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## INVESTIGATION ON PRESENCE OF POTATO NEMATODES IN YUGOSLAVIA

The paper deals with the potato nematodes in Yugoslavia and related results of the investigations on their presence in the regions where the potato is growing.

*Key words:* *Globodera rostochiensis*, *G. pallida*, potato, Yugoslavia

### Introduction

The potato nematodes (*Globodera rostochiensis* (Woll.) Behrens 1975, and *G. pallida* (Stone) Behrens 1975) belong to the group of the economically most important phytoparasite nematodes which together with Colorado Potato Beetle (*Leptinotarsa decemlineata* Say) present the most dangerous pests of the potato plants. Both nematode species were introduced from the South America (region of Andes) to Europe and other parts of the world in the middle of the last century.

The first symptoms on the potato plants which indicated the presence of the potato nematodes were recorded in 1881 in Germany (Jones, 1970 according Evans *et al.*, 1990). Twenty years later, the symptoms were recorded in Great Britain and after while in almost whole Europe. However, the species was not described until 1923 when it was described as *Heterodera schachtii rostochiensis*, Wollenweber. Later, the name of species and its taxonomic status were changed. Finally, it was found that two potato nematodes exist — (*Globodera rostochiensis* and *Globodera pallida*).

In 1953, Tanasijević pointed the *H. rostochiensis* as possible dangerous pests in our country. After the efforts of the above mentioned researcher, a number of scientific institutions and workers started to study the *H. rostochiensis* i.e. the potato nematodes.

### Previous investigations on the potato cyst nematodes

The beginning of work of the phytonematological laboratory in the Institute for Plant Protection, Belgrade /1954 — G. Grujičić and Đ. Krnjačić, 8 years later) in the same time presents the beginning of the investigations on the presence of the potato

## RELIABILITY OF THE POTATO PLANT ORGANS IN PROVING THE POTATO LEAF ROLLER VIRUS (PLRV) AND POTATO VIRUS Y (PVY) BY ELISA TEST

The value of extinction of E 405 was studied including tests on the different organs of potato plants to the presence of *PLRV* and *PVY*, i.e. the reliability of diagnosis of these viruses by Elisa test in the different organs of the potato plants.

It was found that the organs of the potato plants are not equally reliable in diagnosis of *PLRV* and *PVY* by Elisa test, i.e. the different values of extinction were obtained.

*Key words:* Potato, viruses, *PLRV*, *PVY*, diagnose Elisa test

### Introduction

The application of a quick, effective and susceptible method in a diagnosis of the potato viruses is of a great importance in a production and a control of a seed potato. The application of ELISA test is a reliable method in diagnosing the *PLRV* and *PVY* (Casper, 1977; Maat et de Bokx, 1978a and b; Gugerli, 1978, 1979 and 1980; Flanders *et al.*, 1990). Casper (1977) and Clarke (1980): pointed that ELISA test successfully discover *PLRV* in leaf, stalk, root veins and tubers. However, Maat et de Bokx (1978a and b) pointed some differences in detection of certain potato viruses from parts of potato plants.

The aim of this paper has been to determine the relation between the extinction value by testing the different parts of potato plants to the presence of *PLRV* and *PVY*, i.e. the reliability of diagnosis of the viruses by ELISA test.

### Material and Methods

In order to investigate the reliability of some parts of potato plants in diagnosing the *PLRV* and *PVY* by ELISA test, the Desiree cultivar infected by these viruses and originated from th infected tube (secondary infection) was used. The investigation involved 8 groups of plants or a number of trials carried in different time periods.

1. In diagnosing the *PLRV* and *PVY* in 2 groups of plants which were infected simultaneously with the both viruses, i.e. in 2 trials, the preparation of the testing plant material was carried out in 2 ways. The first group involved 4 (Graph 1) while the second group involved 11 plants (Graph 2).

## MAIZE (*ZEAMAYS L.*) RESPONSE TO MAIZE DWARF MOSAIC VIRUS

The response of commercial maize hybrids and parental inbred lines to *maize dwarf mosaic virus (MDMV)* was studied. The response was studied with respect to resistance and decrease in yield.

A great amount of susceptibility of maize genotypes dominant in maize production has been determined. Resistance of inbred lines with a local germplasm is greater than the same introduced germplasm. Tolerance of certain inbred lines has also been noticed.

