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PESTS OF THE OAK ACORN IN THE SEEDLING STAND OF KUPINSKA GREDA

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Summary

In the forests of oak-trees *Quercus robur* L. in the basin of the river Save are set apart the seedling stands. On account of considerable damages the yield of acorns for seeding purposes is diminished. In 1978—1981 were carried out the investigations of different species of harmful animals and of possibilities for reducing the damages.

For this purpose was chosen the seedling stand of Kupinska greda with an area of 261.92 ha, within the structure of the economic unit of 2,237 ha on the territory of the Forest Estate Sremska Mitrovica. The age of oak-trees in the seedling stand is from 130 to 400 years.

There were set 30 experimental plots of 1 sq m each disposed in thre sections. Every 10—15 days were collected the acorns and their remains and analyzed.

The blooming of oak-trees developed each year in a different intensity. The unfertilized germs of acorns and the youngest acorns fell off mostly in the period from the middle of June to the end of July and, to some extent, also to November (Fig. 1). There fell off 35.4—68.1 p.c. of germs on an average and 85.8 p.c. at the most. The situation of the section and microecological conditions determined the differences in the course of falling-off (Fig. 2).

The growth of the acorn evolved from June to August. The length and the weight of a ripe acorn varied from year to year.

In the course of its growth the acorn serves as food to many animals of higher orders and to the insects, and in the years when the yield is poor, it is consumed almost entirely before the acorns are ripe (Tab. 1).

It is possible to prognosticate the yield for the purpose of collecting the acorns one month before the beginning of the gathering, taking as the basis the quantity of healthy and ripened acorns which had fallen off.

Diseases of the acorn. — Young acorns, damaged by the supplementary feeding and oviposition of *B. glandium* and by other animals are attacked by the fungi and they rot, for the most part from the third decade of July to the second decade of August (Fig. 3) and, in some measure, to the end of the vegetation period, reducing the yield by 7.2—24.0 p.c.

Damages caused by animals of higher orders. — By these investigations have not been established individual species of higher animals, among which are rodents, squirrels, big game, birds and others. The rodents and other animals feed on the trunks from July to the end of October (Fig. 4A and 4B). The total of damages on the acorn yield varies from 22.1—61.6 p.c. on an average. The youngest acorns participate in this quantity with 5.6 to 14.3 p.c. Acorns gnawn partly with teeth were found from the end of June to the third decade of September (Fig. 5).

Damages caused by insects. — The most numerous insect species was *Balaninus glandium*, followed by *Cydia splendana*, *C. amplana* and *Cynips quercus calicis*. By this investigation have not been comprised the insect species which are small in numbers.

Balaninus glandium reduces the acorn yield by 37.5 p.c. at the most. The imago swarms from the middle od May to September and in late years to the third decade of September. In the young acorn have been observed 1—4 larvae (Tab. 3). The intraspecific competition acts as the reductive factor. The development of larvae takes place from June to the end of September. The attacked acorns fall off before the ripe ones, and the larval development evolves partly in the fallen-off acorn.

The acorns were collected in three series, to wit: on Aug. 8, on Aug. 24 et on Sept. 20 1981, and the results have shown that the acorns were of different growth (Tab. 2). According to the course of emergence of larvae from acorns (Fig. 6), the duration of the larval development can be determined at about 43 to 49 days at the most. From the acorns of the first series (gathered on Aug. 8) 70 p.c. of larvae emerged. In the course of this test was also proved (Fig. 10), that *B. glandium* was the most numerous insect species.

The rot of acorns diminishes (Fig. 10) with the growth of the acorns.

The acorns containing larvae, those with exit holes and healthy, ripe acorns needed different time to fall off (Fig. 7).

The end of September is the most favourable time for gathering seed acorns.

The exit holes are gently oval (2.25 × 1.68 and 2.3 × 3 mm at the most) and 75 p.c. of them are situated under the cup, 10.7 p.c. on the edge of the cup, 10.7 p.c. on the acorn and 3.6 p.c. on the top of the acorn. Larvae hibernate in the ground, almost equally distributed up to the depth of about 25 cm (Tab. 4). From the middle of July on, they were not found any more in the ground. The new generation has been observed in the ground in the second half of August.

The generation is annual.

