin, no. 3-4:43-52. 1976. (266

También en francés.

Includes dates of the first outbreaks of blue mold (in seedbed and the field) in the various countries participating in the warning service.

_____. Appearance of *Peronospora tabacina* in 1976 (En alemán). Deutsch Tabakbau 57(4): 47-52. 1977. (267

Includes dates and world locations of outbreaks in seedbeds and tobacco fields. (Tobacco Abstracts 21:1610).

* _____. General report on the tobacco blue mold epidemic 1977. CORESTA Information Bulletin, no. 3:4-16. 1977. (268

También en francés.

In March, outbreaks occurred throughout the southern portions of the Euro-mediterranean region: North Africa and Southern Spain; Southern Greece and Tukey; Cryprus and the Middle East. Very few new outbreaks were reported in April. In May, however, blue mold made its appearance in the central zone of the group of countries concerned: Italy, Yugoslavia and Bulgaria. In June the disease appeared further north, to France, Switzerland, Hungary and Rumania. In July the disease moved northwards and westwards to the D.R.G., Poland and eastern Rumania. Finally, in August, the fungus returned westwards to affect a zone including Belgium, the F.R.G. and Austria. (Tobacco Abstracts 22:1839).

* _____. General report on the tobacco blue mould epidemic 1978. CORESTA Information Bulletin, no. 3-4:26-39. 1978. (269

También en francés.

_____. Report on the blue mold epidemic of 1977 (En alemán). Deutsch Tabakbau 58(8):93-96. 1978. (270

* _____. General report on the tobacco blue mold epidemic 1979. CORESTA Information Bulletin, no. 3:3-14. 1979. (271

También en francés.

Date of first blue mold appearance in seedbeds and in the field, country and region are given in tabular form, according to the information gathered by the CORESTA Warning Service. (Tobacco Abstracts 24:1293).

* RAY, P. General report on the 1980 tobacco blue mold epidemic (Euro-mediterranean zone). CORESTA Information Bulletin, no. 3-4:40-50. 1980. (272

También en francés.

Dates of the first outbreaks of blue mold (in the seedbed and in the field) as communicated by correspondents in the countries operating in the Warning Service are given in tabular form. (Tobacco Abstracts 25:2123).

REISCH, W. Ten years of blue mold resistance breeding (results of burley variety tests in 1970) (En alemán). Deutsch Tabakbau 51(19):160-165. 1971. (273

_____. Review of resistance breeding to *Peronospora tabacina* (En alemán). Deutsch Tabakbau 53(11):93-97; 53(12):104, 106-107; 53(14):120-123. 1973. (274

* _____. La culture de variétés résistantes au mildiou dans le contexte de la production tabacole allemande. (Sumario). CORESTA Information Bulletin, no. Especial:132-133. 1974. (275

Documento presentado en: CORESTA Symposium, Montreaux, Suisse, 1974.

Resumen también en francés.

Blue mould resistant varieties grown in the Federal Republic of Germany for the past few years have also shown good resistance to other diseases, especially virus diseases. But the new varieties derived from crosses with Bel 619-12 or Hicks Resistant were not comparable with the common varieties as regards the quality of the end product. Lines obtained by back-crossing were as good as or better than German varieties. Breeding of resistant varieties becomes more difficult because of the occurrence of new virulent strains. For this reason, growing of new varieties with horizontal resistance was attempted. This prevents too rapid an increase of virulent strains and there is less danger of economic losses. It is advisable to apply prophylactic treatment against disease to these varieties. Phytopathology and breeding for resistance are working together to solve present day problems. A partial success in the development of resistance already makes it possible to considerably reduce applications of chemical products in the field. This is very important for tobacco, owing to the regulations with respect to plant protection which will come into force in the German Federal Republic at the beginning of 1978.

_____. Problems of resistance breeding - a new biotype of *Peronospora tabacina* Adam (En alemán). Deutsch Tabakbau 58(15):181-182. 1978. (276

REPORT ON tobacco culture, 1974 (En alemán). Tabakpflanzer Oesterreichs 26(70):9-11. 1975. (277

Includes climate, *Peronospora tabacina* control and production, Austria. (Tobacco Abstracts 19:3100).

REPORT ON tobacco culture 1976. Austria Tabakwerke A.G. 17:369-371. 1977. (278

Includes weather, *Peronospora tabacina* incidence, area under cultivation and tobacco production for Austria. (Tobacco Abstracts 22:124).

RESISTANCE TO blue mould. Australian Tobacco Growers' Bulletin 17:11. 1970. (279

H. H. Wuttke of the CSIRO Tobacco Research Institute has found blue mould-free plants which do not possess the major gene for resistance but which have an accumulation of minor genes for resistance. By combining these minor genes with the major gene, very high blue mould resistance is obtained, exceeding that of varieties Sirone and Sirogo. It has not yet, however, been possible to obtain plants with desirable agronomic and commercial qualities by using this method. The widespread use of extremely resistant varieties would have the advantage, among others, of causing the pathogen to disappear almost completely and thus lower the risk of mutations. (CORESTA Information Bulletin, no. 2:547).

* REUVENI, M. y COHEN, Y. Growth retardation and changes in phenolic compounds, with special reference to scopoletin, in mildewed and ethylene-treated tobacco plants. Physiological Plant Pathology 12(2):179-189. 1978. (280

Tobacco plants (oriental type, cv. Michal) systemically infected with *Peronospora tabacina* Adam exhibited severe stunting and a considerable accumulation of scopoletin (6-methoxy-7-hydroxycoumarin) in the upper part of the stem. The scopoletin concentration increased during the first 10 days of pathogenesis and declined thereafter. *P. tabacina*-infected plants also contained higher amounts of *p*-coumaric acid (two isomers), *o*-coumaric acid and a number of unidentified phenolic compounds than uninoculated plants. Ethylene treatment of tobacco plants (single spray of 2-chloroethylphosphonic acid on leaves) induced a response similar to that arising from a systemic infection with *P. tabacina*, viz. growth retardation and accumulation of scopoletin in the upper stem. Based on preliminary results which showed that *P. tabacina* induced an increase in ethylene production in tobacco, it was hypothesized that some of the changes in phenolics detected in plants systemically infected with *P. tabacina* were ethylene-induced.

ROANE, C. W. Trends in breeding for disease resistance in crops. Annual Review of Phytopathology 11:463-486. 1973. (281

Workers are continuing to extract genes for resistance to tobacco diseases from relatives of *N. tabacum*. They have utilized *N. debneyi* for resistance to blue mold and black root rot, *N. longiflora* for wildfire resistance, *N. plumbaginifolia* for black shank resistance, and *N. glutinosa* for tobacco mosaic resistance. These are generally considered distantly related to *N. tabacum*. Valuable resistance generally has not been found in *N. sylvestris* and *N. tomentosa* which are closely related to *N. tabacum*. (Tobacco Abstracts 17:2403).

* RODRIGUEZ MARTINEZ, N. El moho azul en el cibao. Agroconocimiento (Rep. Dominicana) 4(38): 11-12. 1981. (282

Trabajo preparado en vista del inicio de la época de siembra de tabaco y la presencia del moho azul (*Peronospora tabacina* Adam) en semilleros de la aromática hoja en zonas específicas del cibao. Se le facilita al productor de tabaco y a los técnicos agrícolas dominicanos informaciones básicas sobre: factores que favorecen la propagación del moho azul, sus características, medidas preventivas y de control que se deben tomar en consideración para su erradicación.

* ROTEM, J. y COHEN, Y. The effect of temperature on the pathogen and on the development of blue mold disease in tobacco inoculated with *Peronospora tabacina*. Phytopathology 60(1):54-57. 1970. (283

The highest degree of sporulation and colonization of *Peronospora tabacina* was found at 15 to 20°C. At constant temperatures, the optimum development of disease occurred at 25°C, and under 12-hr periods of 20-C night and 20 to 40-C day temperatures, at 20-25C. Shortening the length of high temperature periods during the daytime resulted in a shift of the optimal disease development to 30-35C in plants exposed to those temperatures for 2 hr/day. Exposure of previously infected but still symptomless plants to temperatures lethal for the fungus, i.e., up to 45 C, induced development of sterile lesions within 24 hr, with 35 C leading to the most accentuated lesions. It was concluded that the optimal development of disease is affected by much higher temperatures than the development of the pathogen; but, for the high temperatures to exert their effect, a certain extent of previous colonization at a temperature favorable for the pathogen is needed. Under these conditions, the disease develops whether the pathogen remains alive or dies.

_____., COHEN, Y. y BASHI, E. Host and environmental influences on sporulation *in vivo*. Annual Review of Phytopathology 16:83-101. 1978. (284

Includes light effect of *Erysiphe cichoracearum* sporulation and moisture effect of *Peronospora tabacina* sporulation on tobacco. (Tobacco Abstracts 22:2605).

SARYCHEV, Y.F., VINOGRADOV, V. A. e IVANITSKII, K. I. Field resistance of tobacco varieties and hybrids to blue mould (En ruso). Tabak 3:52-54. 1975. (285

In tests of 50 varieties and 300 lines of interspecific hybrids resistant to race RT1 of blue mould infection by race RT2 on the varieties was 3.3-29 per cent, on 14 lines 1.4-17.1 per cent and on 53 lines of variety Immunnyi 580 it was 6.1-66.9 per cent. No special correlation was observed between infection in nurseries and field resistance, which decreased when the main leaves were nearer to the surface of the soil and when dew persisted on more of the leaves. (Review of Plant Pathology 56:3710).

SATO, M. Intraspecific transfer of blue mold resistance to Japanese tobacco cultivars. I. Selection of resistant lines from the cross between Hicks 2 and Hicks A2 MRHybrid (En japonés). Bulletin of the Iwata Tobacco Experiment Station, no. 3:21-34. 1971. (286

From the cross between Hicks 2 and Australian Hicks A2 MRHybrid some breeding lines of flue cured tobacco resistant to blue mold were selected. For the selection of resistant lines cotyledon-tests were carried out in Germany mainly at the Bundesanstalt fur Tabakforschung, Forchheim. The segregation of resistance observed in the test on F-3 lines in 1966 suggested that a single dominant gene was involved, and those lines which showed lower than 5 per cent diseased seedlings were selected as breeding materials. However, the results of 1967 at two locations, Forchheim and Munchen, showed a great difference from each other. Although at Munchen most F-4 lines were recognized to have a genetically fixed resistance, a large number of the same lines as well as the resistant variety Hicks Resistant showed a high per cent of diseased seedlings at Forchheim, indicating that an aggressive biotype of the pathogen was involved in

the latter case. While the same tendency was observed in the test of 1968 at Forchheim, some lines remained highly resistant in both of the two years, indicating the probability that these lines were genetically different from other lines and Hicks Resistant and thus showed a higher level of resistance at least by the cotyledon-test method. To know the field resistance of F-4 lines recognized to be resistant in the test of 1967 at Munchen, a part of them were planted in 1968 at Munchen and Mainz. The results confirmed that they were as resistant as the variety Hicks Resistant. In most of resistant lines of this study the number of leaves and the width of them were not sufficient. A breeding line 9-4-1 could be selected, however, which is comparable with Hicks 2 in its morphological characters and yield. (Tobacco Abstracts 15:1884).