A decrease in yield of virus infected plants is statistically significant, and appears greater if maize infection is coupled with some other stress factor (drought).

*Key words:* Maize, *maize dwarf mosaic virus*, resistance, yield decrease.

### Introduction

The first reports on the appearance of *maize dwarf mosaic virus (MDMV)* in the World, as well as in Yugoslavia, was followed by studies of its mode of action on the diseased plant. Modifications at the cell and tissue level as well as the whole plant level were studied. The adverse effect of MDMV on yield is supported by a substantial amount of data. Generally, the values referring to a yield decrease range from 0 to 50%, (Janson *et al.*, 1965; Tošić and Mišović, 1967; Scott and Nelson, 1972; Genter *et al.*, 1973; Kuhn and Smith, 1977; Ivanović and Stanković, 1987). On the basis of very elaborate studies, Scott *et al.* (1988) claim that each 10% of infected plants decreases the yield by 2.4% whereas Ivanović *et al.* (1990) have determined that the same percentage of infected plants causes a decrease in yield by 3.5 to 4.7%. According to these results the statements made by Gordon *et al.* (1983) may be justified since they assert that the yield decrease due to MDMV is a consequence of slight to complete sterility of the plants.

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This paper represents a section of the PhD Thesis, dissertation held at the Agricultural Faculty of the University in Novi Sad on March 15, 1991.

I am extremely grateful to Prof. Dragoljub Šutić for guidance in this study and serving on my graduate committee.

## THE SELECTION OF SPRING WHEAT SOURCES OF RESISTANCE TO SEVERAL PATHOGENS FROM THE INTERNATIONAL SPRING WHEAT RUST NURSERY

In this work the International Spring Wheat Rust Nursery (540 entries) which contained a rich germ plasma was tested in order to separate the new sources of resistance to one or more pathogens. These sources of resistance should be used in the breeding of spring wheat varieties in the hilly—mountain regions in Bosnia and Hercegovina. Only one line showed resistance to all of the four parasites, while the two genotypes were resistant to all of the three rust species. Considerably more lines were separated in other combinations of resistance.

*Key words:* wheat, resistance, leaf rust, stem rust, yellow rust, powdery mildew

### Introduction

In our country mainly winter wheat is grown, while in European countries the spring wheat varieties dominate. The Mexican spring varieties are well—known by their high yields. The occupied wide regions of India, Pakistan, the Middle East and African countries.

In the last few years, the possibility of growing spring genotypes of wheat in the hilly—mountain regions of Bosna and Hercegovina has been studied (B o r o j e v i ć and D r e c a, 1979; 1981). In these works, the importance of several parasite species as a limiting factor of the successful production was emphasized.

The epidemiological and ecological studies suggest that there are very good conditons for the severe development of *Puccinia recondita tritici*, *Puccinia graminis tritici*, *Puccinia striiformis* and *Erysiphe graminis tritici* (B o š k o v i ć, 1988).

A need for testing a collection rich germ plasma arose in order to determine sources of resistance to the mentioned pathogens; that is of great importance for breeding new resistant spring wheat varieties.

The breeding for resistance to the important wheat parasites started at the beginning of this century. A great deal of resistant wheat varieties was created, mostly to one pathogene (A n d e r s o n, 1961; G r e e n, 1975; S h a r p, 1976; M o s e m a n *et al.*, 1984). The combined resistance to two or more parasites are much more efficient.

## THE EFFECTS OF TEMPERATURES ON THE SPORULATION OF PANDORA NEOAPHIDS (REMAUDIÈRE ET HANNEBERT) AND NEOZYGITES FRESENI (NOVAKOWSKI) REMAUDIÈRE ET KELLER IN MIXED INFECTIONS\*

The effects of temperatures on the sporulation of the fungus *P. neoaphids* and *N. fresenii* in mixed infections of the *B. brassicae* larvae of the fourth stage have been studied under the laboratory conditions. The number of the *P. neoaphids* conidia did not significantly differ from the pure infections but the sporulation lasted shorter. The number of the *N. fresenii* conidia was significantly reduced while the fungus sporulated within the period of 9 hrs. The greatest number of the conidia of both species was formed at 25 C.