Cydia splendana and *C. amplana* have a very similar course of development and they reduce the acorn yield in this period by 6.1 p.c. at the most. The moths swarm from the end of May — beginning of June to August, and to the first decade of September at the longest. The development of caterpillars evolves parallel with that of the larvae of *B. glandium* (Fig. 8). The development is concluded in August and September. In the course of the growth, the caterpillars, for lack of food, leave the acorn in search of it. After the development is conculded, the exit holes are oval (1.72 × 1.04 and 2.0 × 1.5 mm at the most). 36.8 p.c. of them are situated under the cup, 21.1 p.c. on the edge of the cup, 36.8 p.c. on the acorn and 5.3 p.c. on the top of the acorn. The caterpillars hibernate in the litter (dead leaves) or at a little depth in the ground. They spin a solid, parchmentlike, flattened, oval cocoon (Fig. 5) in which they hibernate. Chrysalidation takes place from April to July, generation annual.

Cynips quercus calicis is a regular pest of the acorn and reduces its yield by 2.3—13.4 p.c. The galls fall off (Fig. 9) from the third decade of June to November.

The total participation of all the enumerated insects in the reduction of the acorn yield varied from 25 to 55.8 p.c. (Tab. 6) which represents a considerable damage.

The control of the insects has been carried out in a little orientation experiment, by a single treatment of 0.5 ha from the ground. For this purpose was used the insecticide Acothion 0.35 p.c. (Phenitrothion). The attack of *B. glandium* and *Cydia* spp. was reduced by 50.4 p.c., and that of *C. quercus calicis* by 66.2 p.c. The yield of healthy, ripe acorn was increased by 61.1 p.c.

It is necessary to investigate the single treatment on the entire area of the seedling stand in the optimum period of the swarming of insects.

Prema usmenim informacijama drugih naših istraživača nema podataka o štetnom dejstvu Benomyla 50 na klijavost sjemena četinara. Međutim, složenost i međusobna uslovljenost brojnih drugih faktora vjerovatno utiču na razlike u efikasnosti u pojedinim godinama istraživanja, što još jednom pokazuje da primjena fungicida u zaštiti ponika nije rutinski zadatak.

Može se pak zaključiti da u zaštiti ponika bora najbolje rezultate pruža Ortocid 83, a u zaštiti ponika smrče Ortocid 83 i Benomyl 50.

Našu pažnju privlače i rezultati o primjeni Agrostemina koji je za neke poljoprivredne kulture ima osobinu bioregulatora. Iako su laboratorijski ogledi o uticaju ovog preparata na klijavost nekih vrsta četinara bili vrlo neujednačeni, mi smo ga, ipak, koristili u ogledima u polju. Nemamo komentara o negativnom uticaju ovog sredstva na razvoj pet vrsta četinara, jer to ne omogućavaju jednogodišnja istraživanja, ali pada u oči da je broj biljaka kod svih ispitivanih vrsta bio najveći na kontrolnim poljima zasijanim suhim sjemenom (bez prethodnog potapanja u vodu). Što se tiče polja zasijanih smrčom i razlika između broja biljaka pri prvom i drugom brojanju to je pojava koja je specifična za ovu vrstu u nekim rasadnicima, koju još uvijek istražujemo. Dosadašnja zapažanja pokazuju da se ova pojava redukcije broja biljaka ne može staviti u vezu sa prestankom primjene hemijske zaštite biljaka.

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FURTHER EXPERIMENTS ON USE OF SOME CHEMICALS IN PROTECTION OF CONIFER SEEDLINGS AGAINST DAMPING-OFF

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Summary

Experiments on chemical control of damping-off and root-rot diseases in forest nurseries (mostly caused by *Fusarium oxysporum* Schlecht.) have been continued since 1975. Each year some new chemicals were introduced alone or in combination with the others. For this expe-

riments we used for first time chemicals: Agrostemin and Welpar, former is said to be stimulativ to plants growth and latter as the selective herbicide.

In protecting scots pine seedlings the best results gave Basamide 20 gr/m² + Ortocide 83 4 gr/m² (table 1). Satisfactorily results were obteined with other chemicals except combination of Basamide 20 gr/m² and Benomyl 50 2 gr/m² which caused a damage on plants. This effect might be influenced by some uncontrolled factors.

In protecting spruce seedlings the best were Basamide 20 gr/m² + Ortocide 83 4 gr/m² and Basamide 20 gr/m² + Benomyl-50 2 gr/m².

Agrostemin gave uncertain results. The laboratory tests show that in some cases it stimulates seed germination of tested conifers and in other a depression was noted. In field experiments (as shown in table 2) effect of Agrostemin was negative probably because of lack of any fungicidial treatment.

