

UDK 632.9

YU ISSN 0372-7866

INSTITUT ZA ZAŠTITU BILJA — BEOGRAD
INSTITUTE FOR PLANT PROTECTION — BEOGRAD

Z A Š T I T A B I L J A

(PLANT PROTECTION)

VOL. 36 (4) BROJ 174, 1985. GOD.

CONTENTS

Scientific papers

M. Bošković

Virulence investigation of *Puccinia recondita* f. sp. *tritici* and screening of wheat material for specific resistance — — — — 355—356

Šu Li, A. Marić, S. Maširević

Biological and epidemiological studies of *Phomopsis* sp. (*Diaporthe* sp.) in sunflower — — — — — — — — — — 369—370

B. Borić

Cultures growth and reproductive organs formation of *Pleospora herbarum* (Pers. ex Fr.) Rabenh. at different temperatures and pH values — — — — — — — — — — 377

F. Balaž

Effect of crop stand on water status in soil and plants and on the occurrence of *Fusarium* rot of corn stalks — — — — — 388

B. Palaveršić, H. L. Warren

Sporulation and viability of *Fusarium graminearum* grown on liquid media and development of rot on infected stalk — — — 397

D. Čamprag, J. Đurkić, R. Sekulić, T. Kereši, R. Almaši, R. Thalji

The larval population density of *Elateridae* (Coleoptera) on different crops in the region of Vojvodina — — — — — — — 406

D. Čamprag, J. Đurkić, R. Sekulić, T. Kereši, R. Almaši, R. Thalji

Contribution of the study of species belonging to the family *Elateridae* (Coleoptera) in the soils of wheat fields in Vojvodina region during a period from 1961 to 1983 — — — — — — — 415—416

Z. Korunić, D. Hamel-Koren

Effectiveness of deltamethrin and pirimiphosmetyl against stored product insects — — — — — — — — — — 423

Professional paper

M. Arsenijević

Contemporary nomenclature and taxonomy of phytopathogenic bacteria — — — — — — — — — — 440

- Freitas A. P. do C., Freitas L. C. (1978): *Puccinia recondita* Rob. IX. Pathogenicity of cultures obtained in continental Portugal (1969—1971). *Agronomica Lusitana* 38 (4), 275—284.
- Hassan S. F., Hussain M. and Rizvi S. A. (1977): Investigations on rusts of wheat in Pakistan. *Cereal Rusts Bulletin*, Vol. 5, Part 1, 4—11.
- Kostić B. i Bošković M. (1974): Varijabilnost virulentnosti *Puccinia graminis* f. sp. *tritici* i *Puccinia recondita* f. sp. *tritici* i izvori specifične otpornosti u *Triticum* spp. *Agronomski glasnik*, br. 9—12, 463—470.
- Metreveli T. G., Mikhailova L. A. (1976): Genotypic composition of the population of the pathogen of brown rust of wheat in Georgia. *Soobschcheniya Akademii Nauk Gruzinskoj SSR*, 84 (3), 713—716.
- Paradies M. (1978): Razze e biotipi di *Puccinia recondita* f. sp. *tritici* identificati in Italia nel 1977, efficacia di alcuni geni di resistenza e comportamento in serra di frumenti teneri e duri (*Triticum aestivum* L. e *Triticum durum* Desf.). Istituto di patologia vegetale dell' universita degli studi, Bari, Italia.
- Sobet T. M. (1976): Identification of genes governing resistance to leaf rust races (*Puccinia recondita* Rob. ex Desm.) in some local and introduced wheat varieties. Ph. D. Thesis, Cairo, University.
- Samborski D. J. and Dyck P. L. (1968): Inheritance of virulence in wheat leaf rust on the standard differential wheat varieties. *Can. J. Genet. Cytol.* 10: 24—32.
- Siniscalco A., Paradies M., Famelli C. et al. (1978): Risultati delle prove di campo eseguite nel 1977—1978 sul comportamento di frumenti verso ruggini e oidio. Istituto di Patologia vegetale dell' Università — Bari, Istituto sperimentale per la cerealicoltura Roma, 1—57.
- Smith R. T., Kilpatrick R. A. (1978): Effectiveness of genes for leaf rust resistance in International wheat Rust Nurseries, 1970—1975. *Euphytica* 27 (2), 511—519.
- Zadoks J. C. (1965): Epidemiology of wheat Rusts in Europe. *FAO Plant Prot. Bul.* 13, 97—108 pp.

