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Plant Protection Society of Slovenia

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KAZALO

Uvodni referati

Vpliv fitofarmacevtskih sredstev na okolje: ocena stanja v Sloveniji

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V prispevku bodo prikazani podatki o uporabi fitofarmacevtskih sredstev v Sloveniji kot tudi njihov vpliv na okolje, predvsem podzemno vodo in tla. Prikazane bodo tudi nekatere aktivnosti, s katerimi želimo izboljšati stanje na tem področju. Poraba fitofarmacevtskih sredstev je v zadnjih desetih letih dokaj konstantna z manjšimi nihanji, ki pa so posledica predvsem vremenskih razmer. Kljub temu pa koncentracije ostankov fitofarmacevtskih sredstev ter njihovih razgradnih produktov kažejo na večini vodonosnikov v Sloveniji jasno izražen trend zmanjševanja. To je v največji meri posledica intenzivnega izvajanja ukrepov izobraževanja ter usposabljanja uporabnikov kot tudi prodajalcev fitofarmacevtskih sredstev, v katerega so vključene številne izobraževalne in strokovne institucije kot tudi posledica sprememb in dopolnil zakonskih in podzakonskih aktov, ki uravnavajo promet in uporabo fitofarmacevtskih sredstev.

ABSTRACT

The influence of Plant Protection Products on the environment: results of current analysis in Slovenia

The current paper presents data on the use of plant protection products in Slovenia and their influence on the environment, especially on the groundwater and soil. Certain activities which will be used to improve the situation in this field are also indicated. The consumption of plant protection products in the past few years has been pretty much constant, however, with smaller oscillations, which are mainly the result of weather conditions. Nevertheless, the concentration of residues of plant protection products and their metabolites indicate a clearly expressed trend of declining in the majority of aquifers in Slovenia. This is to a great extent due to intensive education and training of the users and of the sellers of plant protection products provided by numerous educational and professional institutions. Also, it is the result of changes and amendments to statutory and executive documents regulating the trading and use of plant protection products.

Varstvo rastlin in varna hrana - evropska perspektiva

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Varstvo rastlin je temeljna potreba v sodobnem kmetijstvu in pri tem imajo pomembno vlogo fitofarmacevtska sredstva. Ta varujejo posevke in nasade pred boleznimi in škodljivci in zagotavljajo trajno pridelavo kakovostnih rastlinskih pridelkov. Lahko bi rekli, da so ta sredstva ekvivalenti zdravilom, ki jih ljudje uporabljamo za zagotavljanje našega zdravja.
Kljub temu industrija fitofarmacevtskih sredstev veliko vlaga v raziskave in razvoj sredstev, ki so ciljno specifična, se hitro razkrajajo in se ne kopičijo v prehranjevalni

verigi, seveda pa je pri tem temeljno vprašanje njihove odgovorne uporabe. Ko uporabljamo fitofarmacevtska sredstva, moramo to delati občutljivo in v smislu trajnostnega razvoja.
Že zdaj so fitofarmacevtska sredstva v Evropi zakonsko zelo regulirana in so predmet regulacijskih pregledov, ki temeljijo na zadnjih varnostnih standardih. Zdaj sta v diskusiji dva nova predloga za uzakonjenje fitofarmacevtskih sredstev. Eden ima namen nadomestiti Smernico 91/414/EEC, drugi pa se nanaša na Tematsko strategijo in okvirno smernico o uporabi fitofarmacevtskih sredstev v smislu trajnostnega razvoja. Izid diskusije je zdaj še odprt, vendar naj pomaga pri končnem uzakonjenju, ki vzpostavlja prognostični sistem, ki bo pospeševal investicije v razvoj boljših fitofarmacevtskih sredstev in zagotavljal njihovo uporabo v smislu trajnostnega razvoja.

ABSTRACT

Plant protection and safe food - an European perspective

Plant Protection is a fundamental need in today's agriculture and plant protection products play an important role therein. They protect crops from pests and diseases and ensure a sustainable production of high quality crops. One could say, they are the equivalents of the medicines we use to safeguard our own health.
Despite the products themselves, and the plant protection industry invests heavily into researching and developing products that are target-specific, degrade quickly and do not accumulate in the food chain, surely there is the question of using the products in a responsible way. Plant protection products, when they are used, need to be used sensibly and sustainable.
Already now, plant protection products are highly regulated in Europe and they are subject to regular reviews based on the latest safety standards. Two new proposals for legislation on plant protection products are currently being discussed: one intended to replace Directive 91/414/EEC, the other regarding a Thematic Strategy and Framework Directive on the sustainable use of pesticides. The outcome of the discussion is still open, but it should aim at a final legislation, which puts in place a predictable system that would keep on encouraging investment in better plant protection products and ensure the sustainable use of plant protection products.