With regard to Velpar promissing results were obteined only in weed control in beds of scots and austrian pine seedlings. Its selectivity was noticable even on seedlings of a few weeks of age.

ciju i neutrališu destruktivno dejstvo parazita zbog čega većina zaraženih biljaka ostaje vitalna do kraja vegetacije. Biljke u netretiranim usevima su prevremeno uginjavale u mlečnoj zrelosti suncokreta.

4. Prvi simptomi zaraze od *Phomopsis* sp. redovno su se javljali početkom cvetanja suncokreta, bez obzira na vreme setve useva. To pokazuje da je u prirodi prisutna redovno dovoljna količina inokuluma zbog čega je neophodna zaštita kako ranih tako i postrnih useva.

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(Primljeno 20. 12. 1981)

THE EFFECT OF SUNFLOWER PROTECTION AGAINST GRAY SPOT OF STEM (*PHOMOPSIS* SP. — *DIAPORTHE* SP.) WITH SOME COMBINATIONS OF FUNGICIDES APPLIED BY ARIPLANE ON SEED AND OIL YIELD DURING 1981.

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Summary

The epyphitotic occurrence of *Phomopsis* sp. — *Diaporthe* sp., a new parasite of sunflower, caused great damages in Vojvodina (Yugoslavia) during 1980. The seed yield has been decreased more than 50% on many fields where heavy infestation of plants by the parasite was observed. All sunflower genotypes which are grown in the country are very susceptible to the parasite. The application of some fungicides (benlate + cineb, enovit + cineb) in micro and macro trials that year gave promissing results in controling of the disease (Marić, et al., 1981).

The aim of the investigation during 1981 was to verify the effect of fungicides application by airplane in the control of *Phomopsis* sp. on sunflower. Six sunflower fields in different localities, sown at different time and plant population, has been sprayed one to three times with some combinations of fungicides, using airplane (70—140 lit. per ha) for spraying. First spraying of crops was carried out in the beginning of flowering stage and the others were repeated every 20 days.

The fungicide application had a slight influence on the number of infected plants by *Phomopsis* but the fungistatic effect of some fungicides localised infection and inhibited the destructiveness of the para-

site. Therefore, most of the treated plants retained vital until the end of vegetation. All untreated plants died in the milk stage of sunflower development. The yield of seed increased on five of six treated fields in comparison with untreated plots. The best result has been obtained on a field with a lower plant population and with airplane spraying in two oposite directions (140 lit. per ha). It seems that the quality of fungicide deposition on lower parts of plants, where infection take place, have decisive effect on the protective effect of plants. The yield of seed was significantly increased on treated plot of that field, 1.373 kg over of untreated plot.

In a separate trial has been found that the domestic hybrides become susceptible to *Phomopsis* sp. at the budding stage and therefore the first spraying of sunflower must be carried out before that time.

tom, baycorom i brestanom. *Phomopsis* sp. je ispoljio veću osetljivost prema fungicidima.

2. Sa jednim tretiranjem postrnog suncokreta u fazi cvetanja, zadovoljavajući rezultati su dobijeni jedino u suzbijanju *Phomopsis* sp. primenom nižih doza nekih fungicida (benlate, enovit, benlate+cineb, enovit+cineb). Dvokratnim prskanjem suncokreta sa istim količinama navedenih i drugih preparata (benlate+dacnil, rovral+cineb, sumilex+cineb), napad *Phomopsisa* je značajno smanjen, a u prilično meri redukcija je i zaraza od *A. helianthi* i *S. sclerotiorum*. Najbolji efekti u suzbijanju navedenih parazita ostvareni su jednokratnim prskanjem suncokreta povećanim dozama nekih kombinacija fungicida.

3. Četvorokratnim prskanjem većeg broja inbred linija i hibrida enovitom i cinebom (1+5 kg po hektaru), u uslovima jakog napada *S. sclerotiorum* i osrednjih zaraza od *Ph. macdonaldi*, značajno je smanjena zaraza od ovih parazita i povećan prinos suncokreta. Ispitivani genotipovi su različito reagovali na suzbijanje navedenih parazita hemijskim sredstvima.

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THE EFFECT OF FUNGICIDES AGAINST SUNFLOWER PARASITES *(ALTERNARIA HELIANTHI, PHOMA MACDONALDI, SCLEROTINIA SCLEROTIORUM, PHOMOPSIS* SP.) ON ARTIFICIAL MEDIA AND MICROTRIALS IN FIELD

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Summary

Most of the tested fungicides at 100 ppm concentration were fungitoxic to *A. helianthi, Ph. macdonaldi* and *Phomopsis* sp. on artificial media. The best fungitoxic effect has been found on media with benlate, enovit and baycor.