SATO, M. *et al.* Intraspecific transfer of blue mold resistance to Japanese tobacco cultivars. II. The introduction of resistance into Matsukawa and Mito 3 (En japonés). Bulletin of the Iwata Tobacco Experiment Station, no. 5:91-107. 1973. (287

To introduce the resistance against the ordinary strain of *Peronospora tabacina* into Matsukawa, a Japanese domestic variety of air-cured tobacco, and a burley variety Mito 3, the former was crossed with Virginia Gold MRHL from Australia and the latter was crossed with a burley line 6605 from Switzerland. These crosses, followed by three or four back-crosses, produced some lines with the resistance to blue mold. Tests for resistance were made by cotyledon-test method in Germany. Data of the tests indicated that the resistance to blue mold was inherited by a single gene. Two lines, N 205 and N 206, were selected after three back-crosses to Matsukawa and N 207 was selected after four back-crosses to the same variety. N 205 produced a slightly lower yield of high quality leaves. N 206 was high in yield but was somewhat defective in the flavor of smoke. N 207 was found most similar to Matsukawa in various characters. Two lines, B 21-17 and B 26-13, were selected after three back-crosses to Mito 3. These lines had no defects in agronomic characters, but both of them were found more sensitive to a physiological disease than Mito 3. The smoke from the cigarettes made from the cured leaves of these lines had a flavor similar to that of the European burley used as the resistant parent. So it is pointed out that they should be further improved. (Tobacco Abstracts 17:1338).

SCHATTAUER, H. y SCHIPFER, L. Ridomil on coated tobacco seed protects the plant from blue mould (En alemán). Tabakpflanzer Oesterreichs 29(77):1-3. 1978. (288

Resumen también en francés.

Trials were conducted on the non-resistant tobacco "Semperante". The seed used was bare, or coated with a non-systemic fungicide, or coated with 0.1 or 0.15 per cent Ridomil-25. Following artificial infection of plantlets at two stages of growth, the results showed that Ridomil protected them for 6-7 weeks, whereas plantlets from bare seed, or that coated with a non-systemic fungicide, were severely attacked after 2 weeks. Later studies should show whether higher rates of the product would be capable of further prolonging the period of protection. (CORESTA Information Bulletin, no. 1:152).

SCHILTZ, P., COUSSIRAT, J. C. y ABEDI, H. Effect of light and kinetin on resistance manifestations to *Peronospora tabacina* A. (En francés). Serv. Exploit. Ind. Tab. Allumettes. Ann. Sect. 2 7(2):181-190. 1970. (289

The authors have studied the effect of light and kinetin (6-furfurylaminopurine) on the resistance manifestations of some *N. tabacum* hybrids

in their cotyledon stage and infected with virulent lines of blue mold. From this study it appears: Light and Mg^{++} are indispensable to a good manifestation of the hereditary factors. The incidence of light is function of the virulence of the parasite and nature of the host plant. In full darkness, analogous effects have been noted between Mg^{++} and kinetin. A deficiency in lighting may be compensated in some cases by the action of sprayed kinetin. (Tobacco Abstracts 16:120).

SCHILTZ, P., COUSSIRAT, J. C. y ABEDI, H. Incidence of the physiology of the host plant upon the changes in pathogenicity of *Peronospora tabacina* A. (En francés). Serv. Exploit. Ind. Tab. Allumettes. Ann. Sect. 2 7(2):171-180. 1970. (290

The changes in pathogenicity of the parasite have been studied following its development on blue mold resistant tobaccos selected at various physiological stages - either as young plants or in the cotyledon stage. The authors show that there is no antagonism between abundant sporulation and appearance of the virulence. On the contrary, the increase of the pathogenicity is linked to the great susceptibility of the host plant. There results a contamination of the seedlings which has a double incidence on the epidemiology as it allows both dissemination of the parasite and an increase in its virulence. (Tobacco Abstracts 16:327).

_____., COUSSIRAT, J. C. y ABEDI, H. Action of the metabolism of the tobacco plant on the manifestation of its susceptibility to *Peronospora tabacina* A. (En francés). Serv. Exploit. Ind. Tab. Allumettes. Ann. Sect. 2 8(2):185-192. 1971. (291

The authors show a property which is peculiar to some *N. tabacum* and whose effect is to modify the hereditary behavior of the plant when the activity of the plastidshas been checked. P. 48 Paraguay tobacco is normally very susceptible to blue mold but it may develop a certain resistance if the infestation is made on young plants previously treated with a solution of chloramphenicol or on young plants grown after seed germination in total darkness. This property is not in direct relation with the modification of the metabolism of the plant but it is due to a varietal character which can be transmitted by hybridization. This factor which is inhibited during the normal growth of the plant is probably related to a particular property of the plastids of this tobacco. (Tobacco Abstracts 16:2468).

_____., COUSSIRAT, J. C. y ABEDI, H. Effect of light and kinetin on the manifestations of resistance to *Peronospora tabacina* A. (En francés). *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. pp. 195-196. (292

The authors studied the influence of light and kinetin (6-furfurylaminopurine) on the manifestations of resistance of some *N. tabacum* hybrids which were contaminated at the cotyledon stage by virulent strains of blue mold. The manifestations of the resistance of some tobaccos were studied on batches of plantlets grown under continuous light (reference batch) and under alternating light (10 hours out of 24). Under these conditions, it is seen that the resistance factor(s) to isolates of virulent blue mold are only completely manifested under continuous light. This lighting incidence is of greater or lesser importance according to the virulence of the pathogen and the specific resistance of the host. Under cotyledon test experimental conditions, light appears as an indispensable factor to the expression of genetic resistance if Mg^{++} nutrition is sufficient. If, however, owing to light deficiency (alternating light), a tobacco does

not show its natural resistance, this can be expressed if kinetin is provided (sprayed at a concentration of 10 mg/l). The authors use this analogy between light and kinetin, in so far as their action on the expression of genes is concerned, to note that kinetin probably acts as an activator of nucleolar functions (RNA) while light is now known to act on RNA-polymerase. (Tobacco Abstracts 16:2175).

SCHILTZ, P., COUSSIRAT, J. C. y ABEDI, H. Incidence of host physiology on modifications of the pathogenicity of *Peronospora tabacina* A. (En francés). *In* International Tobacco Scientific Congres, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. pp. 188-189. (293

The object of this study is to discover the most favorable conditions for the increase or maintenance of pathogenicity of *P. tabacina*. The techniques used consist in studying modifications of the pathogen after its development on blue mold resistant tobaccos selected at different physiological stages; in all cases the activity of the pathogenic fungus would appear to be a function of the physiology of its host. Three experiments are described to support this theory. In the first, a same "virulent strain" of blue mold is kept alive on two batches of plants of the same variety (Resistant Hicks), respectively 4 and 8 weeks old: the highest rate of virulence is always found in the isolate obtained from the youngest plants. The second experiment shows that the pathogenicity of blue mold can be maintained by passages on resistant tobacco, whereas after a certain number of subcultures on susceptible types a return to the state of "normal strain" is observed. This regression is, however, more or less rapid depending on the physiology of the susceptible hosts selected. In the third trial, two blue mold isolates were obtained from a "normal strain" kept alive on a first generation hybrid (P. 48 x Hicks Fixed A.) taken in the cotyledon stage and fed either with water or a mineral culture medium. These isolates (respectively E and M) were found to have widely different pathogenicity. After 6 successive subculturings, a "virulent strain" was obtained, but only if the F-1 hybrid was placed on a nutritive solution. The increase in pathogenicity may, therefore, be due to host receptivity and is apparently encouraged by a repression of the resistant factors. In practice, the abundant sporulation which is often observed on young hybrid resistant plants can have a double incidence on epidemiology, on the one hand permitting active dissemination of the parasite and, on the other, increasing its pathogenicity. (Tobacco Abstracts 16:2176).

_____. Blue mould research in France (En alemán). Deutsch Tabakbau 53(4):27-28. 1973. (294

Resumen también en francés.

After some data on the biology of blue mould, the methods now used throughout the world to control this parasite are reviewed, emphasis being laid on their advantages and drawbacks. The methods now considered to be most suitable in France are especially stressed: breeding of resistant varieties, chemical treatment of seedbeds, adequate management in the field. (CORESTA Information Bulletin, no. 3:3024).

* _____. Action inhibitrice de la β-ionone au cours du développement de *Peronospora tabacina*. (Sumario). CORESTA Information Bulletin, no. Especial:115-116. 1974. (295

Documento presentado en: CORESTA Symposium, Montreaux, Suisse, 1974.

Resumen también en francés.

Reported as an excellent *in vitro* germination inhibitor of tobacco blue mold spores, β-ionone is employed as a fungicide to observe the inhibitions induced on the main phases of *P. tabacina* cycle. The study is carried out by means of the "cotyledon test" and small plants are treated before and after contamination with a normal or a virulent strain of the parasite. Applied as preventive means, β-ionone induces a relatively good inhibition on the virulent isolates, due to its action on the parasite and on the host cell. On the contrary, the inhibitor effect is more evident if the fungus is not virulent when the germination processes are already initiated but it depends on the appearance rate of the germinative tube. The activity of β-ionone on the endotissular growth of *P. tabacina* (curative action) is very weak, but this inhibition which depends on the plant metabolism can be reinforced if the host is resistant and if the product is used in combination with dimethyl sulphoxide. In fact, the sensitivity of the tobacco blue mold against this hig specific inhibitor depends on the growth stage and the pathogenicity of the parasite.

* SCHILTZ, P. An attempt to improve the collaborative experiment for determining the pathogenicity of *Peronospora tabacina*. CORESTA Information Bulletin, no. 1:16-22. 1974. (296

Results of the preliminary experiment carried out in France, Italy and Switzerland by the CORESTA Phytopathology Group in 1973.

* _____. Collaborative experiments carried out in 1974 to determine the pathogenicity of *Peronospora tabacina*. CORESTA Information Bulletin, no. 1:46-53. 1975. (297

También en francés.

Data are tabulated on the development of *P. tabacina* (*P. hyoscyami*) on nine varieties and lines in 14 countries; in most of the countries collaborating in the experiment, one local variety (which differed according to country) was included in the observations. The average level of infestation was lowest in Chemical Mutant followed by Bel 61-10 and GA 955. A new technique for assessing the degree of infection is calculated on the basis of area of lamina affected, intensity of sporulation and extent of systemic development. An average value is assessed for three stalk positions. The method enables the behaviour of susceptible and resistant varieties to be differentiated clearly. (Plant Breeding Abstracts 46:2675).

* _____. Collaborative experiments performed in 1975 to determine the development of the pathogenicity of *Peronospora tabacina*. CORESTA Information Bulletin, no. 3/4:12-19. 1975. (298

También en francés.