(Primitljeno 27. 05. 1985)

VIRULENCE INVESTIGATION OF *Puccinia recondita* F. SP. *TRITICI* AND SCREENING OF WHEAT MATERIAL FOR SPECIFIC RESISTANCE

by

M. Bošković

Faculty of Agriculture, Novi Sad

Summary

In this paper are presented summarized data on identified virulences of *Puccinia recondita* f. sp. *tritici* and on sources of resistance in Yugoslavia during 1975—1979.

For analysis of rust population have been firstly used international differential near isogenic wheat lines — Lr. 2A, Lr. 2D, Lr. 3, Lr. 10, Lr. 16, Lr. 17 and Lr. 18. The high frequency of virulences in all isolates, on these lines clearly indicated the necessity of introducing new differentials for the analysis of this kind.

Virulence frequencies of the mixed cultures from 1974 has served as a base for introduction of new differential genotypes. Thirteen additional experimental wheat varieties and lines were chosen and used for the analysis of rust samples in 1975—1979. Quite good results of virulence frequencies on seedlings and satisfactory field resistance have been achieved. Along with this set of differentials, the last year have been included three additional sets, one of which as check with standard Lr. genes. A pronounced differential characteristics have been displayed on wheat lines with Lr. genes 10, 15, 21, 23, 24 and 25, as well as on the varieties Tobar 66 (Lr. 1, 2D) and Waldron (Lr. 1, 2A, 10).

In the same period many wheat entries from Intern. Wheat Rust Nurseries have been tested each year with leaf rust under heavy epidemics.

The best resistant ones have been classified in five groups, according to their resistance and feasibility for breeding.

- kolektiv autora: Zbornik radova Savetovanje o suzbijanju bolesti suncokreta hemijskim sredstvima, Novi Sad, 1982.
- kolektiv autora: Zbornik radova o suzbijanju bolesti suncokreta hemijskim sredstvima tokom 1983. godine u Vojvodini, Novi Sad, 1983.
- Marić A., Maširević S., Fayzalla S. (1980): Pojava sive pegavosti stabla (*Phomopsis* spp.) do sada nepoznate bolesti suncokreta. Glasnik zaštite bilja br. 12, Zagreb.
- Marić A., Maširević S., Šu Li (1982): Prilog proučavanja *Phomopsis* spp. *Diaporthe* sp., prouzrokovala sive pegavosti stabla suncokreta. Zaštita bilja br. 162, Beograd.
- Mihaljčević M., Petrov M., Muntanola-Cvetković M. (1980): *Phomopsis* spp. — novi parazit suncokreta u Jugoslaviji. Savremena poljoprivreda br. 11—12, N. Sad.
- Muntanola-Cvetković M., Mihaljčević M., Petrov M. (1981): Vrste rodova, *Diaporthe* i *Phomopsis*, zabeležene u Jugoslaviji. Savremena poljoprivreda br. 7—8, Novi Sad.

(Primljeno 10. 07. 1985)

BIOLOGICAL AND EPIDEMIOLOGICAL STUDIES OF *PHOMOPSIS* SP. (*DIAPORTHE* SP.) IN SUNFLOWER

Šu Li, A. Marić and S. Maširević

Faculty of Agriculture, Novi Sad

Summary

Much work has been done in last few years on *Phomopsis* sp. (*Diaporthe* sp.), one of the most destructive parasites of sunflowers in Yugoslavia. This report presents the results of a two-year investigation on some aspects of the epidemiology of the fungus.

The development of the fungus on PDA was successful in a wide range of temperatures (between 7—30°C), with an optimum of about 25—27°C (Tab. 1).

It was concluded on the basis of the results of inoculation in greenhouse conditions that the usual infection sites are mature leaves, leaf petioles and especially the damaged tissue on sunflower stem underneath the base of the leaf petiole (Tab. 2). First symptoms of the disease appear regularly on the basal parts of plants at the beginning of flowering stage. Besides the suitable microclimatic conditions in these places, that phenomenon could be explained by the sensitivity of senescent tissue of plants to the parasite. The growth period between buddings and flowering is most suitable for attacks by the fungus. However the disease is successfully controlled by two treatments with systemic fungicides during that period.