The efficiency of two different doses of some fungicides against sunflower parasites has been tested in field trial, on a late sown crop (after wheat). A heavy attack of *A. helianthi* on stem and *S. sclerotiorum* on head and a moderate one of *Phomopsis* spp. occurred on sunflower plants in the trial. One spraying of sunflower at flowering stage, using lower doses of some fungicides (benlate, enovit, benlate+cineb, enovit+ +cineb) gave satisfactory results only against *Phomopsis* spp. By two treatments with the same dosages of these and other fungicides (benlate+deconil, rovral+cineb, sumilex+cineb), the occurrence of *A. helianthi* and *S. sclerotiorum* has been also significantly reduced. However, the best control of the mentioned parasites was achieved with one treatment using higher doses of fungicides.

The reaction of different sunflower genotypes (19 inbred lines, 9 hybrids) to chemical control of parasites has been studied in a separate field trial. Four sprayings (enovit+cineb, 1+6 kg per ha) of plants, beginning at flowering stage, were carried out in 20 days intervals. An extremely heavy attack of *S. sclerotiorum* and a moderate infection of *Ph. macdonaldi* appeared on most of the tested sunflower genotypes. The influence of chemical application was negligible on the root infection caused by *S. sclerotiorum*. The applied fungicides significantly reduced *Sclerotinia* white rot on stem and head, and the infection caused by *Ph. macdonaldi* induced the increase in yield of all tested sunflower genotypes. The effect of control disease and increase in yield depended on genotype and its reaction to the parasites.

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(Primljeno 22. 02. 1982)

POSSIBILITIES OF CONTROLLING *PHOMOPSIS* SP. AND OTHER PATHOGENS IN SUNFLOWER

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Summary

A small-plot trial was established in field in 1981 to evaluate possibilities of controlling *Phomopsis* sp. and other parasitic fungi in sunflower by fungicides. Following conclusions were drawn on the basis of one-year results:

1. Two sprayings with different fungicides were performed with a portable sprayer to control *Phomopsis* sp. and other parasitic fungi — one at the beginning of budding, another at the beginning of flowering.

2. Eleven fungicides were tested: Aliette, Antracol, Benlate, Curzate, Euparen, Folpet, Mikal, Ridomil, Ridomil plus, in the doses of 3 kg/ha, Rovral 1.5 kg/ha, and sumilex 1 kg/ha.

3. Benlate was most efficient in controlling *Phomopsis* sp. and other parasitic fungi, reducing the intensity of attack by the agents of spot, *Alternaria helianthi, Septoria helianthi,* and *Phoma oleracea* var. *helianthi-tuberosi,* and the agents of wilt, *Sclerotium bataticola, Fusarium,* and *Verticillium* spp.

4. The test plots protected by Benlate brought significantly higher sunflower yields than those protected by the other fungicides and the control.

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(Primljeno 5. 04. 1982)

A CONTRIBUTION TO THE STUDY OF THE INFLUENCE OF TEMPERATURE ON THE GERMINATION OF SPORES OF *PLEOSPORA HERBARUM* (Pers. ex Fr.) Rabenh.

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Summary

The investigation of the influence of temperature on the germination of spores of *Pleospora herbarum* (Pers. ex Fr.) Rabenh. (*Stemphylium botryosum* Wallr.), the number and length of germ tubes, was carried out by means of the suspension of conidia or ascospores in distilled water. The spores were exposed to the temperatures of 1°, 5°, 10°, 15°, 20°, 25°, 30°, 35° and 40°C and after 1, 2, 3, 5, 10, and 24 hours from the putting to germinate there was established the percentage of germination, the number and growth of germ tubes.

The germination of conidia and ascospores is possible within a wide temperature range — from 1° to 35°C. The optimum temperature is about 25°C, the minimum one below 1°C, and the maximum temperature is between 35° and 40°C. The suboptimal temperature is 30°C for the conidia and 20°C for the ascospores.

Except the temperature in the minimum and maximum zones, at all the other temperatures a short time is needed for conidia and ascospores to germinate at a high percentage. A comparatively high percentage is achieved even when the germination lasts but 1 hour and within

a wide temperature range. The ascospores, however, germinate at a considerably higher percentage than the conidia and this is more marked if the temperature is lower and the germination period shorter. At the temperature of 5°C the percentage of the germination of conidia and of ascospores is approximately the same only after the germination period of 10 hours, at the temperature of 10°C after 5, at the temperatures of 15°, 20° and 30°C after 3, and at 25°C after a period germination of 2 hours.