For the first time all participants in this joint study employed a uniform experimental technique based on sets of differential hosts laid out in four blocks and assessment of symptoms using a comprehensive lattice. In 1975, although relative stability was reported in reactions of most of the resistant hosts, it was apparent that the performance of hybrid R x T significantly worsened. (Plant Breeding Abstracts 47:4496).

SCHILTZ, P. *et al.* Compairason de quelques fongistatiques et de produits endothérapiques pour la lutte contre le mildiou du tabac. Annales du Tabac, Sect. 2 14(2):127-154. 1977. (299

Resumen también en francés.

The effectiveness of some contact fungicides (maneb, Folpet, Daconil) was compared with that of three families of endotherapic substances (Curzate, ethylphosphites, and acylalanines). The action of these substances was studied in laboratory in relation to three possible modes of application (root uptake, preventive leaf spraying, curative leaf spraying). Trials in the field confirmed the results previously obtained in laboratory. After several years of experiments, the residual action of Curzate proved to be too short-lived and phosphites were shown to be fully effective in particular circumstances only. The acylalanine group reveals a note-worthy effectiveness on *Peronospora tabacina* either through root uptake or after leaf spraying. The use of Ridomil should reduce and simplify treatments while increasing the protection of tobacco. Yet some care should be taken in its application considering the hazard of development of the pathogenic agent. Preventive treatment (by application to the seed-bed soil and by leaf spraying in the field) is recommended as it should guarantee better effectiveness and reduce the hazard of the parasite variation. (CORESTA Information Bulletin, no. 3-4:9332).

_____. y COUSSIRAT, J. C. Influence exerted by magnesium on the hereditary expression in tobacco plant (En francés). Nouv. Cult. 29(1):4. 1977. (300

After briefly recalling the story of how the cotyledon test, especially the blue mold version, was devised, the experimental model now used to study the different types of expression of properties depending on a plurifactorial heredity is presented. Apart from the susceptibility (or resistance) to *Peronospora tabacina*, other characteristics may be determined by this test: the synthesis of alkaloids, conversion of nicotine into nornicotine, ash content. The part played by magnesium added to the nutrient medium (in nitrate or oxide form) in the accelerated expression of plant heredity has been explicited but not yet basically explained. (Tobacco Abstracts 22:2494).

_____., COUSSIRAT, J. C. y DELON, R. La resistance au mildiou du tabac (*Peronospora tabacina* A.) du type *N. debneyi*: hérédité probable, apparition d'isolats virulents et stratégie de lutte. Annales du Tabac 14(2):111-126. 1978. (301

A trigenic system of resistance is proposed in tobaccos where the resistant derives from *Nicotiana debneyi*. The most resistant types have RnRnRv1Rv1Rv2Rv2, where Rn confers resistance to normal strains of the pathogen and Rv1 and Rv2 are supplementary genes conferring resistance to virulent strains, but only in conjunction with Rn. (Review of Plant Pathology 59:1876).

* _____. Results of collaborative experiments conducted in 1979 to assess the pathogenicity of *Peronospora tabacina*. CORESTA Information Bulletin, no. 3:15-19. 1979. (302

También en francés.

In 1979 blue mold epidemic did not have serious consequences and symptoms on the resistant reference varieties were mild, the figures relating to them being lower than in previous years. It was also confirmed that TI 657 did not possess high resistance to endemic blue

mold in Europe. This behavior probably indicates an original "variation" of the European isolates of the parasite. (Tobacco Abstracts 24:1294).

* SCHILTZ, P. Assessment of the pathogenicity of *Peronospora tabacina* in 1980 by the symptoms recorded in the field on the CORESTA Range of trap plants. CORESTA Information Bulletin, no. 3-4:51-57. 1980. (303

También en francés.

SCHIPFER, L. Blue mold (*Peronospora tabacina*) in Austria - 1972 (En alemán). Deutsch Tabakbau 53(19):166-167. 1973. (304

1972 has been the worst year in the history of Austrian tobacco production. Unfavorable weather conditions combined with a severe outbreak of *Peronospora tabacina* resulted in a crop loss of 50 per cent. (Tobacco Abstracts 18:75).

_____. Blue mold doesn't sleep (En alemán). Tabakpflanzer Oesterreichs 24(66):7. 1973. (305

Recommendations for *Peronospora tabacina* control in Austria. (Tobacco Abstracts 18:1836).

_____. Determination of fungicide and insecticide residues in tobacco (En alemán). Austria Tabakwerke A. G. 14:266-272. 1973. (306

Field experiments, carried out in 1969 with the aim of investigating residues in tobacco after application of Maneb and Metiram for the control of *Peronospora tabacina* were repeated in 1971 under changed conditions. The concentration and frequency of treatments were lowered to the utmost limit preventing infections. The residues of 1971 were considerably lower than those of 1969. Those of Maneb averaged 49.4 ppm and of Metiram 56 ppm, which would not exceed presumed legal restrictions. Waiting days-period between last treatment and reaping/stalk cutting-and rainfalls within this time had a strong bearing on the amounts of residues. Treatment of leaf-tobacco by redrying and one year's storage if hogsheads does not cause a considerable reduction of residues. Stalk cutting reduces the requirements for plant protection as well as the amounts of residues. For a second experiment insecticides were selected which promised both efficacy and lowest possible residues: Aldrin-Emulsion to control soil-born insects and Vamidothion, Ultracide, Dimethoate, Phosphamidon and Metomyl for the control of aphids and ligus pratensis. Samples of three insertions after air curing and after redrying and one year's storage in hogsheads were foreseen to be analyzed. By economical reasons the number of analyses at first was limited to samples from which highest residue-amounts were to be expected. Because no residues were detectable, besides very small ones after soil-treatment with Aldrin, the authors renounced to analyze further samples. (Tobacco Abstracts 18:599).

_____. Report on tobacco cultivation 1976 (En alemán). Tabakpflanzer Oesterreichs 28(74): 7-9. 1977. (307

Includes acreage, climatological factors, hail damage, *Peronospora tabacina* incidence and production. (Tobacco Abstracts 22:807).

SCHMIDT, J. A. Contribution of tobacco research to quality production (En alemán). Deutsch Tabakbau 51(16):133-135. 1971. (308

Peronospora control and soil fertilization. (Tobacco Abstracts 15:2575).

_____. Results of microbiological and biochemical researches concerning the resistance of *Peronospora* in tobacco (En alemán). Zeitschrift für Naturforschung, B 26(11):1197-1198. 1971. (309

_____. Microbiology and biochemistry of *Peronospora* resistance (En alemán). Beiträge Tabakforsch 6(5):227-235. 1972. (310

Resumen también en francés.

In *Peronospora tabacina* resistant tobacco lines such as Bel 61, infection is stopped by synthesis of antibodies; these were separated by electrophoresis and analysis showed them to be composed of nucleoproteins, nucleotides and an alloxazine, a substance related to vitamin B2. Their administration by the roots to German susceptible tobacco varieties (Badischer Geudertheimer, Badischer Burley E and Virgian SCR) provided them with total *Peronospora* resistance which lasted during the two months of the trial. Substances were extracted from Difco commercial yeast extracts which had the same protective effect and were found to be chemically similar to the antibodies found in Bel 61 lines; their curative effect was observed for more than 48 hours after *Peronospora* infection. (CORESTA Information Bulletin, no. 1:2427).

_____., REISCH, W. y VOGEL, F. New *Peronospora* biotype (En alemán). Deutsch Tabakbau 52(24): 208. 1972. (311

Resumen también en francés.

Observations carried out at Forchheim on the appearance of a new *Peronospora* biotype partly confirmed those carried out in other countries on this subject (France, Italy, Switzerland, Eastern and Middle-East countries); its conidia production is 30 per cent higher than normal; the germ tube does not differ from the old type; no spiral windings were observed. Cotyledon-tests showed that *Nicotiana debneyi* and all resistant lines derived from it had no resistance to the new biotype. In cotyledon-tests Maneb and Antracol at 0.1 per cent concentration gave total fungicidal control of the fungus. Wild forms of *N. exigua* and *N. megalosiphon* had 100 per cent resistance to this biotype whereas *N. gossei* and *N. velutina* were susceptible to it. As with *N. debneyi* in the past, spots known as hypersensitivity spots were observed on resistant wild forms after infection with the new biotype. Trials in a moisture chamber showed that the biochemical substances inducing the resistance to the new biotype differ by certain of their fractions from those affecting the common biotype. It was also possible to obtain inhibition of germination in this new biotype. (CORESTA Information Bulletin, no. 1:2428).

_____. New results of *Peronospora* research (En alemán). Deutsch Tabakbau 52(9):78, 80-81. 1972. (312

* _____. La résistance du tabac contre Peronospora sous l'aspect biochimique et microbiologique. (Sumario). CORESTA Information Bulletin, no. Especial:97-98. 1972. (313

Documento presentado en: Joint CORESTA/Tobacco Chemists Research Conference, 26th, Williamsburg, Va., 1972.

Resumen también en francés.

Since 1959, epidemics of blue mold caused by *Peronospora tabacina* (PtA) have caused great tobacco losses in Europe and parts of Asia and Africa. All varieties of tobacco presently under cultivation are sensitive to this fungus, which is a natural tobacco parasite. They must be protected with preventive weekly applications of dithiocarbamate, which leaves a residue. As an alternative, they must be replaced with new resistant varieties based on wild forms of Nicotiana. However, the quality of these wild forms is not acceptable to the German tobacco industry. The author has conducted studies with the German standard varieties Baden Geudertheimer, Baden Burley E, and Virgin SCR. All these are hypersensitive to PtA. This is the basis for a new third method of combating blue mold that has been developed. Observations showed that PtA infections also developed in the PtA-resistant cultivation hybrids (US Bel. 61 types). This was shown by the presence of external so-called hypersensitivity spots. During this process substances are synthesized which stop PtA infections in these varieties. These defensive substances were separated via electrophoresis, identified chemically, and recognized as nucleoproteins or nucleoprotein mixtures and an alloxazine compound closely related to vitamin B_2. The application of these substances via the roots of the cotyledons of the above German tobacco varieties which are highly sensitive to PtA, induces resistance to PtA without altering the external characteristics of the plants. In greenhouse experiments using artificial light, these PtA-sensitive plants treated in this manner were exposed to high doses of PtA spores for a year without developing the disease. These results were confirmed for a period of two years. Since no controlled growth chamber, impervious to spores, is available research can only be conducted from the time after the tobacco harvest (August) until the end of the year, to avoid wild inoculation (transmission of the fungus) during the new tobacco planting and cultivation period. We also observed interactions between these resistance-triggering substances and other microorganisms. A special bacterium was discovered, which only grows in the presence of these PtA inhibitors. This finding made it possible to conduct studies throughout the year without dependence on PtA, and to speed up these experiments. This enables us to determine the PtA resistance triggering substances also in a yeast and separate them from the Difco yeast extract. After adding these substances to the cotyledons of the above German tobacco varieties, the same positive results with regard to resistance development was observed. These substances obtained from yeast extract were compared chromatographically with those obtained from infected Bel varieties. They were shown to be chemically and biologically equivalant. A temporary protective effect was also determined which lasts from up to 48 hours after PtA infection. In a field test, conducted for the first time in 1971, following the natural occurrence of PtA, a single treatment of the cotyledons of Baden Geudertheimer allowed us to observe the induced resistance throughout the entire tobacco harvest period.

