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VARIABILITY OF *PUCCINIA RECONDITA* F. SP. *TRITICI* ON WHEAT AND TYPES OF RESISTANCE

by

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Summary

In the paper the review of national and international investigations of physiologic specialization of *Puccinia recondita* Rob. ex Desm. f. sp. *tritici* Eriks. et Henn. is presented specially related to the dynamic of changes differential wheat genotypes. The gene-for-gene relationship using Lr monogenic resistant genes in pathogen surveys has been demonstrated, as well as the application of the North American System of Nomenclature for *Puccinia recondita* f. sp. *tritici*. It is emphasized the new approach in European-Mediterranean analysis of the populations of *P. recondita tritici* using gentically diverse sources of resistance, excluding complicated nomenclature systems within pathogen populations.

In the second part the types of resistance for cereal rust pathogen have been discussed, but particularly for *P. recondita tritici* following the review of the most important investigations in the last twenty years.

At the end breeding sources of resistance to *P. recondita tritici* by accumulation of the specific resistance strong Lr genes with several other ones in the wheat background are presented.

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SO FAR INVESTIGATIONS ON ENTOMOPATHOGENOUS MICROORGANISMS OF EUROPEAN CORN BORER (*OSTRINIA NUBILALIS* HBN., *LEPIDOPTERA : PYRALIDAE*) IN YUGOSLAVIA

by

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Summary

The first investigations on entomopathogenous microorganisms of the European corn borer in Yugoslavia, date from the 1920's of this century, when the International laboratory for this pest investigation was established in Zagreb. The first laboratory experiments refered to the limited laboratory reproduction of the cultures of *B. thuringiensis* and their use against the Corn borer.

In field experiments (conducted in the course of 1924-1928), *Bacterium thuringiensis* (isolated from the caterpillars of *Ephestia kuhniella*) was more effective in relation to *Coccobacillus ellingeri* and *Bacterium canadensis (from the Corn borer) and Bacterium galleria* (from *Galleria mellonella*). Caterpillars in the plants treated by *B. thuringiensis* were less grown for about 50% in relation to the caterpillars from untreated plants.

In Yugoslavia as pathogenic microorganisms of the Corn borer caterpillars four species of bacteria have been registered so far: *Coccobacillus ellingeri* nov. sp., *Bacterium canadensis* nov.

sp., *Bacillus thuringiensis* Berliner (*Bacterium thuringiensis* Berliner), *Bacterium galleriae* no. 2. and the fungus *Beauveria bassiana* (Bals.). However, *Bacillus thuringiensis* Berliner is the most important, so the special attention was paid to this species by yugoslav investigators.

In laboratory and field experiments it was proved that *B. thuringiensis* manifested high pathogenic effect on the Corn borer caterpillars. The pathogenic power of *B. thuringiensis* was in straight connection with the forming of christal inclusions in the course of sporulation, which caused paralysis of intestines or of the whole insect and soon after that, caterpillars interrupt the nutrition. The old cultures of *B. thuringiensis* were more virulent than the young ones. Besides high pathogenic effect, unharmfulness of bacterial preparations for human, warmblooded animals and useful entomofauna are big advantage in integral maize protection.

Comparative field experiments (from 1960 to 1967) were carried out with microbiological preparations (on the basis of *B. thuringiensis*) Bactospeine I.P. i Bactospeine no. 101 (french production), then Czech production (from caterpillars *Plodia interpunctella* Hbn.), Baktukal-S (water dispersible powders) and Baktukal-G (granules) (the product of the Serum Institute Kalinovac-Zagreb), Baktukal-P, Entobakterin-3 (water dispersible powder, soviet production) from the caterpillars of *Galleria mellonella*, Boverin on the basis of the fungus *Beauveria bassiana* (Bals.) and the chemical insecticide Pepein-G-S on the basis of DDT as standard, proved that the highest possible efficiency was manifested by Entobakterin (water-dispersible powders and granules). Baktukal manifested lower efficacy in all formulations. Boverin was considerably behind the others, and in many combinations it did not manifest any effect in relation to the check.