The results obtained show that the temperature as an important factor of the outer environment has not a decisive role in the germination of spores, as the high percentage of germination is achieved regardles of the temperature oscillation, even if it occurs within wide limits and when the period of favourable temperature conditions for the germination is of short duration. It means that the infective potential is high, both at lower and higher temperatures.

The optimum temperature for the growth of germ tubes with conidia and ascospores is about 25°C, which is, at the same time, also the temperature at which they germinate and with the greatest number of germ tubes.

A great variation in the number and growth of germ tubes at the same temperature and in the same investigation period show that conidia and ascospores, though of the same age, are not at the same time also of the same physiological maturity and not even all the cells on the same conidium res. ascospore.

The maximum number of germ tubes on a conidium, at the optimum temperature, was 18, and on an ascospore, 12.

Germinating of conidia and ascospores, with numerous germ tubes, both on higher and lower temperatures, is an important characteristic of this fungus, which makes the realization of infections easier, increasing to a considerable degree its infective potential.

REACTION OF LOCAL MAIZE VARIETIES TO ROOT ROT *(GIBBERELLA ZEAE*, SCHW, PETCH.) IN CONDITIONS OF ARTIFICIAL INOCULATION ON NUTRITIVE AGAR (SUBSTRATE)

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Summary

The testing of the resistance of maize to root rot *(Gibberella zeae)* was carried out with 197 varieties in laboratory conditions according to the method of Messiaen, Lafon et Malot (1959).

According to results of our investigations, of the 197 varieties none was identified as a very resistant variety. In the group of resistant varieties, there was only one variety with the entry number M 1086. Medium resistant were only two varieties M 331 and M 1096. In the group of medium susceptible, four varieties were identified: M 327, M 631, M 1019 and M 1097. Most varieties were identified as susceptible and very susceptible. Our results led to the conclusion that medium resistant varieties can be used as sources of resistance in the development of resistant hybrids. Our aim is to develop hybrids with a horizontal resistance due to the existence of many pathogens and even isolates of different aggressivity within a single species such as *Gibberella zeae.*

I broj izašlih imaga bio je najmanji u serijama gde su imaga eksponirana nižim temperaturama (—4°C). Pri delovanju od 1 časa izašlo je 6 imaga a pri dužem izlaganju od 5 časova nije došlo do pojave imaga.

Na dužinu života imaga delovale su promenljive temperature tako da je njihov život duže trajao.

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EFFECT OF CONSTANT AND VARIABLE TEMPERATURES ON FLOUR MOTH (*PLODIA INTERPUNCTELLA* Hb.)

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Summary

In this paper are presented the results of laboratory investigations of the effect produced by different constant (17°, 21° and 28°C) and variable temperatures (periodical exposure to 0° and —4° C in different duration at a relative humidity of 50 p.c. on fecundity, embryonal and total development, number of progeny and the duration of life of imagos of coppery flour moth *P. interpunctella)*.

These results allow to conclude:

— that, in rearing *P. interpunctella* at constant temperatures of 17°, 21° and 28°C the lenght of embryonal development is reduced with the increase of temperature from 12.6 days (at 17°C) to 3.9 (at 28°C). The increase of temperature gives rise also to the reduction of duration of the total development and it is the shortest at the examined highest temperature of 28°C, when it lasted 69 days. From the above quoted three constant temperatures at which this moth developed, the temperature of 21°C has the most favourable for the hatching of larvae, at this temperature 70 p.c. of eggs were hatched. At this same temperature was also obtained the greatest number of imagos (55 p.c.).

— When the eggs of coppery flour moth were exposed once or twice to the temperatures of 0° and —4°C in different duration, the length of embryonal development increased with exposed eggs in relation to the non-exposed ones. The variable low temperatures produced also an effect on the total duration of development in that sense that it was chiefly prolonged. The least number of hatched larvae (44 p.c.) was obtained when the eggs had been exposed to the effect of the temperature of —4°C. Variable low temperatures considerably reduced the number of obtained imagos in relation to the check, particularly with the populations reared at 17°C.

— Variable temperatures of 0° and —4°C to which the imagos, reared at the temperature of 21°C, had been exposed once in the durations of 1 and 5 hours, had an unfavourable effect on fecundity, and particularly the temperature of —4°C in duration of 5 hours, when 14 eggs only were laid. The exposure temperature of —4°C in duration of 5 hours thwarted the hatching of larvae so that the imagos did not appear at all. When the exposure to the temperature of —4°C lasted 1 hour, the larvae and imagos were hatched, but in a considerably less number than in the check. The effect of variable temperatures lengthened the duration of life of imagos.