Although the parasite can be transmitted from one year to another by seed and volunteer plants, perithecia are the main source of infection. A small number of perithecia forms in fall on plant residues. The fungus is capable of producing perithecia in winter, in infected plant residues are exposed to room temperature in a growth chamber. In 1982. first mature perithecia were observed in early May; in 1983, they were observ-

ed a month earlier, because of higher temperatures (Table 3). Perithecia form on plant residues throughout the sunflower growing season, but most intensively during and after long rain spells (May-June).

Ascospores are released from mature perithecia in wet conditions and at temperatures above 10°C. They are being released for a relatively long period of time (17 days) under optimal condition for the fungus (most chamber, 25°C). The dynamics of ascospore release is shown in Graph 1. In field conditions, the released ascospores are disseminated by wind (Graph. 2).

There exist large differences in the intensity of infection among sunflower crops sown at different dates, although first symptoms appear regulary at the beginning of the stage of flower. Disease attack is in corelation with the number of rainy days, which overlaps with the highest population of ascospores in the air, in the period between budding and flowering.

CULTURES GROWTH AND REPRODUCTIVE ORGANS FORMATION
OF *PLEOSPORA HERBARUM* (PERS. EX FR.) RABENH. AT
DIFFERENT TEMPERATURES AND pH VALUES

B. Borić

Institute for Plant Protection, Beograd

S u m m a r y

The influence of temperature ranging between 1 and 40°C and of pH values varying from 3.8 to 9.0 on the initiation of growth of cultures and formation of reproductive organs of *P. herbarum* was evaluated in this investigation.

The optimum temperature for the beginning of growth as well as for the reproductive organs formation of the cultures was 25°C, the minimum and maximum ones ranging between 1—5°C and 30—35°C, respectively.

At the optimum temperature, cultures started their growth on the first day after sowing on the medium; at the maximum temperature the growth began on the third day, and at the minimum temperature at the seventh day.

Perithecia were formed at temperatures varying between 15 and 25°C; however, this process was more abundant and faster (after 10 days) at temperatures ranging between 20 and 25°C. Maturation of perithecia was only possible at lower temperatures — from 5 to 15°C. Under such conditions, ascus formation took first place at 10°C — after 23 days; ascospore formation took place 97 days after the perithecia were exposed to the effect of lower temperatures.

Conidia were formed at temperatures from 10 to 25°C, however, this phenomenon was most rapid and abundant at temperatures varying between 20 and 25°C (after 5 days already).

Growth of *P. herbarum* cultures and formation of reproductive organs occurred on media of different pH values — from extremely acid (3.8) to moderately alkaline (9.0). The optimum medium for culture growth was highly acid (4.9), whereas for the formation of conidia and perithecia was neutral (7.0). Increase in acidity and alkalinity affected more adversely perithecial than conidial formations.

- Dodd J. L. (1980): The role of plant stresses in development of corn stalk rots. *Plant Disease*, Vol. 64, No 6: 533—537.
- Duniway J. M. (1973): Pathogen induced changes in host water relations. *Phytopathology*, Vol. 63: 458—466.
- Gagro M. (1977): Utjecaj dušika na visinu stabljike hibrida BcSC-39-41 i OSSC-218. *Polj. znanst. smotra*, 41 (51): 71—83.
- Krüger W. (1978): Effect of fertilization and crop density on stem rots, stem breaking and yield of maize. *Rev. Plant.*, Vol. 58, No. 12: 5828.
- Marić A., Balaž F., Marković Ž. (1976): Uticaj temperature i padavina na razvoj i štetnost fuzariozne truleži stabla kukuruza (*Fusarium moniliforme* var. *subglutinans*; *F. graminearum*). *Polj. znanstvena smotra*, 39 (49): 213—221.
- Mortimore C. G., Ward G. M. (1964): Root and stalkrot of corn in South-western Ontario III. Sugar leveles as a Measure of Plant vigor and Resistance. *Can. Jour. of Plant Sci.*, Vol 44: 451—457.
- Mortimore C. G., Gates L. F. (1969): Effects of reducing interplant comperation at different stages of growth on stalk rot and yield components of corn. *Can. Jour. Plant Sci.*, Vol. 49: 724—725.
- Palaveršić B. (1979): Uticaj različitih gustoća sklopa u nekih hibrida kukuruza na lom i trulež stabljike. *Zaš. bilja*, 30 (4): 345—352.
- Sarić M., Kastori R., Cupina T., Gerić I., Petrović M. (1978): Praktikum iz fiziologije biljaka. Univerzitet, Novi Sad.