SCHMIDT, J. A. Research results on the biology of *Peronospora tabacina*. I. Spore infection (En alemán). Deutsch Tabakbau 53(19):168-170, 172-178. 1973. (314

_____. Results of simulation trials effected to obtain a better biological understanding of *Peronospora tabacina* (En alemán). Deutsch Tabakbau 53(19):168-178. 1973; 55(12):101-105. 1975. (315

Resumen también en francés.

This two-part article gives an account of the studies effected in the Forchheim phytotron over the past few years on the infection of tobacco

by *P. tabacina*. It was shown that sporulated infection by race A of the pathogen occurs from 92 per cent relative humidity and between 5-28° temperature (optimum 17°), whereas infection by the new race (race B) can occur between 2 and 28°, the optimum ranging between 10 and 26°; UV irradiation of susceptible tobacco varieties considerably reduces infection by race A (from 95% to less than 5%). In the second part, dealing with systemic infection, this infection is shown to develop on both resistant and susceptible plants when lighting conditions (less than 6,000 lx) and temperature (less than 10°) are unfavourable to the biological activity of the plant; but resistant plants recovered more rapidly and more completely than susceptible ones when these conditions improved. There appears to be a very close biochemical correlation between photosynthesis and the formation of 'defense' substances by the resistant plant; with respect to this, certain wavelengths of the light spectrum appear to be particularly important, and this question is under study. (CORESTA Information Bulletin, no. 3-4:5383).

SCHMIDT, J. A. New biological knowledge on blue mould related to the new type pathogen observed in 1977 (En alemán). Deutsch Tabakbau 58(14):171-173. 1978. (316

Resumen también en francés.

The resistance of the varieties developed at Forchheim is dependant on weather conditions: with a long period of cloudy cold weather this resistance is lost towards the new strain of *Peronospora*. Resistance improves with better weather conditions, and this also applied to a lesser extent to susceptible varieties. The latest results from cotyledon-test show that a new biotype of the pathogen made its appearance in Germany in 1977, to which the varieties developed at Forchheim have little or no resistance. In the past, the relations between susceptibility (or resistance) and the effect of the light spectrum have been studied in the phytotron; these studies will be effected on seedbeds and in the field for the first time in 1978. Data obtained will make it possible to carry out a transposition on the level of the artificial light in the phytotron (cotyledon-test) and will probably be applicable as regards the glass or plastic materials used to cover greenhouses. (CORESTA Information Bulletin, no. 2:8909).

_____. Recent knowledge on the biology of the blue mold disease in connection with the new *Peronospora* type of 1977 (En alemán). Deutsch Tabakbau 58(14):171-173. 1978. (317

_____., FISCHBACH, E. D. y BURKART, F. Trials on the systemic protection of tobacco seedbeds with Ridomil, against *Peronospora tabacina*. II. Residual levels of the product in seedbeds after its use by spraying or as granules (En alemán). Deutsch Tabakbau 59(22): 256-257. 1979. (318

Resumen también en francés.

Ridomil as a spray (25% a.i.) and granular Ridomil (5% a.i.) were used on seedbeds at rates of 0-0.4 g/m^2 and 2-4 g/m^2 respectively. Samples taken at different times after treatment showed that the level of residues in plant tissue were not excessive. Trials in growth pots showed that the advised dose must be multiplied by 8 for phytotoxic effects to be observed on plants. The growth of the plant itself in the seedbed has the effect of diluting the concentration of fungicide in its tissues. Residual levels were, however, sufficiently high to ensure the plant's being protected from *P. tabacina* for 30 to 50 days after treatment. (CORESTA Information Bulletin, no. 4:1363).

SCHWEPPENHAUSER, M. A. Anticipatory resistance breeding to *Peronospora tabacina*. South African Journal of Science 70(11):349-351. 1974. (319

In view of the possible spread of blue mould to Rhodesia, agronomically suitable tobacco lines were produced highly resistant to strains of *P. tabacina* at Munich and Forchheim, Germany. Susceptibility to the Swiss Nyon strain, however, poses a serious question as to the value of these flue cured breeding lines in the event of the disease appearing in Rhodesia. (Review of Plant Pathology 54:2963).

SEEDBED TREATMENTS against tobacco blue-mold (En francês). Voix Culture 31(267):13. 1977. (320

SEMENOVA, I. V. e IVANOVA, T. Z. Influence of cultivation conditions in obtaining plants of the interspecific hybrid *Nicotiana occidentalis* x Ostrolist 1519 cultivated *in vitro* (En ruso). Krasnodar. Vsesozuznogo Nauchono-Issledovatelskogo Instituta Tab. Makhorki. Sb. Nauchno Issled. Rab., no. 158:38-42. 1973. (321

Under normal conditions the hybrid seedlings died at different stages of development without forming roots. By means of *in vitro* cultivation, with suitable lighting and nutrient media, satisfactory shoot formation and a well developed root system could be achieved. The hybrid plants showed a high degree of resistance to *Peronospora hyoscyami*. (Tobacco Abstracts 20:2234).

SFICAS, A. G. e IOANNIDIS, N. M. Performance of Oriental and Burley tobacco hybrids in Greece. Tobacco International 182(17):42-46. 1980. (322

Hybrids resistant to *Peronospora tabacina* were bred by crossing varieties of Oriental or Burley type which were cytoplasmically male sterile with resistant lines of the same type. The hybrids were of higher quality and gave higher yields than the parental varieties. The total alkaloid content was higher in Kaba-Kulak hybrids than in the parents and the rate of burn was higher in Tsembeli Agrinion and in Burley hybrids. Heterosis ranged from 8.6 to 16.1 per cent for yield, from -2.6 to 14.5 per cent for quality and from 50 to 95 per cent for resistance to *P. tabacina*. (Plant Breeding Abstracts 51:10771).

SHABANOV, D. *et al.* Agrobiological and technological features of the new tobacco variety Struma 75 (En búlgaro). Rasteniev''dni Nauki 13(5):47-54. 1976. (323

This new Oriental tobacco variety, a product of hybridization and selection, has a higher yield than the standard variety Petrich 84 and is highly resistant to black shank (*Phytophthora parasitica* var. *nicotianae*) and tolerant of blue mould (*Peronospora tabacina*). (Review of Plant Pathology 56:2208).

SHALDZHYAN, M. M. y AVUNDZHYAN, E. S. Comparative study of the aminoacid content in the leaves of tobacco varieties susceptible, resistant and immune to *Peronospora* (En ruso). Biologicheskiĭ Zhurnal Armenii 27(8):34-40. 1974. (324

Marked changes were observed in the aminoacid content of varieties infected with *P. hycoscyami*. The immune variety contained 2-3 times more arginine than the susceptible one, which contained much less lysine and valine than both the resistant and immune variety. (Plant Breeding Abstracts 45:5677).

SHATI, A. y NIKOLOV, S. A study of the blue-mold resistance of F_3 tobacco hybrids from crosses of the variety Cabot with resistant lines (En búlgaro). Genetika i Selektsiya 6(4):295-300. 1973. (325

F3 hybrids from the crosses of the susceptible Tunisian variety Cabot as female with Bel 61-10, Hicks Resistant, 521, L216, F_{80} and PRV/67 showed 57.4-70 per cent resistance, Cabot x Bel 61-10 and Cabot x Hicks Resistant having the best field resistance, 84.4 per cent and 70 per cent, respectively. The hybrids combined good economic properties with resistance. Peroxidase activity was positively correlated with resistance. (Plant Breeding Abstracts 44:2657).

SHEIDOW, N. Blue mold control. Canadian Tobacco Grower 29(6):41. 1981. (326

Ridomil is now registered and recommended for the prevention of blue mold in tobacco fields in 1981. This year the number of sprays has been reduced but the total quantity of Ridomil applied will be similar to that used in 1980. Complete details regarding the use of this product will be found on the 1981 label. Ridomil is a systemic insecticide or in other words the chemical moves into the leaf and provides protection from within. Once inside the leaf, there is a tendency for this product to move towards the edge and away from the center. Thus, good leaf coverage is important. (Tobacco Abstracts 25:2126).

* SHEPHERD, C. J. Nomenclature of the tobacco blue mould fungus. Transactions of the British Mycological Society 55(2):253-256. 1970. (327

The taxonomic status of the organisms causing blue mold of tobacco in Australia is discussed. It is considered that the common strain of this organism present on cultivated tobacco is identical with *Peronospora hyoscyami* de Bary f.sp. *tabacina* (Adam) Skalicky. Two new f.spp. are proposed for strains of the fungus with host ranges different to f.sp. *tabacina*.

* _____., SIMPSON, P. y SMITH, A. Effects of variation in water potential on the viability and behavior of conidia of *Peronospora tabacina* Adam. Australian Journal of Biological Sciences 24(2):219-229. 1971. (328

A method is described for the collection of dry conidia of *P. tabacina*. Conidia were shown to lose or gain water according to the ambient humidity. When stored at 91.4 per cent R.H., 50 per cent of conidia were swollen, while all were shrunken at 88 per cent R.H. and all swollen at 94 per cent R.H. Average wright per conidium increased from 1.04 ng at 0 per cent R.H. to 2.65 ng at 99 per cent R.H. Immersion of conidia in sucrose solutions caused shrinkage and prevented germination. When transferred to water, germination occurred, indicating that reduction of germination in sucrose solutions was due to reduced water potential and not to loss of viability. Conidial viability was affected by temperature (5-25°C) and relative humidity, viability decreasing most rapidly at the higher temperatures and humidities. When conidia were allowed to start germination and then dried, they remained capable of completing germination, but their viability gradually fell to zero, the rate of fall being most rapid at high temperatures and humidities. At low relative humidities conidia were considerably more resistant to inactivation by ultraviolet irradiation than were conidia in water. Low humidities also decreased the effect of high temperatures on conidial viability. The rate of sedimentation of conidia in still air was lower at low relative humidities (0.742 cm/sec at 34% R.H.) than at high humidities (0.953 cm/sec at 79% R.H.). The epidemiological significance of these findings is discussed.

* SHEPHERD, C. J. y BAAS-BECKING, H. G. Reaction of leaf disks of *Nicotiana tabacum* to infection by *Peronospora hyoscyami* F.sp. *tabacina*. Transactions of the British Mycological Society 56(3):443-449. 1971. (329

The development of water-soaked and nectrotic lesions on leaf disks of *Nicotiana tabacum* after infection by *Peronospora hyoscyami* f.sp. *tabacina* (Adam) Skalicky was followed by time-lapse cinematography. Water soaking was first observed 5 h after inoculation, while the first necrotic lesion appeared 38 h later. Water-soaked lesions appeared abruptly and persisted for only 4-5 h, while the majority of necrotic lesions persisted throughout the course of the observations (4 days). A periodic occurrence of water-soaked lesions was seen, rapid increases of lesion numbers occurring approximately every 26 h. The dynamic nature of development, expansion, coalescence and contraction of water-soaked lesions was shown by following the progress of individual lesions.