3. Najveća ostvarena plodnost ispoljena je ako su gusenice hranjene travom *Poa pratensis* (205,1 jaje) a najmanja kod mešanih trava iz familije *Poaceae* (147,1). Kod ostalih prosečno iznosi *Dactylis glomerata* (171,1); *Phleum pratense* (163,2) i *Lolium perenne* (156,5).

U ogledu gde su gusenice hranjene travama iz različitih familija najveći prosečni fertilitet je kod *Carex divulsa* (220,7), a najmanji kod *Lolium perenne* (156,5) i *Juncus conglomeratus* (182,4). Prosečni fertilitet po jajnom leglu u mešanih trava jedne familije *(Poaceae)* iznosi (147,1), a kod mešanih trava iz 3 familije *(Poaceae, Cyperaceae, Juncaceae)* je (217,2).

Na osnovu analize varijanse vidi se da razlike između vrsta trava postoje, ali one nisu značajne. Ove razlike nisu nastale kao rezultat dejstva ispitivanih vrsta trava, već su nastale slučajno.

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HOST PLANTS AND FEMALE FECUNDITY OF *HYPOGYMNA MORIO* L. IN RELATION TO THE KIND OF FOOD

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Summary

As part of investigations of the woolly moth *(Hypogymna morio* L.) host plants were registrated and female fecundity was followed in relation to the kind of food. Grasses were collected and identified in localities of distribution area of this species in nature. Caterpillars of *(Hypogymna morio* L.) are narrow polyphagous. They are feeding on grasses of 3 families: *Poaceae, Cyperaceae* and *Juncaceae.* Within the family *Poaceae* caterpillars of woolly moth are not feeding on grasses: *Arrhenatherun elatius* L., *Setaria germanica* L. and *Panicum miliaceum* L. In the open caterpilars of *Hypogymna morio* L. prefere grasses on the family *Cyperaceae* and *Juncaceae* in comparison to the grasses of family *Poaceae.*

Hypogymna morio L. achieves its largest fecundity when caterpillars feed on the grass Poa pratensis (205,1 eggs), and its lowest in the

case of mixed grasses from the family Poaceae (147,1). With other grasses of this family fertility is in cases of Dyctylis glomerata (171,1), Pleum pratense (163,3 and Lolium perenne (156,5).

In the experiment where caterpillars werw fed with grasses of diferent families the largest average fertility was found in Carex divulsa (220,7) and the lovest in Lolium perenne (176,5) and Juncus conglomeratus (182,4). Average fertility per egg cluster in mixed grasses of one family (Poaceae) is 147,1 and in mixed grasses of three families (Poaceae, Cyperaceae and Juncaceae) is 217,2.

From the analysis of variance we can see that there are differences between grass species, bat these are not significant. These dofferences are not the result of the influence of investigated gras species, but the result of random.

REGULATION OF THE POPULATION NUMBERS OF THE APPLE LEAF MINER (*LEUCOPTERA SCITELLA* ZELL.) BY THE METHODS OF INTEGRAL CONTROL

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Summary

In the course of introducing the integral control in the orchards of the Agriculture Company »Peščara« in Subotica in 1981 there had to be defined the approach to the regulation of population density of leaf miners, in the first place of *L. scitella*.

The development of *L. scitella* was followed on the object »Bruk«, 30 ha large, situated in the vicinity of private orchards. The trees are formed as modified oblique palmettes, 20 years old and 5—6 m high: sorts: Jonathan, Golden and Red Delicious.

Following methods were used:

1. Emergence cages. For this purpose were used boxes into which were put the cocoons. Thise boxes had the opening closed with a glass vial.
2. Beating method.
3. Survay of 100 leaves under binocular.
4. Visual survay.

The apple orchard was inspected every 15—17 days folowing the path fixed beforehand.

By means of rotomilling. leaves were introduced into the sandy soil in autumn and thereby was reduced the danger of a mass occurrence of the miners *L. blancardella* and *L. corylifoliella*. By this measure also numerous cocoons of *L. scitella* which were hiding in the fallen leaves or some other places suitable for the chrysalidation (Fig. 1) were also introduced into the sandy soil. However, most of the cocoons of *L. scitella* were to be found in the cracks on the trees.

For the control of *L. scitella* in the course of vegetation period we used Dimilin WP 25 in conc. 0.05 p.c (Producer Duphar, Netherlands) with 200 l. water/ha.