*Key words:* *Pandora neoaphids* sporulation, *Neozygites fresenii*, temperature

### Introduction

Ecological conditions play significant role in distribution of the entomopathogenic fungi specially of *Pandora neoaphids* (Remaudière et Hannebert) Humber — the species without resting spores. The entomopathogenic fungi depend on the environmental conditions specially in the phase of sporulation and the germination of conidia. The conditions required for the conidia sporulation have been studied on *Pandora neoaphids* (Wilding, 1969, Milner 1981, Sivčev, 1992). However, there are no literature data on the number of the spores and the intensity of sporulation of this fungus and other entomopathogenic fungi in mixed infections. Under the conditions which prevail in our country, the mixed infections are more abundant during the autumn on the cabbage aphids. Out of the total number of infected aphids their share ranges 2%. In the mixed infections registered in our country the most often are the combinations of the *P. neoaphids* with *Neozygites fresenii* (Novakowski) Remaudière et Keller and *Entomophthora planchoniana* Cornu (Sivčev, 1991). The aim of this paper has been to determine how *P. neoaphids* and *N. fresenii* sporulate in mixed infections at different temperatures.

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## THE EFFECT OF THE INTERACTION BETWEEN *ALTERNARIA MALI* AND *PANONYCHUS ULMI* ON SEVERITY OF *ALTERNARIA* BLOTCH OF APPLE

The effect of the interaction between *Alternaria mali* and *Panonychus ulmi* on the severity of *Alternaria* blotch symptoms on Red Delicious trees was studied during the summer of 1991 in North Carolina, USA.

Disease severity, defoliation, and fruit characteristics such as length, diameter, weight, firmness, soluble solids, and color, were examined at different combinations of disease levels and mite infestations. At both high and low disease levels, disease severity and defoliation were greater in the high mite infestation treatments. In the treatment with high disease level and high mite populations, the fruit diameter, length, weight, and soluble solids were significantly decreased.

*Key words:* *Alternaria mali*, *Panonychus ulmi*, *Alternaria* blotch, North Carolina

### Introduction

During summers of 1989 and 1990, 65 Red Delicious orchards in North Carolina were surveyed for *Alternaria* blotch incidence. A high infestation of European red mite was noticed in most of the orchards severely infected with *A. mali* (N. Filajdić and T. B. Sutton, unpublished). The presence of European red mite was not quantified, but it was an indication that they may have an influence on *Alternaria* blotch development in apple orchards. Chandler and Thomas showed that feeding of leaf miners (*Liriomyza trifolii*) increases infection of muskmelon by *Alternaria cucumerina*. Other studies which showed the influence of mite feeding on apple leaves helped us to develop the methods and experimental design for this research.

The objective of this study was to determine if high infestations of *P. ulmi* increase the severity of *Alternaria* blotch symptoms, as well as quantitative and qualitative fruit characteristics which subsequently influence yield.

## THE LEAF MINERS (AGROMYZIDAE, DIPTERA) OF WHEAT IN SERBIA<sup>\*)</sup>

In the period 1989–1991, the *Agromyzidae* of wheat are studied in several localities of Serbia. We established 8 species: *Agromyza ambigua* Fall., *A. conjuncta* Sp., *A. intermittens* (Beck.), *A. nigrella* Rond., *Pseudonapomyza balkanensis* Sp., *Cerodontha (Poemyza) lateralis* (Macq.), *Chromatomyia fuscula* Zett., *Ch. nigra* Mg. Three species, *Ps. balkanensis*, *Ch. fuscula* and *Ch. nigra* are for the first time found in Serbia, and *Ch. fuscula* is new in fauna of Yugoslavia.

*Key words:* *Agromyzidae*, wheat, Serbia

### Introduction

Among 2500 species of *Agromyzidae* known in the world, 19 species develop on wheat, and some of them are present on the other plants of *Poaceae*, too. As the host plants for some species are not known, but it is suggested they are in *Poaceae*, it could be expected to increase the number of species on wheat and other cereals. Although they attack the leaves of young plants, due to small numbers they usually do not have economic importance, but appearing periodically in great populations some of them can be treated as a potential pests.