(Primljeno 20. 02. 1985)

EFFECT OF CROP STAND ON WATER STATUS IN SOIL AND PLANTS AND ON THE OCCURENCE OF FUSARIUM ROT OF CORN STALKS

F. Balaž

Faculty of Agriculture, Institute for Plant Protection, Novi Sad

S u m m a r y

Fusarium stalk rot is the most important disease of corn in Yugoslavia. It occurs regularly, year after year, but its intensity oscillates in dependence of a number of factors. In dry years, the intensity of the diseases may be decisively affected by certain agricultural practices. One of them is the stand of corn crop.

We conducted a five-year (1976—1980) small-plot trial in field conditions to study the effect of soil and plant water status, brought about by different stands, on the intensity of occurrence of *fusarium* stalk rot of corn. The disease intensity was found to depend primarily on soil and plant regimens in certain phenophases. Tasseling, pollen shedding, and the end of flower were the most critical phenophases regarding the plant provision with water and the occurrence of *fusarios* stalk rot. A water shortage during these phenophases affects the vitality of corn plants and intensifies the disease attack.

As a rule thick stands suffer more severe soil and plant water deficits in dry years which directly intensify the disease. The majority of the examined indicators of water regimen in plants indicated reliably the water status in corn leaves. The values of actual evapotranspiration were not suitable for the analysis of plant provision with water in the course of the growing season.

- Sutton J. C., Baliko W. 1981: Methods for quantifying partial resistance to *Gibberella zeae* in maize ears. Can. J. Plant Path. 3: 26—32.
- Tuite J. 1969: Plant pathological methods. Fungi and bacteria. Burgess publishing company.
- Twumasi-Afriyie, Hunter R. B. 1982: Lodging — enhancing techniques for use on corn performance trials in short season areas. Canadian Journal of Pl. Sc. 62: 299—304.
- White D. G. 1978: Correlation of corn stalk rot reactions caused by *Diplodia maydis* and *Gibberella zeae*. Plant Disease Reporter 62: 1016—1018.
- Young M. C. 1943: The toothpick method of inoculating corn for ear and stalk rots. Phytopathology 33: 16 (Abstr.).

(Primljeno 3. 01. 1985)

SPORULATION AND VIABILITY OF *FUSARIUM GRAMINEARUM* GROWN ON LIQUID MEDIA AND DEVELOPMENT OF ROT ON INFECTED STALK

by

B. Palaveršić

Faculty of Agricultural Sciences,
Institute for Breeding and Production of Field Crops, Zagreb

H. L. Warren

Purdue University W. Lafayette, Indiana
Department of Botany and Plant Pathology

Summary

Studies were conducted to test *F. graminearum* on several liquid mediums for spore production and to determine the need for aeration.

Sucrose — basal mineral salt medium (SBMS) plus yeast extract both in shake and still culture was the best medium tested for rapid spore production of *F. graminearum*. The number of viable spores decreased significantly after 12 days.

Significant differences between stalk rot resistance of hybrids were determined by artificial inoculation of plants with spores produced on SBMS plus yeast extracts.

In susceptible hybrids the pathogen spread even up to the third internode, but did not significantly increase the severity of natural rot and lodging.

THE LARVAL POPULATION DENSITY OF *ELATERIDAE*
(COLEOPTERA) ON DIFFERENT CROPS IN THE
REGION OF VOJVODINA

by

D. Camprag, Jelena Đurkić, R. Sekulić, Tatjana Kereši, Radmila Almašić
and R. A. Thalji

Faculty of Agriculture, Novi Sad

S u m m a r y

In the region of Vojvodina (the northeastern part of Yugoslavia) the investigations have been made for several years on the effect produced by different cultivated plants and pastures on the density of larval population of *Elateridae*. The investigations were chiefly made on the chernozem and chernozem meadow soil, in which *Agriotes ustulatus* Schall. was the dominant species.