In the programme, for the control of caterpillars of *Tortricidae*: *P. heparana* and *A. orana* were used the insecticides Cymbush 10 (cypemethrin) in conc. 0.05 p.c. and Gusathion WP 25 (azinfos methyl) in conc. 0.2% p.c.

The first flight of adults *L. scitella* began on April 6 and lasted 51 days. On 100 leaves of the spring generation were observed 130 mines and 56 eggs (Tab. 1).

Dimilin was applied on April 10, i. e. in the beginning of oviposition. In most cases was observed the hatching of caterpillars and the growth of mines, but only up to 2 mm in diameter, when the caterpillars died on the occasion of the first moulting (Fig. 2). By inspecting the leaves at the height of 1.5 m and on the top we found that Dimilin acted on 89.91 p.c. to 99 p.c. of caterpillars in miner.

The second flight of moths began on June 22 and lasted 34 days. In the course of June and July for the control of *P. heparana* and *A. orana* were used the insecticides Cymbush 10 and Gusathion, which acted also on *L. scitella*, so that the numbers were low, only 4 mines on 100 leaves (Tab. 1).

The third flight of moths began on July 27 and lasted 34 days. On account of the moths flying in from neighbouring private orchards the density of this generation reached the number of 52 mines on 100 leaves. The number of mines would have been even greater, had not the number of eggs remained unhatched. At this density of the population of *L. scitella* in some places where the attack was stronger there was observed a small number of cocoons on the fruits. Therefore was proposed the reduction of the economic threshold 50 mines on 100 leaves.

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STRUČNI PRILOG

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DOSADAŠNJA PROUČAVANJA BILJNIH VIRUSA U JUGOSLAVIJI

Prve zabeleške o biljnim virusima u Jugoslaviji potiču od pre pedeset godina, pa se zato biljna virusologija u ovoj zemlji može smatrati mladom naučnom disciplinom. Njen razvoj u proteklom periodu odlikovao se različitim stepenom, što je zavisilo od opšteg napretka ove nauke u svetu, ali najviše od uslova razvoja naučnih istraživanja u Jugoslaviji. Razmatranje i ocenjivanje dosadašnjeg razvoja virusoloških istraživanja je teško zbog nedovoljnih podataka i vrednovanja tog razvoja u kome smo prisutni kao savremenici. Zato ćemo se u našem kraćem izlaganju ograničiti na prikazivanje samo nekih podataka, koji nam se čine karakterističnim za pojedine periode istraživanja biljnih virusa.

Početni period (1925—1940)

U ovom periodu zabeležene su prve viroze biljaka u Jugoslaviji. Te zabeleške se odnose na viroze krompira, duvana i šljiva. U tom razdoblju Šutić (1925) je opisao uvijenost lišća krompira u Sloveniji. Ivanić (1929) je proučavao izazivača mozaika krompira u Srbiji, a Protić (1931) je zabeležio mozaik na hercegovačkom duvanu. Iz tog doba potiču i prvi podaci o šarki šljive o kojoj su saopštili naši poznati fitopatolozi Josifović (1937) i Pobegajlo (1939, 1940).

Otkrića prvih viroza pokazala su njihovu štetnost u proizvodnji biljaka i potrebu da se u Jugoslaviji, slično drugim zemljama, pristupi njihovom detaljnom proučavanju.

Početni period eksperimentalnih istraživanja (1946—1960)

U ovom periodu javlja se generacija specijalizovanih virusologa koji su bili osposobljeni za naučni i eksperimentalni virusološki rad. Oni su uveli naučne eksperimentalne metode u virosološka istraživanja i doprineli obrazovanju novih stručnih i naučnih radnika iz ove oblasti. U desetak virusologa iz ovog perioda spadaju: Panjan M. (1946), Nikolić, V. (1949), Lušin, V. (1953), Jordović, M. (1954), Miličić, D. (1954), Mickovski, J. (1955), Šutić, D. (1958), Delević, B. (1958), Hočevar, J. (1958) i Šarić, A. (1960).

Period razvijenih eksperimentalnih istraživanja (1960—1970)

U ovom periodu javlja se skoro dva puta veći broj specijalizovanih virusologa nego u proteklom periodu. U ovoj generaciji nalazi se veći broj virusologa, koji su svoja naučna zvanja magistrature i doktorate stekli iz ove naučne oblasti. To je period u kome se obavljaju obimna istraživanja, osavremenjavaju i usavršavaju metode istraživačkog rada. Zahvaljujući stvorenim kadrovskim i materijalnim uslovima rada u ovom razdoblju je otkriven i opisan najveći broj viroza biljaka, čime

Mikroskopiranjem svih ovih organa pasulja, moguće je konstatovati prisustvo parazita. Njegovu identifikaciju međutim najbolje je utvrditi izolacijom i dokazivanjem karakterističnih odgajivačkih i seroloških osobina.