Dejavnost IOBC/WPRS na področju varstva rastlin in varnosti hrane

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IOBC/WPRS (= International Organisation for Biological and Integrated Contorl of noxious animals and plants/West Palaearctic Regional Section; http://www.iobc-wprs.org) je neprofitna organizacija, ki je bila ustanovljena v letu 1955, z namenom pospeševati uporabo razvojno trajnih, za okolje prijaznih, gospodarsko izvedljivih in socialno sprejemljivih načinov zatiranja bolezni in škodljivcev v kmetijstvu in gozdarstvu v okviru integrirane rastlinske pridelave.
V tem smislu so skupna prizadevanja na izbranih žariščnih temah ter sodelovanje kot tudi izmenjava informacij in podatkov v posebnih delovnih skupinah velikega pomena. Do zdaj

je ustanovljenih 19 delovnih skupin (npr. Integrirano varstvo v sadjarstvu), 1 študijska skupina in 4 komisije (npr. Smernice za integrirano pridelovanje).
IOBC/WPRS je ena od šestih Regionalnih sekcij IOBC Global in ima individualne, podporne in institucionalne člane iz 24 evropskih držav, iz sredozemskega območja in Bližnjega vzhoda. Ker so zastopani tako posamezni znanstveniki ali svetovalci in državne ali zasebne gospodarske organizacije, je omogočeno nepristransko reševanje problemov v varstvu rastlin. Glede varnosti hrane se skoraj vse delovne skupine ukvarjajo z možnostmi zmanjšanja in/ali optimiranja uporabe fitofarmacevtskih sredstev pri pridelavi živeža in s tem odprave neželenih ostankov (reziduov). Izdelane so alternativne strategije varstva poglavitnih gospodarsko pomembnih rastlin, ki so usmerjene predvsem k preprečevanju okužb in napadov in optimalni izrabi naravnih regulacijskih mehanizmov za škodljivce (naravni sovražniki) in bolezni (antagonisti), ki naj te ohranjajo pod ekonomskimi pragovi.
Delovna skupina "Fitofarmacevtska sredstva in koristni organizmi" je izvedla nekaj skupnih programov (vključno z razvojem standardnih testnih metod) za ugotavljanje stranskih učinkov fitofarmacevtskih sredstev na koristne organizme (http://www.iobc.ch/ news.html (= Toolbox: Selectivity of pesticides) s predlogi za omenjena sredstva, ki so kompatibilna z naravnimi sovražniki in z drugimi postopki integriranega varstva rastlin. Metode za ugotavljanje stranskih učinkov fitofarmacevtskih sredstev na talne neciljne organizme, da bi izpolnili zahteve za registracijo omenjenih sredstev v Evropski uniji, temeljijo večinoma na preverjenih testnih metodah, ki so jih razvili s pomočjo IOBS/WPRS.
Iskanje feromonov in drugih semio-kemikalij ter biozatiralnih agensov (mikro/makro), testiranje njihove učinkovitosti skupaj z razvojem aplikacijskih strategij znotraj konceptov integriranega varstva rastlin, je bilo izvedeno posebej za pečkarje, vinsko trto in rastline, ki se gojijo v rastlinjakih (http://www.agrsci.dk/plb/iobc/iobc_ home.htm) (http://www.iobc-wprs.org/wg sg/index.html). Na podlagi podatkov, ki so jih pridobile te delovne skupine, so razvili dodatne koncepte za integrirano varstvo rastlin in integrirano pridelavo, ki imajo poglavitno vlogo kot osnovne informacije za smernice v posameznih državah Evropske unije in jih je objavila Komisija za smernice integrirane pridelave (povezava s spletno stranjo te komisije: http://www.iobc.ch).
Zdaj se IOBC/WPRS ukvarja tudi z učinki genetsko spremenjenih organizmov (GMO's) na integrirano pridelavo rastlin in svetuje Evropski agenciji za varno hrano (EFSA). Dodatno se ukvarja z možnostmi za harmonizacijo registracije koristnih organizmov (macrobials) kot sredstev za varstvo rastlin v Evropi v povezavi ali z izmenjavo informacij z EPPO, OECD in FAO.