So far the experiments in laboratory and field conditions have been carried out with the preparations Dipel, Bactospeine, Bactucide, Nubilacid ect., in different formulations, but the insecticides in granules proved to be of higher efficacy.

B. thuringiensis does not have long residual effect, nor the effect on the second generation of the Corn borrer, which in the last decades, firstly due to mass breading of tollerant maize hybrids, increased several times in relation to the first generation of this pest. Immediately after the application, high pathogenic effect on caterpillars was manifested, and the treatment when maximal number of caterpillars was on leaf or in leaf pit, before tunneling into the stalk was important.

On the basis of *B. thuringiensis*, a large number of preparations has been synthesized so far which nowdays are applied successfully for the control of many pests from the order *Lepidoptera* (Baturad, Bactospeine, Dipel, Bactucide, Thuricide, Kondor, Biodart, Forey, Biobit, Nubilacid i dr.). Most frequently it is pathotype A, variety kurstaki or the strain 3a3b. Most of them (mostly in granular formulation) are also used for the control of the European Corn Borer.

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CHARACTERISTICS OF THE BACTERIUM *PSEUDOMONAS SP.*, A TOMATO PATHOGEN

by

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Summary

In the course of the summers of 1989 and 1990, a severe occurence of the disease was manifested in the form of wilting and necrosis of leaf, stalk and stalk cortical tissue of tomato (Fig. 1). From the tissue of diseased plants several strians of bacteria were isolated, and of which two strains (Pt-127 and Pt-129) and one reisolate (RPt-127) were investigated more detailed.

The investigated strains manifested the following characteristics:

- High degree of virulency and pathogenicity manifested as wilting, necrosis of leaf, leaf petiole, side shoots, stem and stem cortical tissues of inoculated tomato plants (Fig. 2-3).
- Pathogen growth is characterized by cream to yellow colour of colonies and the occurence of yellowgreen and later on also brown pigmentation on medium.
- Bacterium is rod-shaped, gramnegative, asporogenous and has polar flagellation, does not produce oxidase, lecitinase nor arginin dehydrolase; tobacco HR is variable, it causes potato slices rot, and grows in liquid medium with 5% of NaCl, but not at the temperature of 37°C; gelatine

liquefication and amonia producing were positive; starch hydrolysis, nitrate reduction, indole and H_2S production were negative (Tab. 1).

On inoculated carrot slices weak and slow rot is caused, and brown tissue necrosis in onion bulbs, withought typical rot symptoms.

According to this, in spite of some exceptions, we are of the opinion that, so far, the investigated strains manifest the biggest similarity with the bacterium *Pseudomonas viridiflava*, and that they belong to the group of oxidase-negative bacteria of the genus *Pseudomonas*, with an outstanding pectolitic activity on potato slices and creation of yellowgreen and then brown pigmentation on King's medium B.

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SEROLOGICAL IDENTIFICATION OF *ERWINIA AMILOVORA* BACTERIUM, A POMACEOUS TREE PATHOGEN

by

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Summary

With polyclonal antisera, produced in rabbits by native antigens, the referens strain 1430 *Erwinia amylovora* and the strains Du-39 and Ks-89, originated from pomaceous trees, the identification of the cultures of all 11 investigated isolates of this bacterium was possible by the slide agglutination test (Tab. 1-3).

A high homogenicity of the structure of superficial, termolabile antigens of the bacterium *Erwinia amylovora* isolates was proved by the reaction of agglutination in tubes with the same antisera. The occurence of somatic (termostabile) antigens was not proved in two isolates with two antisera (Tab. 4). It makes the basis for the assumption that there are the differences in the structure of somatic antigenes among isolates tested.