After having grown some crops, even on the untilled areas, there was established the following population density of larvae per sq m: 3.5 on winter wheat, 3.3 on soybean, 1.4 on corn, 1.1 on sunflower, 1.0 on sugar beet, 5.7 on peas, 1.4 on alfalfa and 8.1 on pasture.

Three crops, to wit: corn, sunflower and sugar beet, taken together gave an average of 1.2 larvae per sq m, i.e. 34 p.c. only of their population on winter wheat. These crops represented an unfavourable habitat because of their destructive effect on the click beetle, a more frequent soil tillage (in comparison with the fields under wheat) and an abundant application of insecticides to the control of larvae.

On the fields under alfalfa, although it was a perennial crop with a high density of population and with almost no application of mechanical soil tillage, there was recorded a low average of larval population density (1.4/sq m). This was the result of the intensive drainage and of the compactness of soil, and, on account of this, there occurred a great reduction of the number of eggs and in the population of young click beetle larvae.

Wheat and other cereals represented the main places for oviposition of the click beetle on ploughed fields in the region of Vojvodina. Their reproduction is particularly well affected by the growing of wheat on the same field for 2 and 3 consecutive years. The abundant reproduction of the click beetle could be profitably limited by avoiding the monoculture of wheat, i.e. by replacing wheat growing in a year with other crops (corn, sugar beet and sunflower).

- Štrbac P. (1983): Fauna, bionomija i morfološko-taksonomske karakteristike klisnjaka i trčuljaka (Col.: Elateridae; Carabidae) u agroekološkim uslovima Slavonije i Baranje. Doktorska disertacija, Polj. fakulter, Osijek.
- Tkač M. K. i dr. (1978): Prablemi počvenoj zoologii, 243—244, Minsk.
- Tóth Z. (1978): A Mosonymagyaróvári Mezőgazdasági tudományi Kar közleményei, 3, 3—20.
- Tóth Z. (1980): A hazai mezőgazdaságilag művelt talajokon élő, növénydelemi szempontból jelentős (*Arthropoda*) fajok minőségi és mennyiségi vizsgálata. Mosonymagyaróvár.
- Vukasović P., Camprag D., Đurkić J., Sekulić R. (1970): Zaštita bilja, 108, 87—95, Beograd.
- Zabel A. (1974): Zaštita bilja, 127, 55—63 (magistarski rad). Beograd.

(Primijeno 14. 02. 1985.)

CONTRIBUTION OF THE STUDY OF SPECIES BELONGING TO
THE FAMILY *ELATERIDAE* (*COLEOPTERA*) IN THE SOILS
OF WHEAT FIELDS, IN VOIVODINA REGION DURING
A PERIOD FROM 1961 TO 1983

by

D. Camprag, Jelena Đurkić, R. Sekulić, Tatjana Kereši, Radmila Almaši and
R. A. Thalji

Faculty of Agriculture, Novi Sad

S u m m a r y

Studies of *Elateridae* were conducted in Voivodina (the northeastern part of Yugoslavia) on the areas under chernozem and chernozem meadow soils being the dominant soil types. In the period from 1961 to 1983, analyses were done on 2,477 fields after winter wheat growing, with a total area of about 180,000 hectares. Soil testing was performed in September and October. A method of manual digging holes and test of dug soil was used. A total of 103,296 holes was dug up, the size being most frequently 0,25 sq m. More than 92,000 larvae were collected and determined in the laboratory.

The larvae found were grouped into 8 order among which the dominant ones were *Agriotes* (78% of all larvae collected) and *Adrastus* (21%), especially the former mentioned one. As regards the other orders the most frequent were *Melanotus* and *Athous*. Concerning the density of population the first place was occupied by the order *Agriotes* (3,25/sq m), then followed (*Adrastus* (0,90/sq m) etc.

We registered 18 species, mostly of the order *Agriotes* (9), then followed *Melanotus* (4) while the other orders were represented by a smaller number of species. The most dominant species were the South-European ones, then followed the species spread in Europe-Asia, Europe-Siberia and Palearctic, whereas the Mediterranean species took the last place. Among the individual species regarding the number of collected

larvae, the most outstanding one was *Agriotes ustulatus* Schall. (66%), then followed some species of the order *Adrastus*, then came *Agriotes sputator* L. (8,8%), *A. sordidus* Ill. (1,1%), *A. brevis* Cand. (0,6%), *Melanotus cinerascens* Küst. (0,5%) etc.