ABSTRACT

Activities of the IOBC/WPRS in the area of plant protection and food safety

The IOBC/WPRS (= International Organisation for Biological and Integrated Control of noxious animals and plants/West Palaearctic Regional Section; http://www.iobc-wprs.org) is a non-profit organisation, which was founded in 1955 with the scope to promote the application of sustainable, environmentally friendly, economically feasible and socially acceptable methods for the control of agricultural and forest pests within the frame of integrated plant production.
In this respect joint activities on selected focus topics and cooperation as well as the exchange of information and data in specific working groups are of major importance.
At present 19 working groups (e.g. Integrated Protection in Fruit Crops), 1 study group and 4 commissions (e.g. Guidelines for Integrated Production) are established.
Die IOBC/WPRS is one out of 6 Regional Sections of IOBC Global and has individual, supporting and institutional members from 24 countries in Europe, in the Mediterranean

area and of the middle east. As both single scientists or advisors and state or private, commercial organisations are represented, the development of solutions for plant protection problems from different stake holders views at the same time is facilitated.
With regard to food safety nearly all working groups deal with the possibilities to reduce and/or optimize the use of plant protection products in crop production and thus the avoidance of undesired residues. Alternative plant protection strategies which focus on the prevention of infestation and on the optimum use of natural regulation factors for pests (natural enemies) and diseases (antagonists) to keep them below economic threshold levels were developed for major crops. The working group "Pesticides and Beneficial Organisms" has carried out several joint programmes (including the development of standard testing methods) for the testing of side effects of plant protection products on beneficial organisms (http://www.iobc.ch/ news.html (= Toolbox: Selectivity of pesticides) to propose pesticides which are compatible with natural enemies and other tools of integrated plant production. The methods for testing side effects of pesticides on terrestric non target organisms in order to fulfil the requirements for the authorisation of plant protection products in the European Union are mainly based on the validated testing methods developed by IOBC/WPRS.
The search for pheromones and other semio-chemicals and for bio control agents (micro/macro) and their efficacy testing together with the development of application strategies within integrated control concepts are carried out especially for crops such as pome fruits, grapevines and greenhouse crops (http://www.agrsci.dk/plb/iobc/iobc_ home.htm) (http://www.iobc-wprs.org/wg_sg/index.html). Based on the data worked out by these working groups additionally concepts for integrated plant protection and integrated plant production were developed which played a major role as basic information for national guidelines in this respect in several European countries and have been published by the commission for "Guidelines for integrated production" (link to the commissions own website: http://www.iobc.ch).
At present IOBC/WPRS also focuses on the effects of GMO's on integrated plant production and is advising the European Food Safety Agency (EFSA). Additionally the possibilities for the harmonisation of the authorisation for beneficial organisms (macrobials) as plant protection products in Europe is worked on in contact or information exchange with EPPO, OECD and FAO.

Novosti in spremembe EU in RS zakonodaje na področju FFS

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Zakonodaja je živ element v sodobni državni ureditvi in se neprenehoma razvija in dopolnjuje. To velja tako za slovensko kot tudi za zakonodajo Evropske unije. Osnovna zakonodaja za fitofarmacevtska sredstva (FFS) je v EU predpisana z Direktivo Sveta 91/414/EEC o dajanju FFS v promet z vsemi spremembami in dopolnitvami. Ta direktiva je v slovenski pravni red prenesena s slovenskim zakonom o fitofarmacevtskih sredstvih, ki prenaša zahteve evropske zakonodaje na nacionalno raven. Poleg tega zakon ureja tudi nekatere nacionalne postopke in pogoje na področju prometa FFS, ki se z novo spremembo zakona skušajo prilagoditi pogojem prakse, tam kjer je to mogoče. Vse spremembe sledijo glavni usmeritvi, ki jo določajo novi predlogi predpisov EU zakonodaje s tega področja. V postopku sprejemanja v Evropskem parlamentu je namreč nekaj predlogov novih predpisov. Tematska strategija o trajnostni rabi pesticidov – Sporočilo Komisije

predstavlja politični okvir urejanja tega področja. V tem okviru so načrtovani štirje predpisi: predlog Uredbe o dajanju fitofarmacevtskih sredstev v promet, ki bo nadomestila Direktivo 91/414/EEC o dajanju FFS v promet; predlog nove Direktive o doseganju trajnostne rabe pesticidov; predlog Uredbe glede statističnih podatkov o FFS; ter predlog Direktive Sveta in Parlamenta, ki bo določala osnovne pogoje za varstvo okolja za nove naprave za nanašanje FFS in njihove dodatne dele v okviru Direktive 2006/42/EC. Direktiva o doseganju trajnostne rabe pesticidov bo prinesla nekatere novosti tudi za Slovenijo. In sicer bodo morale države članice izoblikovati, sprejeti in izvajati nacionalne akcijske plane (NAP) za zmanjšanje nevarnosti, tveganja in odvisnosti od kemijskega varstva rastlin ter o napredku redno poročati Evropski Komisiji.

