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PREVIOUS INVESTIGATIONS AND PERSPECTIVE OF BIOCONTROL OF PLANT PATHOGENS

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Summary

Modern breeding of the fruit trees, filed crops and vegetables is not possible without chemical control of plant pathogens. Though there are many advantages of chemicals (various fungicides, bactericides and antibiotics), many disadvantages of such plant protection method were recently discussed. Firstly, it is pointed to the adverse effects of chemical pesticides on the environment and human health in general. Due to this, biological control measures got on the importance. A research on biological control of plant protection is a relatively new method with the first significant results obtained in the last 30 years.

The present study points to the importance and the perspective of control of plant pathogens, as well as to the basic mechanism of the activity of antagonistical microorganisms. In relation to this, various practical uses of antagonists for plant protection were noted.

Though, a great progress in this research has been made, biological pesticides are not widely used in practice. Due to this, the further studies are necessary in order to overcome the present problems and use more biological pesticides for plant protection.

Key words: biological control, antagonistic effect, saprophytic microorganisms, phytopathogenic bacteria, phytopathogenic fungi.

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PREVIOUS STUDIES OF PHYTOPHAGOUS INSECTS FOR BIOLOGICAL CONTROL OF PLANTS FROM THE GENUS *EUPHORBIA* L. (*EUPHORBIALES: EUPHORBIACEA* J. ST. HILL.)

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Summary

Annual, biennial and perennial, mostly weed plants belong to the genus *Euphoria* L. (*Euphorbiales: Euphorbiaceae* J. St. Hill.). The genus encompasses about 600 species distributed all over the world. There many wide spread species, though a significant number of them has a limited distribution, while certain of them are even endemic.

In both Europe and Yugoslavia, the plants of the genus *Euphorbia* L. are locally present, occuring very dispersedly, rarely in great associations. Their abundance and deleterious effects have been on a tolerant level for a long period of time and therefore they are not species of the utmost economic importance. In Europe, 121 species of insects (23 species of *Homoptera*, 6 of *Heteroptera*, 37 of *Lepidoptera*, 4 of *Hymenoptera*, 14 of *Diptera* and 37 of *Coleoptera*) develop on plants of *Euphorbia esula* L., *Euphorbia virgata* Waldst. and *Euphorbia cyparissias* L. In countries of former Yugoslavia, 32 species of insects (from seven orders and 13 families) develop on plants of *E. esula* and *E. virgata*, while 29 species of insects (from 6 orders and 17 families) develop on *E. cyparissias*.

The species of following genera were studied in detail in Yugoslavia: *Aphthona (Col.: Chrysomelidae) (Aphthona flava* Guill., *Aphthona lacertosa* Rosenb., *Aphthona nigriscutis* Foudr., *Aphthona ovata* Foudr., *Aphthona pygmaea* Kutsch., etc.), then *Oxycesta geographica* Fab. (*Lep.: Noctuidae*), *Symira dentinosa* (Freyer) (*Lep.: Noctuidae*), *Chamaesphecia empiformis* Esper and *Ch. tenthrediniformis* Den.-Schiff. (*Lep.: Sesiidae*), *Bayeria capitigena* (Bremi), *Dasineura capsulae* (*Dipt.: Cecidomyiidae*), etc.

E. cyparissias, *E. esula* L. and *E. virgata* have been introduced to North America where they have become important weed plants. Upon the studies for biological control of mentioned harmful plants of the genus *Euphorbia* the following species were introduced form Europe (some of them from Yugoslavia) to North America: *Aphthona cyparissias* (Koch), *Aphthona flava* Fuil., *Aphthona nigriscutis* Foudras, *Aphthona czwalinae* (Weise), *Aphthona lacertoas* (Rosenbauer) (*Col.: Chrysomelidae*), *Oberea erythocephala* (Schrank) (*Col.: Cerambicyidae*), *Hyles euphorbiae* (L.) (*Lep.: Sphingidae*), *Lobesa euphorbiana* (Freyer) (*Lep.: Torticidae*), *Minoa murinata* Scop. (*Lep.: Geometridae*), *Chamaesphecia empiformis* Esper, *Chamaesphecia tentrediniformis* (Dren.-Schiff.), *Chamaesphecia hungarica* (Tormala) (*Lep.: Sesiidae*), *Bayeria capitigena* (Bremi) (*Dipt.: Cecidomyiidae*), *Pegomya euphorbiae* (Kieffer) and *Pegomya curticornis* (Stein.) (*Dip.: Anthomyiidae*). Many species have adapted to a new environment and now significantly reduce the population densities of the mentioned weeds.