Kolonije su žućkaste boje, a bakterije štapičaste, grampozitivne, asporogene i s prisustvom 1—3 bočne ili polarne cilije.

Zaključak

Usled sve češće pojave i pojave jakog intenziteta bakterioze pasulja i boranije se ubrajaju u ekonomski značajne bolesti povrća. U mnogim zemljama one predstavljaju osnovni faktor koji utiče na smanjenje prinosa. Neke su od njih i na listi karantinskih parazita.

Zbog svega toga brza dijagnoza bolesti koje bakterije njihovi prouzrokovači izazivaju ima svoje puno opravdanje.

U navedenoj šemi (tab. 1) date su osnovne zajedničke karakteristike i razlike bakterija *Pseudomonas phaseolicola, Ps. syringae, Xanthomonas phaseoli f. sp. phaseoli, X. phaseoli f. sp. fuscans* i *Corynebacterium flaccumfaciens*. Uzimajući sve te osobine u obzir mišljenja smo da se u rutinskom radu može sa dosta verovatnoće, odmah posle izvršene izolacije i provere patogenosti, na raznim test biljkama, doći do podataka i saznanja o kojoj se vrsti bakterije radi, kada su ove bolesti pasulja i boranije u pitanju.

Tako bismo bakterije *Ps. phaseolicola* i *Ps. syringae* razlikovali na osnovu odsustva ili pojave mrkih pega na inokulisanim zelenim plodovima trešnje, višnje, kruške i limuna (tab. 1), bez obzira što obe ove bakterije obrazuju kolonije bele boje na hranljivoj podlozi i što one obe prouzrokuju hipersenzibilnu reakciju na listu duvana, tatule (*Datura stramonium*) i pomoćnice (*Solanum nigrum*) (sl. 6 i 7).

Bakterije žute boje kolonija razlikovali bismo prema tome da li boju podloge menjaju u mrku (*X. phaseoli f. sp. fuscans*) ili ne, odnosno, da li se, uz ovu osobinu, po Gramu boje negativno (*X. phaseoli f. sp. phaseoli*), ili su, te bakterije, žute boje kolonija, grampozitivne *(C. flaccumfaciens)*.

Razume se da dodatna primena seroloških metoda i korišćenje bakteriofaga pruža pouzdanije rezultate i daje sigurniji sud o konačnoj identifikaciji bakterija o kojima je u ovome radu reč.

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BACTERIOSIS OF BEAN AND STRING BEAN

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Summary

On account of the increasing frequency of their occurrence and of their high intensity, the bacterioses of bean and string bean are considered as economically important diseases of vegetables. In many countries they are the fundamental factor which exerts an influence on the reduction of the yield. Some of them figure on the list of quarantine parasites.

Because of all that a prompt diagnosis of diseases which are caused by these bacteria is fully justified.

In the annexed scheme (Tab. 1) are given the fundamental common characteristics of and differences between the bacteria *Pseudomonas phaseolicola, Ps. syringae, Xanthomonas phaseoli f. sp. phaseoli, X. phaseoli f. sp. fuscana* and

Corynebacterium flaccumfaciens. Taking all these properties into consideration I am of the opinion that in the routine work can be obtained, with a sufficient probability, immediately after having isolated and checked the pathogeneity on different test plants, the data and knowledge about the species of bacteria which cause these diseases of bean and string bean.

Thus we should distinguish the bacteria of *Ps. phaseolicola* and *Ps. syringae* by the absence or the occurrence of dark brown sports on inoculated unripe fruits of cherries, sour cherries, pears and lemons (Tab. 1), regardless of the fact that both these bacteria species form white colonies on culture media and that both of them cause hypersensitive reaction on the leaves of tobacco, jimson weed (Datura stramonium) and black nightshade (Solanum nigrum) (Fig. 6 and 7).

We should distinguish the bacteria whose colonies are of yellow colour according to whether they change the colour of culture media into brown (*X. phaseoli f. sp. fuscana)* or not, or whether they, in addition to the above mentioned property, are stained negatively according to Gram's method (*X. phaseoli f. sp. phaseoli*) or these bacteria, with yellow coloured colonies, are gram-positive (*C. flaccumfaciens*).

It goes without saying that the additional application of serologic methods and the use of bacteriophages offer more reliable results and give a more accurate judgment as to the definitive identification of bacteria which are dealt with in the present paper.