OCCURRENCE AND DISTRIBUTION OF APHIDOPHAGOUS COCCINELLIDS (*COLEOPTERA : COCCINELLIDAE*) ON AGRUCULTURAL CROPS AND WILD PLANTS IN VOJVODINA

by

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Summary

In 1981-1992, the composition and differences in coccinellid communities were analyzed from aphid infested stands of agricultural crops (lucerne, sugar beet and sunflower) and weeds. The population density of coccinellids was regularly recorded on localities representing the main landscape types in Vojvodina.

During the period of study, thirteen species were found, eight of them were the most abundant and could be observed in the investigated area every year. The population density of coccinellids depends largely on environmental conditions. Aphid density was generally the most important determinant of coccinellid occurrence. However, plant density was also an important factor influencing population density of *Coccinella septempunctata* and *propylaea quatuordecimpunctata*. Both of these factors changes with the course of the season.

The investigated stands of field crops contain a similar coccinellid communities. These communities consist mainly of *Coccinella septempunctata, Propylaea quatuordecimpunctata, Hippodamia variegata, Semiadalia undecimnotata* and *Scymnus rubromaculatus*. These species represent 93% of total coccinellid population. Other species were represented only by a small fraction.

In early spring wild plants support aphid for adults immigrating from hibernation sites, prior to the invasion and multiplication of most pest aphids on young crops. Since, these aphids remain abundant on many plants until the end of June, they may serve as an alternative prey for coccinellids when their presence is most required on neighbouring infested crops. The availability of sufficient aphids on wild plants for the most of the season delay the period of emigration of beetles to the neighbouring fields. Therefore, wild plants provide an alternate feeding sites for coccinellids. Thus, as a resorvoir for predators, weeds contain more than 30% of the overall coccinellid population.

At the end of April, when mass migration of coccinellid began the adults settled first at the lucerne fields. At the first decade of May the adults were already present at high concentracion. At this time coccinellid population may be reduced by the first cutting of crops. Cutting by harvesters destroys about 48% of coccinellid population. In the climatic conditions of Vojvodina, this crop contains 27,9% of coccinellid population.

In the fields of sugar beet, the adults appeared immediately after settling of aphids (*Aphis fabae*) which occurred at the end of May. The coccinellids became most abundant in first two decades after aphid settling. During July and the first half of August coccinellid population density decreased. This decrease was caused probably bay emigration and partly due to destruction by chemical treatments. Afterwards, the population density of beetles slightly increased in September.

Composition and population density of coccinellids in sunflower crops depends mainly on aphid abundance and plant density. The fields of sunflower, annualy harboured up to 14,3% of the overall population.

The quantitative composition of coccinellid population was different within crops, localities and seasons, however, the qualitative composition was almost similar in all seasons.

CONTRIBUTION TO THE STUDY OF *MACROPHOMINA PHASEOLINA* CHARCOL ROT OF MAIZE STALK

by

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Summary

From diseased maize plants ZPSC 704, in the vicinity of Vlasotince, with simptoms of charcol rot of stalk, *Macrophomina phaseolina* (Tassi) Goidanich. has been isolated. Investigated fungal isolates, at the beggining form whiteish, and latter grayish colony. Very soon colony becomes covered with dark, spherical or oval sclerotia (diametar 42-46 μm in average).

Pathogenicity has been demonstrated on maize seeds, in treatment where seedlings were not watered for four days after germinating. Pathogenicity was not proved on maize plants with four developed leaves.

The optimal temperature for colony growth and sclerocial development is 30°C, minimal temperature 13°C and the maximal 38°C. The most intensive colony growth and sclerotial formation were obtained on Potato-fructose agar and Potato-fructose-glucose agar. Among eleven investigated, the optimal acidity of media were pII 6 and pH 7. No differences in growth and sclerotia formation were observed related to the light conditions.