In our country, there are no many papers about wheat leaf miners. In the publication about wheat pests in Yugoslavia and neighbouring countries, Čamprag (1980) mentioned 9 agromyzed species: *A. intermittens* (Beck.), *A. luteitarsis* Rond., *A. megalopsis* Her., *A. mobilis* Mg., *A. nigrella* Rond., *A. nigrifemur* Hd., *Domomyza ambigua* Fall., *Pseudonapomyza atra* Mg., *Phytomyza nigra* Mg. Studying *Diptera* on wheat in Serbia, Tešić (1966) found 3 agromyzid species, (*A. ambigua*, *A. sintermittens*, *A. nigrifemur*), and Spasić (1988), two, (*A. nigrella*, *Cerodontha (Poemyza) lateralis* Macq.). In Macedonia, Ančev (1974, 1976 and 1980. cit. Čamprag) established 6 species, (*A. nigrella*, *A. intermittens*, *A. luteitarsis*, *A. megalopsis*, *Ps. atra*, *Ph. nigra*), and in 1970/71., *A. nigrella* occurred in large numbers with grater damages.

<sup>\*)</sup> These investigations were partly funded by the Republic project „Plant protection“

## COMPARATIVE STUDIES ON FOUR GENERATIONS OF THE COCKCHAFFER (*MELOLONTHA MELOLONTHA* L.) POPULATION IN WESTERN SERBIA

The paper presents the results of comparative studies on four generations of *M. melolontha* (Fam. *Scarabaeidae*) in the Čačak area (Western Serbia) over 1980–89.

*Key words:* *Melolontha melolontha* population, for generation, West Serbia

### Introduction

The cockchafer (*Melolontha melolontha*) and other species from the subfamily *Melolonthinae* are important pests of small fruits, potato and other cultivated plants.

The adults of *M. melolontha* most frequently feed on the young leaves of oak, maple, beech, walnut and plum, but they also attack the foliage of poplar, sweet cherry, birch and apple (Couturier & Robert, 1955). However, the greatest damage is caused by larvae feeding for three to four years (depending on the regime of development) on the roots of cultivated plants or meadow grasses.

In Yugoslavia, *M. melolontha* mainly occurs in the hilly regions, whereas *Polyphylla* and *Anoxia* spp., developing in the sand, are common in the lowlands (Nonweiler, 1955). The cockchafer requires special temperatures, soil structure and moisture for its development, and these favourable conditions are usually found on the wooded slopes of hills at altitudes above 500 m.

In Yugoslavia, depending on the region, one generation develops over two or three years (Kovačević, 1952) or three to four years (Stančić, 1952). According to Živanović (1970), the cockchafer in Serbia develops one generation over a 3-year period. There is one main, numerous generation in this region and two secondary ones, with few individuals only, developing over a 3-year period, too.

### Distribution of *Melolontha melolontha* in Yugoslavia

In the period after World War II, *M. melolontha* has been studied by a number of authors in Yugoslavia (Kovačević, 1952; Stančić, 1952, 1954, 1957; Nonweiler, 1955; Janežić, 1952; Sidor, 1952; Maksimović, Hadžistević & Radonjić, 1955; Živano-

## THE POSSIBILITY OF CHEMICAL CONTROL OF CHAETOCNEMA TIBIALIS ILLIG. (COLEOPTERA: HALTICINAE) ON SUGAR BEET

This paper deals with the results of the 3-year investigation on the possibility of application of the insecticides formulated for the seed treatments in control of *Chaetocnema tibialis* Illig.

The efficacy of a preparation Promet 400 SC in control of *Chaetocnema tibialis* Illig. applied on the sugar beet seed was same as the efficacy of the preparation Agrofos super applied on foliage in the period of serious occurrence of pests. In the localities where according the data provided by advisory service the serious attack of the mentioned pest is to be expected, preventive treatments on the sugar beet seed by the insecticides formulated for the seed dressing is required.

*Key words:* *Chaetocnema tibialis* Illig; sugar beet; seed dressing; insecticides; efficacy.

### Introduction

Besides *Bothynoderes punctiventris* Germ., *Chaetocnema tibialis* Illig. appears to be the most important pest on the sugar beet in our country. This pest attacks the sugar beet at the end of March and during the April-May period. The most important injures have been caused on plants from the phase of germination to the phase of forming of 1-2 pairs of permanent leaves. The insects feed on the cotyledons and the permanent leaves, on the upper epidermis and part of the mesofile tissue on which later on rounded holes of 1-2 mm occur (Č a m p r a g, 1983).