As regards the frequent occurrence in the wheat fields the outstanding species was especially *Agriotes ustulatus* Schall. (93% of field was covered with that species), then followed the genus *Adrastus* (77%), *Agriotes sputator* L. (37%), *A. sordidus* Ill. (16%), *Melanotus cinerascens* Küst. (12%), *Agriotes brevis* Cand. (9%) etc.

About 12 to 13 species belonged to the phythofagous ones, mainly from the genera *Agriotes*, *Melanotus* and *Selatosomus*. The most important wheat pests, on the chernozem and chernozem meadow soil in Voivodina were *Agriotes ustulatus* Schall. and *A. sputator* L., especially the former mentioned one. An average of 4,2 larvae per sq m was registered taking together all registered species. If we take into account only phythofagous species then their average density of population amounts to about 3,3/sq m, which makes 78% of the whole population of *Elateridae*.

- Lahue W. D. (1976): Pirimiphos-methyl effect on population of *Tribolium confusum* and *T. castenum* in wheat. *J. Econ. Ent.* 70, 135—137.
- L'Hoste J., Balloy L. et Rauch F. (1969): La protection des blés contre *Sitophilus granarius* (L.), Congrès International des Antiparasitaires, Milan, 6—8 Octobre 1969.
- Wildiey K. B. (1977): The effectiveness of three contact insecticides against a susceptible and a malathion-resistant strain of the saw toothed grain beetle (*Oryzaephilus surinamensis*). Proceedings 1977 British Crop Protection Conference — Pest and Diseases.

(Primljeno 5. 09. 1985)

EFFECTIVENESS OF DELTAMETHRIN AND PIRIMIPHOSMETHYL AGAINST STORED PRODUCT INSECTS

Z. Korunić

»Agrokontrola«, Jugoinspekt, Zagreb

Darka Hamel-Koren

Faculty of Agricultural Sciences,
Institute for Plant Protection, Zagreb

Summary

More trials were set up to establish if there is possibility of using synthetic pyretroid deltamethrin and O.P. pirimiphosmethyl in protection of stored agricultural products. Results of investigations are shown in table 1 and graph 1 and 2.

The trials have confirmed suitability of deltamethrin in combination with piperonyl butoxide in protection of stored agricultural products in a very low dosage of 0.5 ppm of active ingredient. The applied dosage has completely protected the wheat during 168 days against *Sitophilus oryzae*., *S. granarius* and *Rhizopertha dominica* but it was different with species *Tribolium confusum*. In these experiments it was shown that *T. confusum* is resistant on deltamethrin, although deltamethrin has paralyzed pests but mortality was very low. Except of the resistance *T. confusum*, the population from the laboratory of Institute for Plant Protection, Zagreb, the similar resistance has been found at species *Tribolium madens*, the population from the same laboratory.

Pirimiphosmethyl in the dose of 4 ppm has given a complete protection of wheat through 168 days against *S. oryzae* and *S. granarius*. On *T. confusum* the efficacy has been a little bit lower. There was a very good activity against *R. dominica* at the first two evaluations (28 days) but after 56 days the effectiveness was reduced. After 84 days there was no more activity of the applied ingredient on *R. dominica*.

It must be pointed out that deltamethrin causes a paralyzation of insects in a very high percentage when they are in contact with treated wheat. This activity has a great practical value because the paralyzed insects can not damage wheat and they are not able to produce a progeny.

In case that these two insecticides can get a licence for their use in Yugoslavia a very good protection of stored cereals against the insect infestation during a long period of time, could be provided.

**CONTEMPORARY NOMENCLATURE AND TAXONOMY OF
PHYTOPATHOGENIC BACTERIA**

by

M. Arsenijević

Faculty of Agriculture, Novi Sad

S u m m a r y

In the paper is given a survey of literature of the present-day nomenclature and taxonomy of phytopathogenic bacteria and are quoted numerous pathogenic varieties instead of the denominations of bacteria that were so far used.