SIKAN, L. Z. y VOLZHINA, S. YU. Relation between tobacco death and the degree of infection by blue mould (En ruso). Mikologiya i Fitopatologiya 8(5):415-418. 1974. (330

Downy mildew in the Ukraine is favoured by RH at least 70 per cent, frequent but short rains, day/night temps. 20±6/11±4°, cloud and morning mist. Maximum development of the disease occurred in early June. Infection at an early stage of growth in the field led to partial or total death of the plants. (Review of Plant Pathology 54:2961).

_____. y VOLZHINA, S. YU. The efficacy of field selections in breeding tobacco for resistance to *Peronospora* (En ruso). Sel'skokhozyaistvennaya Biologiya 11(2):294-296. 1976. (331

During 1973-74 a study of 54 varieties, 169 F_1 and F_2 intervarietal hybrids and nine interspecific hybrids revealed a high heritability coefficient for field resistance to *P. hyoscyami* ($h^2 = 0.78$). This indicates the efficacy of selection for resistance. (Plant Breeding Abstracts 46:9297).

* SMITH, A. Biometric studies on conidia of *Peronospora tabacina*. Transactions of the British Mycological Society 55(1):59-66. 1970. (332

The size of *Peronospora tabacina* conidia varied considerably under glasshouse conditions. Differences in host, whether of age or genetic constitution, were found to have no effect. Different pathogenic strains showed significant size variation. Single conidium inoculations were made to reduce the genetic variability of the second generation population, but the range of sizes was not significantly altered compared with multi-conidial inoculations. The only environmental factor to affect conidial size significantly was temperature where condidial size was found to increase as the temperature decreased, from 18.2 x 14.6 µm at day-night temperatures of 30/25°C to 20.0 x 16.6 µm at 15/10°C.

SMITH, W. D., WHITTY, E. B. y KUCHAREK, T. A. Blue mold incidence in tobacco as affected by nitrogen fertilization. Proceedings of the Soil Crop Science Society of Florida 39:140-141. 1980. (333

In a 1979 fertilizer equipment, conducted near Gainesville, Florida, differences in blue mold incidence in tobacco (*Nicotiana tabacum*)

were observed between three levels (84, 168, and 252 kg/ha) of nitrogen. A high linear correlation (r = .96) was obtained, with a definite increase in severity of the disease occurring with increased rates of nitrogen. This relationship was attributed to certain physical and physiological factors. Physically, the larger leaves produced by higher nitrogen rates provided shaded conditions which would be a favorable environment for disease development. Physiologically, the plant was rendered more susceptable to infection by high water content and thin cell walls, which are characteristic of young, rapidly growing, succulent leaves produced with high levels of nitrogen. (Tobacco Abstracts 25:801).

* SOLHEIM, W. G. y GILBERTSON, R. L. *Peronsopora* species in Arizona. Mycopathologia et Micologia Applicata 49(2-3):153-159. 1973. (334

Incluye *Peronospora tabacina*: p. 159.

SOYDAN, A. Epidemiology of *Peronospora tabacina* in the Marmara region and factors affecting the fungus dissemination (En turco). Tekel Enstituleri Yayinlari, A, no. 13. 1971. 134 p. (335

Resumen también en francés.

Following a short survey of the epidemiology of *Peronospora tabacina* on a worldwide level, the particular situation of Turkey in this respect is given by regions, with indications of losses caused by the fungus in tobacco crops since 1961. In the Marmara region a station was set up 9 years ago to record meteorological conditions (temp., r.h., wind, sunshine) and relate them with the outbreaks of *P. tabacina* and its spreading in crops. These numerous data are given here. Field trials of crops under shades showed that this method increased losses due to blue mould by 20-40 per cent, but parallel trials in an incubator did not confirm this tendency. Resistance to blue mould in the varieties Izmit, Edirne, Hendek, Duzce and Bursa is compared. (CORESTA Information Bulletin, no. 1:2431).

* SPURR JUNIOR, H. W. y TODD, F. A. Observations of the extensive 1979 tobacco blue mold epidemic. (Sumario). Phytopathology 70(7):693. 1980. (336

The worst American tobacco blue mold field epidemic occurred during 1979 resulting in a 252 million dollar loss to growers. The epidemic spread generally from south to north favoured by ample inoculum and unseasonably cool, wet weather. In North Carolona, burley losses were 40 per cent with many fields completely destroyed and flue-cured tobacco losses were 4 per cent. Systemic infections were abundant in burley, which resulted in severe stunting. Conidia produced by the fungal pathogen *Peronospora tabacina* were typical. Oospores were abundant in leaves and systematically infected stems of burley. They were less abundant in flue-cured tobacco especially when local leaf infections were arrested.

STEFANOV, D., KOTSOV, K. y RANGELOVA, R. Trials of new fungicides against *Peronospora tabacina* on tobacco (En ruso). Zashchita Rastenii 3:27-29. 1971. (337

Application of 0.25 per cent cimanat was the most effective, followed by 0.4 per cent polycarbacin. (Tobacco Abstracts 16:432).

STEINER, V. D. Blue mold in Germany in 1972 (En alemán). Deutsch Tabakbau 52(18):162-163. 1972. (338

Article discusses the control of blue mold disease by the use of chemical sprays and the breeding of resistant varieties. On the basis of a twelve year experiment, it is concluded that this feared disease can be held in check by spraying. The dangers of too much spraying are pointed out and detailed instructions given as to when and how much spray to use. It is thought that residues can be brought within tolerable limits so as to render economic damage negligible. (Tobacco Abstracts 17:122).

STOESSL, A., ROCK, G. L. y GAYED, S. K. Virtual absence of capsidiol and related stress compounds from field-grown tobacco naturally infected with *Peronospora tabacina*. Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz 88(6):367-372. 1981. (339

During the 1979 blue mold epidemic of tobacco (*Nicotiana tabacum*) in South Western Ontario, samples of cultivars "Virginia 115" and "Nordel" heavily infected with *Peronospora tabacina* were collected from the field and tested for the presence of sesquiterpenoidal stress compounds characteristic of the Solanaceae. The compounds were present at most in only minute traces. Capsidiol, a typical representative, was present in a concentration of ca. 1 ppm as estimated by a combination of silica gel column and gas chromatographic techniques. Capsenone and hydroxycapsidiol, possible detoxification products of capsidiol, were not present in readily detectable amounts. The results are consistent with the concept that the fungus either suppressed stress compound formation or that it metabolized, and thereby detoxified them, to unknown products. (Tobacco Abstracts 26:69).

STOYANOVA, M. y BAILOV, D. A new gigantic tobacco form resistant to diseases. Comptes Rendus de l'Academie Agricole Georgi Dimitrov 8(4):81-83. 1975. (340

The new gigantic form, from Virginia line No. 623 x Roman hybrid, possesses complex resistance to potato virus Y, *Peronospora tabacina* and *Erysiphe cichoracearum* var. *nicotianae*. (Review of Plant Pathology 55:3278).

_____. y KONOTOP, A. Study on the resistance to Lycopersicon virus 3 Smith in progenies of *Nicotiana tabacum* L. x *N. glauca* Grah interspecies hybridization (En alemán). Doklady Akademii Sel'sko-khozyaistvennykh Akademii im Georgiya Dimitrova 8(3):43-44. 1975. (341

The purpose of this investigation was to establish whether the hybrid material, obtained from the interspecies *N. tabacum* L. x *N. glauca* Grah cross, which is resistant to Potato Y-virus, possesses also resistance to tomato spotted wilt. Of the progenies studied the sesquidiploid *N. tabacum* L. (cv. Harmanliiska Basma 163) x *N. glauca* Grah manifested a very high resistance to tomato spotted wilt (97.20-100%), as well as to powdery mildew (92.90-98%). (Tobacco Abstracts 19:3469).

SVIRCEV, A. M. y McKEEN, W. E. Conidial germination of *Peronospora tabacina* Adam. Phytopathology 71(2):259. 1981. (342

The conidia of this obligate parasite germinate in a temperature range from 0 to 35°C. The optimum temperature is 15° to 20° C. Varying intensities of artificial light have no effect on the total per cent germination. However, the conidia are markedly affected by ultra

violet irradiation. The influence of ultra violet on the germination of conidia is modified by temperature and humidity. The influence of temperature, humidity and light on the germination of *P. tabacina* conidia is demonstrated. The response of authors' isolate of *P. tabacina* is different to that reported by other investigators. (CORESTA Information Bulletin, no. 2-3:2960).

TERNOVSKII, M. F., VINOGRADOV, V. A. e IVANENKO, B. G. Infection of resistant tobacco varieties by an aggressive race of *Peronospora tabacina* (En ruso). Mikologiya i Fitopatologiya 7(1):40-45. 1973. (343

Nicotiana debneyi, *N. didebta* and 7 local tobacco varieties considered to be resistant to the ordinary race of the pathogen, were severely attacked. This indicated the presence of a virulent race of *P. tabacina* in the Krasnodar region (USSR); this was designated as PT2. This, contrary to race PT1, was able to attack varieties, the resistance of which was obtained by interspecies crossings, and to cause punctate necroses on *N. debneyi* during the seedling phase. The distribution of PT2 in Krasnodar is limited. Due to the high resistance of *N. didebta* to both races, the utilization of this species in breeding tobacco plants resistant to peronosporosis is recommended. (Tobacco Abstracts 18:2968).

_____., LAR'KINA, N. I. y MOISEEVA, M. E. Investigation of the interspecific hybrid Immunyi 580 x *Nicotiana otophora* (En ruso). Genetika 13(6):988-995. 1977. (344

This new tobacco hybrid is resistant to blue mould /*Peronospora tabacina*/. (Review of Plant Pathology 57:5678).

_____. y LAR'KINA, N. I. Remote hybridization as a method of creating resistance to *Peronospora tabacina* Adam initial material (En ruso). Genetika 14(6):1046-1054. 1978. (345

Remote hybridization is a perspective method, which makes possible to obtain tobacco varieties resistant to downy mildew. Subsequent progenies of amphidiploid Immuny 580 x *Nicotiana debneyi* segregated by morphological characteristics and displayed age resistance of *Peronospora tabacina*. The processes of meiosis and mitosis had some disorders. The plants of the first backcross were of the tobacco type, they had early ripening leaves and uniformity. The plants of the second backcross were various by their phenotype, they had asynchronous and abnormal meiosis and produced age resistance to *P. tabacina*. (Tobacco Abstracts 22:2710).

TOBACCO BLUE mould (En alemán). Deutsch Tabakbau 10(51):83. 1971. (346

Resumen también en francés.

The Baden-Wurtemburg Plant Protection Service gives advice on blue mould control: the use of healthy plants, good preparation and balanced fertilization of soils, exact determination of the rate of metobromuron to be used in at least 400 l/ha of water prior to transplanting (flat nozzle sprays); a 1st preventive treatment as soon as plants are established, and alternating the direction of operation, renewing treatment, as a function of weather conditions, with maneb or propineb (Antracol) which leaves less residues. The amounts of a 0.1 per cent solution to be used according to the

height of tobacco are given, and the types of sprays (20-40 atm.) and the nature and slope of nozzles. (CORESTA Information Bulletin, bo. 4:1161).