The control of *C. tibialis* Illig. in our country has been carried out most often by the insecticides applied on foliage in the moment of occurrence of a critical number of imagoes. Since very important pests on the sugar beet are the soil insects of which the most important pests are wireworms which will be controlled by the new preparation and related seed applications, the aim of this paper is to study the effects of insecticides used for the sugar beet seed treatments against *C. tibialis* Illig. Such preparations, for which the satisfied efficacy will be obtained, could be used for *C. tibialis* Illig., also for preventive treatments in the localities where according the advisory services such need exists.

## THE EFFECT OF HERBICIDES AND LOW TEMPERATURES ON CERTAIN MAIZE GENOTYPES

This paper presents an overview of our up-to-date studies on the effect of herbicides and low temperatures on some maize inbred lines. On the basis of our results, we are of the opinion that additional studies on the herbicide effect on maize inbred lines are required. The environmental effect is particularly significant in expressing the phytotoxic effects of herbicides on maize.

*Key words:* Maize inbreds, herbicide effect, temperature effect.

### Introduction

The effects of herbicides on plants are based on the inhibition of various living processes, the most important being respiration, photosynthesis, protein synthesis etc. (Buchel, 1972; Moreland, 1967). By acting on these processes, herbicides may either intensify (stimulate) or weaken (inhibit) their normal function. Each group of herbicides has a specific mode of action. Studies have shown that the selective action of herbicides depends a great deal on the disruption of matter turnover rate in a plant, as well as the ability of the plant to breakdown these introduced substances.

The resistance of maize hybrids to herbicides is relatively good. However, inbred lines may demonstrate differences in the degree of susceptibility of herbicides of various groups. Many studies have been directed toward revealing the response of maize inbreds to herbicides since this is significant to both breeders and seed producers. Grogan *et al.*, (1963), Andersen (1964) and Eastin *et al.*, (1964) have demonstrated that maize inbreds show a different pattern of resistance to simazine and atrazine. Landi and Catizone (1981), as well as Stefanović (1986) have found that resistance of the maize inbreds depends on the genotype, type of herbicide, environment, as well as the interaction of all these factors. Fleming *et al.* (1988) have indicated the significance of maize sensitivity to bentazone and its mode of inheritance. Wright and Rieck (1973) have stated that some hybrids are more resistant than others to butylate. Rao and Fleming (1978) have established the different response of maize cytoplasm to butylate action. The inheritance of hybrid maize resistance to the herbicide alachlor has been studied by testing the susceptibility of inbred seedlings (diallel analysis of parental

## HARMFULNESS OF *CUSCUTA CAMPESTRIS* YUNCK ON SUGAR BEET UNDER VARYING MINERAL NUTRITION

The authors have examined the harmfulness of dodder under conditions of severe attack of this parasite in a stationary micro trial, in which in the last 25 years the effect of mineral nutrition on sugar beet development is being investigated. In this trial, the intensity of attack was estimated, yield of root and leaves were measured, as well as the content of sugar and impurities in healthy and diseased sugar beet plants.

*Key words:* sugar beet, (*Beta vulgaris* var. *saccharifera*), dodder (*Cuscuta campestris*), mineral nutrition, harmfulness of parasite.

### Introduction and literature

Parasitic flowering plants from the genus *Cuscuta* are very widespread on various cultivated plants and weeds in our country. The greatest damage has been caused on alfalfa and clover.

Very little is known about the distribution and harmfulness of dodder on sugar beet in Yugoslavia. Čamprag and Matić (1959) have studied the incidence and harmfulness of *Cuscuta* sp. on sugar beet. They have reported that dodder occurs sporadically and that the losses were of no greater importance, as the parasite was found on a limited number of plants. However, the yield of root was decreased up to 59% and sugar content up to 2.8% on heavily infected plants according to these authors.

There are some reports indicating that dodder represents a serious problem in some sugar beet producing areas of other countries. For example, a higher attack in Čujaska valley, Kirgizija, regularly occurs on 15–20% of the fields under sugar beet (Minaškova, 1983). In severely infected fields the losses in root yield are up to 9 tons/ha, and sugar content from 1.5 to 2%.

Several species known as parasites of sugar beet have been reported. In Yugoslavia, only *Cuscuta campestris* Yunck (Stojanović et al., 1973) has been identified on sugar beet. These authors have studied in detail some biological characters of this species on alfalfa and clover.