Key words: Biological control, *Euphorbia cyparissias, Euphorbia esula, Euphorbia virgata, Aphthona cyparissias, Aphthona flava, Chamaesphecia empiformis, Chamaesphecia tentreoiniformis, Chamaesphecia hungarica, Chamaesphecia astatiformis, Hyles euphorbiae, Oberea erytrocephaia, Bayeria capitigena, Dasineura capsulae.*

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ERWINIA AMYLOVORA AS A PATHOGEN OF PEAR IN PARENT FRUIT TREES AND IN APPLE NURSERIES ON NURSERY STOCKS

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Summary

Many bacterial strains were isolated by using nectotic tissues of diseased pear originated from parent fruit trees and from the apple nursery stocks. Investigated strains induced HR on tobacco and pelargonium leaves. Bacterial cells were asporogenous, gramnegative and rode-shaped. They formed round, creamy-white and levantype colonies on NAS mesium; they did not produced fluoroscent pigment on King's medium B.

Oxidase and methyl-red rests were negative and catalase and O/F tests were positive. Acids were produced from glucose, fructose, sucrose and mannitol. All strains caused tissue necrosis forming a pale-yellowish ooze exudate on unripe fruits of pear (cv. William's), plum (cv. Stanley), apple (cv. Idared) and apricot (cv. Hungarian the Best-Magiar Kajszi) artificially inoculated.

The slide agglutination test carried out by using *Erwinia amylovora* antiserum was positive.

Therefore, on the basis of the results obtained it was concluded that *Erwinia amylovora* pathogen was responsible for the fire blight symptoms observed during 1995 and 1996 on pear diseased in parent fruit trees and in nurseris on apply nursery stocks (Fig. 1 and 2).

Key words: *Erwinia amylovora*, bacterium, strains, pathogenicity, cultural characteristics, biochemical-physiological characteristics, parent pear tree, apple nurseries.

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HOST PLANTS OF THE *ERWINIA AMYLOVORA* BACTERIUM SO FAR ESTABLISHED IN YUGOSLAVIA

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Summary

During the last seven years (1989-1996) from the first occurrence of *Erwinia amylovora* in Yugoslavia, the pathogen was experimentally proved on four cultivated fruit trees (pear, quince, apple and medlar) and on two species from spontaneous flora (hawthorn and wild pear).

The first appearance of the strong infection noticed on pear and quince trees in 1989 was the reason for individual fruit trees uprooting or orchards eradication as one of the control measures applied.

Until 1995 apple trees showed infection sporadically, but from 1995 the symptoms of severe blight in many apple cultivars were noticed.

After 2-3 years from the first apperance of the disease in Yugoslavia domestic medlar also expressed the susceptible reaction.

On *Crataegus* (hawthorn) and wild pear (field ash) the symptoms of the disease were also found. From the tissues diseased the pathogen was isolated and the identification was carried out (Table 1).

Since the end of 1996, beside the species mentioned above, *Ervinia amylovora* could not be found on other fruit trees nor on the species from spontaneous and ornamental plants: cotoneaster, pyracantha (firethorn), mauntainash (*Sorbus spp.*) and forsythia (Table 1).

Key words: *Erwinia amylovora*; bacterium; pear; quince; apple; medlar; hawthorn; wild pear; host plants.

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NATURAL ENEMIES OF *TRIALEURODES VAPORARIORUM* WESTWOOD IN YUGOSLAVIA

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Summary

In the region of Yugoslavia 15 species of natural enemies of *T. vaporariorum* were determined. These are: four species of the family *Aphelinidae*, six species from the family *Nabidae* and *Anthocoridae*, seven species from the family *Coccinellidae* and two species from the family of *Chrysopidae*. The species: *Encarsia formosa* Gahan, *Encarsia tricolor* Foerster, *Encarsia partenopea* Masi, *Encarsia lutea* Masi, *Clitostethus arcuatus* Rossi and *Chrysopa phyllochroma* Vesmael were registered for the first time.

Key words: *Trialeurodes vaporariorum* westwood, parasitoids and predators.

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