TOBACCO: NEW tobacco chemical. Progressivè Farmer 95(5):75. 1980. (347

Ridomil 2E is a new fungicide recently released by Ciba-Geigy for the control of field blue mold and black shank in tobacco. The new product is a soil-applied systemic. (Tobacco Abstracts 24:1916).

TODD, F. A. Blue mold disaster assessed, prevention of another planned. Tobacco International 181(26):57-58, 62, 65, 69, 72-73. 1979. (348

About 125 tobacco scientists (researchers and extension specialists) and company representatives gathered in Raleigh, North Carolina late in the year, to review the destructive blue mold epidemic of 1979 and discuss the situation, determine what happened and why; formulate a warning system to operate through the U.S. and Canada; and review control methods to prevent the occurrence of high loss to blue mold (plant bed and field) in future crops. (Tobacco Abstracts 24:803).

_____. Blue mold: field damage a threat for 1980 crop; weather conditions will be the key factor. Flue Cured Tobacco Farmer 17(3):34. 1980. (349

Preventive program for tobacco farmers to follow in the plant beds includes spraying or dusting with any of the fungicides containing ferbam, zineb, maneb or metriam when plants are the size of a dime in beds covered with cheesecloth. In the field, two effective control methods: a preplant chemical Ridomil applied during land preparation as a soil treatment, or weekly or even bi-weekly application of spray treatments involving fungicides with maneb and stretomycin sulfate, are recommended. (Tobacco Abstracts 24:1019).

_____. Blue mold story. Tobacco International 182(26):24, 26, 28, 31. 1980. (350

The author reviews the blue mold disease situation, the Warning System operating throughout the U.S. and Canada, and control methods to prevent high loss in the 1980 and future crops. (Tobacco Abstracts 25:803).

_____. Blue mold - what to expect in 1981. Progressive Farmer 95(12):8. 1980. (351

Includes control program outlines for plantbeds and fields. (Tobacco Abstracts 25:581).

_____. How you'll know if blue mold's on the way: early warning system tracks its spread across tobacco country. Flue Cured Tobacco Farmer 17(4):34. 1980. (352

Blue Mold Central in Raleigh, North Carolina, is an information relay network. Growers in every area report to county Extention agents, who pass information along to state plant pathologists. The Central analyzes all these reports to determine what action growers should take, if any, to control existing disease levels. That recommendation, in turn, is passed back through the same channels and incorporated with weather information from cooperating meteorologists. Reports on the status of blue mold are then given to growers in every area. (Tobacco Abstracts 24:1919).

TODD, F. A. Tobacco field blue mold control: burley. North Carolina State University. Agricultural Extension Service. AG-213. 1980. 14 p. (353

Field blue mold reduced crop values about 40 per cent and cost North Carolina Burley growers $8 1/2 million in 1979. Losses were also high in Tennessee (10%), Kentucky (10%), Ohio (30%), Virginia (20%), and West Virginia (20%). The combined loss in the six Burley states amounted to a reduction in crop value of 12 per cent and cost growers $93 million. The field epidemic of 1979 was the first to occur in the burley area, and the blue mold disease organism could still be in abundant supply. Control methods are included. (Tobacco Abstracts 25:583).

_____. Tobacco field blue mold control: flue-cured. North Carolina State University. Agricultural Extension Service. AG-212. 1980. 13 p. (354

Field blue mold reduced crop values 4 per cent and cost North Carolina growers $38 million in 1979. Losses were also high in Florida (3.5%), Georgia (1.5%), South Carolina (4%), and Virginia (3%). The combined loss in the five flue-cured states amounted to a reduction of crop values by $53 million. The field epidemics which occurred in North Carolina in 1953 and 1964 were mild compared to the destructiveness of the disease in 1979. Control methods are given. (Tobacco Abstracts 25:584).

_____. To prevent blue mold, anthracnose and damping off: Operation TTB (treat those beds). North Carolina State University. Agricultural Extension Service. AG-209. 1981. 11 p. (355

Operation T.T.B. (short for Treat Those Beds) is the title of a campaign to encourage all tobacco growers to produce an abundant supply of healthy transplants by controlling diseases on the plantbed. Another objective of Operation T.T.B. is to prevent beds from serving as a source of disease causal agents by destroying the beds when transplanting is complete. This plan is especially important with the dreaded blue mold disease. Although, it does not provide field control, it prevents buildup of blue mold and reduces the changes of field occurrence. (Tobacco Abstracts 26:70).

TOSIC, L. Efficacy of some fungicides in control of *Peronospora tabacina* Adam. *In* International Tobacco Scientific Congress, 5th, Hamburg, 1970. Proceedings. s.l., s.e., 1971. p. 199. (356

The efficacy of the fungicides Dithane M-45, Dimecin P-38, Kryptonol and Orthocide 50 (Captan) in control of tobacco blue mold was studied in laboratory conditions. The investigations were carried out on tobacco plants of the varieties Samsun and Virginia Golden Cure. The plants were treated one day before inoculation. The preparations were used at following concentrations: Dithane M-45 at 0.1 per cent; Dimecin P-38 at excess dose: Kryptonol at 0.005 per cent; and Orthocid 50 at 0.2 per cent. Inoculation was done by spraying tobacco plants with a conidia suspension of *P. tabacina*. The concentration of the suspension was about 200.000 conidia/ml. The chemicals showed different efficacy in control of tobacco blue mold. Dithane M-45 and Orthocid 50 were very effective, Dimecin P-38 moderately effective and Kryptonol was ineffective. Phytotoxic effects on tobacco plants were not observed after use of any of the fungicides. (Tobacco Abstracts 16:2181).

* TOSIC-KRSMANOVIC, L. The importance of the fungicide Karathane as an inhibitor of sporulation of *Peronospora tabacina* Adam. (Sumario). CORESTA Information Bulletin, no. Especial:82. 1976. (357

Documento presentado en: International Tobacco Scientific Congress, 6th, Tokyo, 1976.

Resumen también en francés.

The possibility of using the fungicide Karathane (dinocap) to inhibit the sporulation of *Peronospora tabacina* Adam was investigated employing artificially infected tobacco variety Virginia Golden Cure. The fungicide formulation EC containing 50 per cent active ingredient was used at concentrations of 0.01, 0.03 and 0.04 per cent. Tobacco plants were sprayed with the fungicide two days prior to inoculation and one, two and three days after inoculation. The fungicide inhibited sporulation when leaves were sprayed on underside only, or both sides, but not if sprayed on top of the leaf only. Inhibition of sporulation was detected at all levels of application and times of application, but the extent of inhibition was proportional to dose and also dependent on time of spraying with respect to inoculation.

* TOSKOV, N. *et al.* New Oriental tobacco varieties, resistant to blue mould (*Peronospora tabacina* Adam). (Sumario). CORESTA Information Bulletin, no. Especial:89. 1978. (358

Document presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

Resumen también en francés.

In 1962, simultaneously with the appearance of blue mould on tobacco, Bulgarian research workers embarked on creating new selection lines and industrial varieties, resistant to the disease. The basic method employed was interspecific hybridization with subsequent selection in the hybrid generations. The high quality Oriental varieties Harmanlijska basma 163, Krumovgrad 988, Tcherven tzciat, Rila 207, Nevrokop 5, Djebel basma 174, Tekne and Sultanski were crossed with the Australian and US selection lines resistant to blue mould - F 80, F 94, 349-5, 61-10, 61-11, Hicks Resistant. Methodologically, the process of selection included 3 main stages: An investigation of the crosses from F_1 to F_5 and achieving constancy. A study on a large number of selection lines and finding out perspective combinations - resistance plus the original characters of the respective origin. A study on the most valuable lines by comparative varietal tests and establishment of lines, combining resistance and technological characters with high yield and quality. Blue mould resistance was evaluated by the cotyledon method of Izar (autumn seedlings), while grade evaluation was done by the method of CORESTA. Particular attention was paid to smoking qualities and chemical composition. Sixteen selection lines have been obtained from the origins Harmanlijska basma, Krumovgrad, Djebel basma, Ustinska, Nevrokop basma, Doupnitza, Tekne and Melnik. The resistant varieties have significance only for the microregions seriously threatened with the disease.

* _____. y TCHINTCHEV, B. Results from the use of the heterosis method on Virginia and Oriental type tobacco in connection with blue mould (*P. tabacina* Adam). (Sumario). CORESTA Information Bulletin, no. Especial:93-94. 1978. (359

Documento presentado en: International Tobacco Scientific Symposium, Sofia, Bulgaria, 1978.

Resumen también en francés.

Research was conducted on the oriental aromatic tobaccos of Perushtitza origin, varieties Pazardjik 17 and Plovdiv 17, and on high quality flue-cured tobacco varieties, introduced from the US - Cocker 254, Cocker 347 and Speight 28. The Oriental type lines Plovdiv 58 and Povdiv 21-95 and the flue-cured type line 1349 were used as initial resistant lines. The selection methods during the initial stage included testing of a large number of crosses in field trials on small plots, followed by precise variety tests. Results: 1) Resistance to powdery mildew is transfered in F_1 by the incomplete dominance scheme with proximity to the resistant parent in both tobacco types. 2) In the Oriental type crosses with general and specific combining ability, the heterosis manifests itself through powerful initial and subsequent growth, prolonged vegetation, a slight increase in leaf number and size, preserved quality and higher productivity. 3) In the flue-cured type crosses with favourable general and specific combining ability the heterosis manifests itself throught a more dynamic growth and development, shortened period of maturation, increased leaf size (mostly in width) and 12-16 per cent increase of yield. 4) One of the crosses F_1 (Cocker 254 x P-1349), with a number 0192, has been sent for further testing to the state system for varietal trials.

* TOTTERDELL, C. J. y BLAIR RAINS, A. Plant reflectance and colour infrared photography. Journal of Applied Ecology 10(2):401-407. 1973. (360

Criteria for the evaluation of aerial photography acquired with infrared colour films have been complicated by conflicting reports of the ability of such materials to record previsual symptoms of disease or stress in natural and cultivated vegetation. This paper presents comparison laboratory photography on colour and false colour films of mesomorphic and xeromorphic plants in a healthy state, and in varying degrees of disease, wilt and desiccation. The results indicate that it is not possible to record on infrared colour film, on the species used for the test, visual evidence of disease or stress symptoms which was not recorded on colour film. The paper incorporates a discussion of the relationship between spectral reflectance from plants and the sensitivity of colour infrared film. *Peronospora tabacina* infected tobacco plants were used in the experiment.

TREATMENT OF tobacco in the field. Apparatus for treating blue mold (En francés.). Voix Culture 29(337):12-17. 1975. (361

After recalling a few facts on blue mold, and presenting the general principles governing its control in the field, a detailed survey is given of the practical means for carrying out these operations: choice of equipment, adjustment and adaptation of existing equipment, control of the treatment when applied. This article reproduces the essentials of a recent publication by the Center for Professional Training of Tobacco Growers in France. (Tobacco Abstracts 20:1287).