ALFA-CHLORHYDRINE TOXICITY TO *MICTOTUS ARVALIS* PALL. AND *ARVICOLA TERRESTRIS* l. (*MICROTINAE : MAMMALIA*): LABORATORY TESTS

by

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Summary

Microtus arvaliss Pall and *Arvicola terrestris* L. manifest high susceptibility to alfa-chlorhydrine (3-chlorine-1, 2 propanidol). Average time of death, LD values and values of coeficient of regression for toxicity prove that both populations of voles are relatively high susceptible to the effect of alfa-chlorhydrine, but the population of *A. terrestris* is slightly more susceptible.

The results proved that the average time of death (T_{50}, days) of *M. arvalis*, in relation to *A. terrestris*, was considerably shorter. Average time of death of *A. terrestris* for the tested doses of alfa-chlorhydrine of 78,78 mg/kg; 122,29 mg/kg; 255, 36 mg/kg, 362, 75 mg/kg and 543,77 mg/kg, was: -, -, 3,0, 2,5 and 2,0 days. That means that alfa-chlorhydrine manifested faster its effect to the population of field voles. In no one control group of animals the death was proved.

The values of the lethal dosis of alfa-chlorhydrine are indicative for the investigated voles. The LD_5 values of alfa-chlorhydrine are approximate for both species (80,57 mg/kg for *M. arvalis* and 81,17 mg/kg for *A. terrestris*). In the LD_{50} values there is difference which is not big (*M. arvalis* 244,27 mg/kg, and *A. terrestris* 224,62 mg/kg of alfa-chlorhydrine). The LD_{90} values of alfa-chlorhydrine manifest even bigger difference between these two species, so the value for *M. arvalis* is 741,11 mg/kg, and for *A. terrestris* 620,03 mg/kg. The coefficient of regression for *M. arvalis* is 3.416 and for *M. terrestris* 3,730. All cited results prove that both population of voles are highly susceptible to the effect of alfa-chlorhydrine, but the population of *A. terrestris* is slightly more susceptible.

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Preliminary communication

SPATIAL PATTERN OF ALTERNARIA MALI, THE CAUSAL AGENT OF ALTERNARIA BLOTCH OF APPLE

The spatial pattern of Alternaria blotch of apple (caused by *Alternaria mali*) in an orchard was described using indices of dispersion, two-dimensional distance class analysis, and spatial autocorrelation analysis. An aggregated to strongly aggregated pattern of equally sized quadrats (containing 40 Red Delicious trees each) occurred within the orchard. The detection of an edge effect (greated disease incidence on the edges of the orchard) provides evidence for the involvment of arthropods in the epidemiology of this disease as well as for the introduction of *A. mali* conidia from the outside the orchard.

Introduction

Alternaria blotch of apple, caused by *Alternaria mali* Roberts, has become a serious disease in southeastern United States. Since its initial identification in 1988 in western North Carolina (Filajdić and Sutton 1992), it has been reported from all four neighboring states. At the same time, the intensity of Alternaria blotch has increased in the area where it was found initially. In the period from 1988-1993, defoliation of up to 70% was recorded in experimental blocks in two orchards of Red Delicious. The pathogen has a potential to spread throughout the apple producing regions of the eastern United States.

A series of studies on epidemiology and etiology of this disease have recently been conducted (Filajdić and Sutton, unpublished). Preliminary data on overwintering of *A. mali* suggest that once a certain inoculum threshold is reached, the presence of additional inoculum early in the season does not increase the significance of the role of inoculum density in the outbreak of Alternaria blotch (Filajdić and Sutton, unpublished). Environmental conditions such as temperature, rain and especially duration of dew periods seem to have the greater influence on the epidemic, once the inoculum threshold is met.

Studies on the characterization of the distribution of pathogens and/or diseased plants in the field were conducted as early as 1940s and 1950s. Spatial pattern analysis became a commonly used tool in plant disease epidemiology in the 1980s (Campbell and Madden, 1990). If proper methods and data analysis are used, spatial pattern analysis can reveal significant findings concerning the epidemiology and biology of a pathosystem.

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