* TSAKIRIDIS, J. P., VASILAKAKIS, C. B. y CHRISOCHOU, A. P. Evaluation of new systemic and nonsystemic fungicides for the control of *Peronospora tabacina* in tobacco seedbeds and fields in Greece. Plant Disease Reporter 63(1):63-66. 1979. (362

In comparative seedbed and field tests, the experimental systemic fungicide N-(2,6-dimethylphenyl)-N-(methoxyacetyl)alanine methyl ester (CGA-48988), applied as a foliar spray treatment every 10 days in seedbeds at 30 g a.i./100 liters of water or in the field as a single

soil treatment at 1 and 2 kg a.i./ha, provided excellent control of *Peronospora tabacina* on tobacco. Another experimental systemic fungicide, N-(3-dimethylaminopropyl)thiocarbamic acid S-ethylester hydrochloride (SN 66752), applied to the soil at 14 kg a.i./ha did not provide effective control. Among the other non-systemic products tested, a combination of polyethylenethiuram monosulfide and disulfide + maneb at 160 g a.i./100 liters of water was as effective as the standard fungicides zineb or maneb. A mixture of ammoniates of [ethylenebis(dithiocarbamato)] zinc with ethylenebis [dithiocarbamic acid], bimolecular and trimolecular cyclic anhydrosulfides and disulfides (NIA 9102) and a mixture of 2-cyano-N-[(ethylamino)carbonyl]-2-(methoxyimino)acetamide (DPX-3217) and a coordination product of zinc ion and maneb were less effective. CGA-48988 applied to the soil through irrigation or transplant water offers an effective, easy, and economic method of controlling blue mold on tobacco in seedbeds and in the field.

TUBOLY, L., GABORJANYI, R. y KIRALY, Z. Induced resistance in tobacco to blue mould (*Peronospora tabacina*) by TMV infection: Acta Phytopathologica Academiae Scientiarum Hungaricae 5(2-4):211-213. 1970. (363

Resumen también en francés.

Plants of *Nicotiana tabacum* cv. Samsun, grown under greenhouse conditions, were inoculated with TMV, then with *Peronospora tabacina* on the 7th, 14th, 21st and 28th days after. By comparison with the non TMV-inoculated controls, at the 8-leaf stage, the numbers of conidiophores were with respect to the previous dates, reduced by: 63%, 72-36%, 63-7%, 51-18%, respectively. It seems that the systematization of the virus increases the resistance to blue mould. (CORESTA Information Bulletin, no. 4:1158).

_____. Outbreaks of *Peronospora* epidemics and present day control measures (En húngaro). Növényvédelem, no. 7(10):433-440. 1971. (364

Resumen también en francés.

A survey of tobacco blue mould in Europe; mode of propagation; influence of weather conditions. The chemicals recommended for treatment are, in decreasing order of efficiency: Antracol (Zn propylene-bis-dithiocarbamate), Mancozeb (Zn and Mn dithiocarbamate); zineb (Zn dithiocarbamate) is not sufficiently effective. (CORESTA Information Bulletin, no. 1: 1494).

_____. The appearance of a new aggressive strain of blue mould of tobacco in Hungary (En húngaro). Növényvédelmi Kutató Intézet Közleményei 8:175-187. 1974. (365

The new biotype of *Peronospora tabacina* which appeared in 1972 infects resistant tobacco varieties and also *Nicotiana debneyi*. The source of inoculum, accumulated during the growing period, caused an epidemic on resistant varieties which was more severe than that seen on commercial varieties under similar conditions. (Review of Plant Pathology 55:881).

_____. Damaging of blue mold on tobacco (En húngaro). Dohanyipar 22(4):135-137. 1975. (366

UHRIN, P. A study of the fungicides chosen for the control of tobacco blue-mould at Bab in 1972-74 (En cheko). Bul. Tabak. Priem. 17:51-58. 1974. (367

Resumen también en francés.

Among the products tested in micro-plots of tobacco var. Monte Calme Jaune, an 0.2 per cent concentration of Dithane M45 was the most effective. Perozine 75B and Polymarcine were as effective as Dithane M45 but at a concentration of 0.4 per cent. In practice, applications of Dithane M45 (0.2%) or Perozine (0.4%) every week during cold, rainy periods, are recommended. (CORESTA Information Bulletin, no. 3-4:6700).

_____. Methods for testing the resistance of tobacco (*Nicotiana tabacum* L.) to *Peronospora tabacina* Adam. Sborník Vysoké Skoly Zemedelské v Praze, A 25:116-124. 1978. (368

Nine varieties from the CORESTA collection, grown in the field, were provided with shade and irrigation after repeated inoculations commencing at six weeks of age, and both the type and incidence of attack were recorded at intervals up to seven weeks after the first inoculation. Results obtained by these means agreed well with the known relative resistances of these varieties to *P. tabacina*, whereas a concurrent trial, using the standard CORESTA technique with neither shade nor irrigation, gave inconclusive results. Chemical Mutant and Samsun showed the strongest resistance, but in most varieties, and particularly in the susceptible Burley line 14, the lower leaves escaped infection. (Plant Breeding Abstracts 50:4189).

UOZUMI, T. Introduction of the cotyledon test used for the test of blue mould resistance in tobacco (En japonés). Bulletin of the Iwata Tobacco Experimental Station 47(4):45-48. 1972. (369

Resumen también en francés.

The cotyledon test is described according to the method used in the German Federal Republic. The first results obtained with several Japanese varieties are given. (CORESTA Information Bulletin, no. 1:2432).

URECH, P. A. y SCHWINN, F. I. Propriétés d'une nouvelle famille chimique active contre les péronosporales et de CGA 48 988 en particulier. Phytiatrie-Phytopharmacie 27(4):239-247. 1978. (370

The chemical characteristics of CGA 48 988, its toxicity and biological properties are discussed. Results are presented of trials against *Plasmopara viticola* on grapevine, *Phytophthora infestans* on potato and *Peronospora tabacina* on tobacco. Due to the persistence of the fungicide intervals between treatments can be increased. The ascending systemic spread and high activity of the chemical within the plant enable new shoots to remain protected for 2-4 weeks. As CGA 48 988 is rapidly absorbed by the green parts of the plants its effect is independent of weather conditions. (Review of Plant Pathology 59:4943).

* VANBERCIE, R. Meetings of the working groups "Agronomy" and "Phytopathology" of CORESTA, 1973 (En francés). L'Agronomie Tropicale. Serie Agronomie Générale. Etudes Scientifiques 29(6/7):753-756. 1973. (371

The system for testing resistance to *Peronospora hyoscyami* was modified. The CORESTA catalogue had 23 additions, among them four Tunisian varieties

resistant to *P. hyoscyami* and a variety from IRAT resistant to *Erysiphe cichoracearum*. (Plant Breeding Abstracts 45:4772).

* VARDABASSO, A. Test di resistenza alla *Peronospora tabacina*, in pieno campo, su diverse varietá e linee di tabacco. Il Tabaco 76(744):19-27. 1972. (372

In 1972 in Scafati (Italy) a resistance test was done on *Peronospora tabacina* Adam for native and foreign tobacco cultivars, resistant or not to blue-mould. All the cultivars in the seedbeds were treated whereas the ones in the field were not treated, to favour the natural *Peronospora tabacina* infection. The best results for *Peronospora tabacina* resistance were obtained with B 181-1, 5-94 P.5 and B 104-1 (oriental tobacco), with W-10, Pereg 604/1 and W-1 (flue-cured tobacco) and with W M-11, W A-13, W R-14, 1001 A x Burley G. R. x 5.55 P.13 (Burley tobacco).

* _____. y SCHILTZ, P. Report on the collaborative experiment carried out in 1973 to determine the virulence of *Peronospora tabacina*. CORESTA Information Bulletin, no. 4:12-17. 1973. (373

También en francés.

Seven varieties and breeding lines and one interspecific hybrid were grown in eleven countries; in most of the countries collaborating in the experiment, one local variety (which differed according to country) was included in the tests. The most resistant was a line from Australia designated Chemical Mutant. Bel 61-10 and GA955 also possessed good field resistance. (Plant Breeding Abstracts 44:8858).

VASIL'EV, A. E. y BOGOYAVLENSKAYA, R. A. The ultrastructure of leaves of *Nicotiana tabacum* freed from infection by *Peronospora tabacina* Adam (En ruso). Mikologiya i Fitopatologiya 9(6):468-472. 1975. (374

In infected tobacco leaves there are numerous intercellular hyphae and haustoria, with ultrastructure characteristics of active cells. Most host cells show marked ultrastructural effects, including changes in their membranes, fewer chloroplasts and mitochondria and an increase in free ribosomes. With increased air temps. development of the pathogen ceases; mycelium and haustoria die and most leaf cells have normal ultrastructure. (Review of Plant Pathology 55:2356).

VINOGRADOV, V. A., SHINKAREV, V. P. y SARYCHEV, Y. F. On the origin of *Peronospora tabacina* (En ruso). Mikologiya i Fitopatologiya 6(6):517-519. 1972. (375

In this review the authors support the hypothesis that *P. tabacina*, causing blue mold of tobacco, originated in Australia. (Tobacco Abstracts 18:353).

_____. *et al.* Types and genetic sources of the resistance of blue mold of tobacco (En ruso). Genetika 12(1):24-32. 1976. (376

_____. y TERENT'EVA, A. I. Method of complex assessment of horizontal and vertical resistance in tobacco to blue mould (En ruso). Tabak, no. 1:52-53. 1977. (377

This method is based on the assessment of blue mould on 3 standard tobacco varieties. Lead infection is measured on a 5 point scale. Rates of 50-60 per cent on the leaf surface of the susceptible

control in the glasshouse and 21-30 per cent in the field are optimum for selecting forms with horizontal resistance. The inoculum potential is sufficient for selecting for vertical resistance. (Review of Plant Pathology 57:4132).

VINOGRADOV, V. A. *et al.* Types and genetic sources of blue-mold in tobacco. Soviet Genetics 12(1):14-20. 1977. (378

A study has been made of blue-mold resistance in tobacco. Australian *Nicotiana* species have vertical (specific) resistance to both races of *P. tabacina*. The South American section Tomentosae has modifier genes which ensure high resistance to both races. Various forms of *N. tabacum* show types of horizontal resistance (adult-plant, stem, etc.). Disease control and breeding must be based on the consideration of both vertical and horizontal resistances. (Tobacco Abstracts 21:945).

VOGEL, F. The importance of methods of disinfection for the prevention of tobacco disease (En alemán). Deutsch Tabakbau, no. 19:165-167. 1971. (379

Resumen también en francés.

Although planters use preventive spraying they often hesitate to disinfect seedbed soil and frames, which appears to be indispensable for the control of *Peronospora tabacina, Thielaviopsis basicola, Pseudomonas* and TMV, the first symptoms of which are described. Disinfection is effected with formaldehyde at 2 per cent at the end of autumn or beginning of spring, 8 weeks prior to sowing. It is necessary to use fresh manure, and peat and/or compost previously sterilized in the manner indicated with formaldehyde at 2 per cent, and unused plants should be pulled up. The crop rotation is at least 3 years with, if possible, a cereal as the preceding crop. (CORESTA Information Bulletin, no. 1: 1495).

_____. Testing of new tobacco varieties for blue mold, and brown rib disease resistance (En alemán). Deutsch Tabakbau 51(4):30-31. 1971. (380

_____. The importance of hygiene for blue mould control in the seedbed and in the field (En alemán). Deutsch Tabakbau 53(1):4-5. 1973. (381

Resumen también en francés.

Disinfection of seedbed frames and soil after transplanting is recommended, using a 2 per cent formol solution. Advice is also given on sowing densities (formation of a microclimate), watering conditions as a function of temperature (risks of condensation) and the use of Zineb as soon as seedlings appear. For control in the field, a four-year rotation system, sufficient spacing (62.5 x 50 cm), the use of Zineb, early harvesting, disinfection of barns, are recommended. (CORESTA Information Bulletin, no. 2:2732).

_____. Study of the resistance of new blue mould resistant tobacco lines to *Sclerotinia sclerotiorum* (En alemán). Deutsch Tabakbau 56(23):318-320. 1976. (382

Of four lines resistant to *Peronospora hyoscyami* and inoculated with *S. sclerotiorum*, three had 6-15 per cent of the sclerotia formation of the control; in the second generation, all four had 4-14 per cent. (Plant Breeding Abstracts 48:599).

* VULETIC, N. Effect of blue mold on chemical composition of flue-cured tobacco in Yugoslavia. (Sumario). CORESTA Information Bulletin, no. Especial:82-83. 1976. (383

Documento presentado en: International Tobacco Scientific Congress, 6th, Tokyo, 1976.

Resumen también en francés.

After 1960, blue mold caused severe losses in all types of tobacco grown in Yugoslavia. Field protection became costly, not effective and unpopular among tobacco growers. That was the reason for extensive research in development of the resistant varieties. Presently, flue-cured varieties in Drava valley possess moderate tolerance to blue mold, but in Sava valley, where varieties susceptible to blue mold are grown, lower parts of leaves are affected each year. Analytical data show that the components which contribute to quality decreased while those which are not needed for quality increased significantly in diseased leaves. Total sugar content fell from more than 28 per cent in healthy to less than 7 per cent in diseased leaves. Total nitrogen increased from 1.60 per cent in healthy to 2.20 per cent in affected leaves. The protein nitrogen content increased from 1.05 per cent in healthy to 1.45 per cent in leaves with blue mold. Soluble nitrogen fractions were higher in diseased tobacco. Nicotine and nornicotine did not change significantly. Tobacco injured with blue mold produced twice as much ash (27%) as the healthy leaves from the same stalk position (12%). Potassium, calcium and magnesium for that reason are higher in diseased leaves. Thus, the quality constituents which were examined all decreased with the exception of the alkaloids and potassium.

WARK, D. C. Development of flue-cured tobacco cultivars resistant to a common strain of blue mold. Tobacco 171(16):19-22. 1970. (384

Two new tobacco cultivars resistant to the common Australian strain of blue mold have been developed. The cultivars resulted from the backcross technique with *Nicotiana goodspeedii* being the donor parent. Six backcrosses were required in the development of the cultivar Sirogo and seven backcrosses in the case of Sirone. At least one selfing was made following each backcross. Both cultivars compare favorably with good commercially grown cultivar Hicks in both yield and quality. Chemical tests and leaf examination by cigarette manufacturers have shown the cured leaf from the new cultivars to be essentially the same as that from the Hicks control plots in the same trials. (Tobacco Abstracts 15:230).

_____. Breeding for resistance to tobacco mosaic. Australian Tobacco Growers' Bulletin, no. 20:14-16. 1972. (385

Resumen también en francés.

In Australia, crosses have been made between Virginia 45, an American-bred mosaic-resistant flue-cured cultivar and Sirogo, a blue-mould resistant flue-cured cultivar. Back-crossing to mould resistant cultivars has produced breeding lines resistant to both diseases and only slightly inferior in quality to the cultivars at present being grown. Efforts are being made to stabilise these lines. (CORESTA Information Bulletin, no. 2:111).

WARK, D. C. The development of blue mould resistant cultivars of tobacco in Australia. *In* Australia. CSIRO, Division of Plant Industry. Annual report 1975. pp. 31-33. (386

Most of the species of *Nicotiana* which have lines resistant to *Peronospora hyoscyami* are endemic to Australia but *N. knightiana*, which is native to southern Peru, has also shown some resistance. Lines within a species from different geographical areas vary in resistance. The breeding of the resistant varieties Sirogo and Sirone is described. Three strains of the fungus have been recongnized. Sirogo and Sirone are resistant to strain APT1. The level of resistance to strain APT2 within the genus *Nicotiana* is much lower than the level of resistance to strain APT1. Two lines with resistance transferred from *N. excelsior* and *N. velutina*, respectively, to *N. tabacum* inhibit spore production. These two back-cross lines and some others with resistance to strain APT2 transferred from *N. excelsior* or *N. exigua* have been back crossed to Sirogo and Sirone. One line has shown high yield and quality in the field in Victoria and appreciable resistance in three seasons. (Plant Breeding Abstracts 48:4005).

_____., WUTTKE, H. H. y BROUWER, H. M. Resistance of eight tobacco lines to blue mold in South Queensland. Tobacco Science 20:104-107. 1976. (387

También en: Tobacco International 178(15):127-130. 1976.

Observations were made on the natural infection of tobacco cultivars and breeding lines grown in replicated trials at Beerwah in the Moreton district of South Queensland. This district is notorious for the regular occurrence of blue mold caused by a strain (A.P.T.2) of the fungus able to infect cultivars resistant to the common Australian strain (A.P.T.1). One breeding line derived by backcrossing from *Nicotiana excelsior*, one from *N. velutina* and two from *N. debneyi* suffered the least damage from blue mold. Cultivars bred for resistance to A.P.T.1 suffered less damage than the susceptible cultivar Hicks. Lines that showed the severest leaf symptoms also suffered most loss from stem infection. Three donor parents (*N. excelsior*, *N. velutina* and *N. debneyi*) appear to be equally useful as sources of resistance to A.P.T.2. (Tobacco Abstracts 21:2675).

* WITTMER, G. *et al.* Progressi della selezione per resistenza alla *Peronospora*. Il Tabaco 75(739):9-28. 1971. (388

The more interesting *Peronospora*-resistant varieties created by the Istituto Scientifico Sperimentale per i Tabacchi, as they are at present after simple mass selection, are described from the practical point of view by a bio-anagraphic schedule based on the results of a five years trial at field. Preliminarly, a synthesis is given of the experimental programme which is the background of these new tobaccos, touching upon research planning, work hypothesis, methods and techniques formulated or utilized during this programme.

* _____. Tobacco seed and free marketing. Il Tabaco 76(744):1-8. 1972. (389

In trials with three lines of Burley tobacco, data on the resistance to *Peronospora tabacina*, leaf quality and nicotine, sugar and N composition were collected. The availability of seed is discussed. (Field Crop Abstracts 26:5864).

WUTTKE, H. H. Blue mould resistance in tobacco. Australian Tobacco Growers Bulletin, no. 20: 6-10. 1972. (390

Resumen también en francés.

On the basis of extensive testing over six years, two lines, resistant to the common blue mould strain APT1 in the Mareeba-Dimbulah district, were released as new cultivars, i.e. Sirogo and Sirone; their resistance derives from *N. goodspeedii*. These are at least equal to the commercial variety Hicks in respect of yield, quality and chemical composition. For the South Queensland, New South Wales and Victorian tobacco growing districts, where the strain APT2 occurs, selections Beerwah G.G. abd Beerwah H. are used; their resistance derives from *N. debneyi*. Crosses were also made with Canberra backcross lines. The bases for the resistance of these backcrosses were *N. excelsior* and *N. velutina*. (CORESTA Information Bulletin, no. 2:2734).

YAKOVUK, A. S. The yield of first-generation tobacco hybrids and their resistance to *Peronospora hyoscyami* (En ruso). Sb. Nauchno-Issledovatelskogo Rabot VNII Tabaka i Makhorki, no. 158:54-57. 1973. (391

The level of resistance in the F_1 hybrids was determined by the genetic characteristics of the resistant variety; the progeny of Bel 61-9 had the highest resistance. The hybrids gave a high yield in various soils and climatic zones. The yield of hybrid seed from crosses in different years was practically the same regardless of the year in which the seed was produced. (Plant Breeding Abstracts 46:3583).

_____. Tobacco hybrids of the heterotic type - important resources for increasing yield (En ruso). Tabak, no. 3:60-63. 1980. (392

Peremozhets 83, which is susceptible to *Peronospora tabacina*, was crossed with the resistant varieties Bel 61-9, Hicks Resistant and Immunnyi 580. All the hybrids outyielded Peremozhets 83 (by 2.5-10.6 c/ha). The percentage of resistant plants was 78 per cent in Peremozhets 83 x Immunnyi 580, 76 per cent in Peremozhets 83 x Hicks Resistant and 81 per cent in Peremozhets 83 x Bel 61-9. Hybrids of Immunnyi 580, Trebizond 219, Peremozhets 83 and Dubec 566 bred in Krasnodar using cytoplasmic male sterility (CMS) derived from *Nicotiana debneyi* were inferior in yield to their normally produced counterparts, but hybrids of Samsun 27, Trebizond 3072, Dubec 44 and Ostrolist 2747 produced in Armenia using CMS were in most cases equal in yield to their normally produced counterparts. The highest-yielding hybrids were generally obtained using CMS derived from *N. plumbaginifolia* and *N. tabacum*. Information is presented on some of the most useful hybrids bred in recent years. (Plant Breeding Abstracts 51:1378).

YILDIZ, M. y KARACA, I. Resistance of the principal Turkish tobacco varieties to downy mildew. Journal of Turkish Phytopathology 1(3):104-107. 1972. (393

In the present investigation, the resistance behaviour of 22 Turkish tobacco varieties to downy mildew, *Peronospora tabacina*, was determined by cotyledon test. The percentage of the diseased plants in the varieties ranged from 92.29 to 100 per cent which indicated that the varieties were highly susceptibl to downy mildew. (Tobacco Abstracts 22:1603).

ZALPOOR, N. The appearance of a new race of *Peronospora* in Iran (En alemán). Entomologie et Phytopathologie Appliquées, no. 29. 1970. 5 p. (394

Resumen también en francés.

The *Peronospora* epidemic first observed on tobacco in northern Iran in 1962 lead to blue mould resistant varieties (Resistant Hicks) being grown. In 1967 blue mould appeared again on the variety Resistant Hicks in Guilan province. The spores tested on 5 reputedly resistant varieties were infectious, whereas the spores of common blue mould were not. It is therefore a new race of *Peronospora* . This new race has now spread to Mazandaran province. (CORESTA Information Bulletin, no. 1:222).

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