ABSTRACT

Novelties and ammendments to EU and RS legislation in the field of PPP

Legislation is vivid element in contemporary administration and it develops and modifies constantly. Changes are happening on all levels, EU and national level. Plant Protection Products are regulated by Council Directive 91/414/EEC concerning placing plant protection products on the market and by its all amendments. The requirements of this Directive are implemented into Slovenian legislation by Plant Protection Product Act. Beside these requirements PPP Act regulates also some national procedures and conditions for sales of PPP, which by new amendments try to adjust to practical work when possible. All amendments are in line with new EU legal drafts in this field of work. Some new proposals take place in the co decision procedure in Council and European Parliament. Thematic strategy for sustainable use of pesticides – Communication from the Commission introduces the political frame for managing this field of work. Further four legal acts are foreseen: a proposal for a Regulation of the European Parliament and the Council revising Directive 91/414/EEC; a proposal for a Directive of the European Parliament and the Council establishing a framework for Community action to achieve a sustainable use of pesticides; a proposal for a Regulation of the European Parliament and the Council concerning statistics on plant protection products; and a proposal for a Directive of the European Parliament and the Council laying down essential environmental protection requirements for the placing on the market of new pesticide application equipment and accessories, possibly within the framework of Directive 2006/42/EC. The Directive establishing a framework for Community action to achieve a sustainable use of pesticides will bring some new requirements also for Slovenia. Member States will need to design, adopt an implement national action plans (NAP) to reduce hazard, risks and dependence on chemical control for plant protection and regularly report to European Commission on the progress.

Fitofarmacevtska sredstva in njihova aplikacija

Ostanki fitofarmacevtskih sredstev v integrirani pridelavi grozdja in vina

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Zaradi uporabe fitofarmacevtskih sredstev (FFS) se tudi v Integrirani pridelavi grozdja in vina (IPGV) soočamo s problematiko ostankov FFS na grozdju oziroma v moštu in vinu. Količina in vrsta aktivnih snovi na grozdju sta odvisni od vrste uporabljenih sredstev, števila aplikacij sredstev v rastni dobi, vremenskih razmer, uporabljene koncentracije in obdobja od zadnje aplikacije sredstva do trgatve. Prehod aktivnih snovi iz grozdja v mošt je odvisen od njihove topnosti v vodi in načina vinifikacije. Ker je večina FFS slabo topnih v vodi, so koncentracije aktivnih snovi v moštu nižje kot na grozdju. Nadaljnje zmanjševanje njihovih koncentracij v moštu lahko opišemo z eksponentno enačbo v kateri imamo tudi konstanto razgradnje, ki je značilna za vsako aktivno snov in je dobljena iz eksperimentalnih podatkov. V prispevku bomo predstavili rezultate spremljanja koncentracij večine FFS, ki se uporabljajo za zatiranje bolezni in škodljivcev vinske trte v IPGV in sicer za dva pridelovalca vključena v omenjeni sistem pridelave. Vzorčenje grozdja smo opravili 20 in 10 dni pred trgatvijo ter ob trgatvi. V kleti smo vzorčili mošt in tropine po stiskanju grozdja, drozgo pred in med fermentacijo (rdeča sorta), vino po končani alkoholni in jabolčno mlečno kislinski fermentaciji, vino po končanih enoloških postopkih in vino med skladiščenjem. Za analizo ostankov FFS na grozdju smo naredili multirezidualni analizi z GC/MS in LC/MS ter analizo na ostanke ditiokarbamatov z GC/MS. Za analizo ostankov FFS v moštu in vinu smo izvedli prilagoditve opisanih metod. Predstavljeni rezultati analiz za letnik 2006 dajejo dober vpogled v stanje problematike ostankov FFS v IPGV.

ABSTRACT

Pesticides residues in grapes and wines from vineyards included in integrated pest management

Although the list of products used in integrated pest management (IPM) and their annually application rates are limited, we are still confronted with the problem of pesticide residues in must and wine. The quantity of residues in grapes depends on the pesticides applied, the number of applications, climatic conditions, the concentration of pesticides and the period from the last application. The transition of residues from grape to wine is determined by vinification scheme and solubility of pesticides in water. Since most of the pesticides have a low solubility in water a decrease of their concentration is expected during the wine production process. Further reduction of their concentrations is described by exponential equation in which degradation coefficients for each pesticide are obtained from the experimental results. The paper presents the results of pesticide monitoring performed at two producers for the majority of pesticides allowed in IPM. Grapes were sampled 20 and 10 days before the harvest. In the cellar the following samples were taken: must and marc after the pressing, mash before and during the maceration, wine after alcoholic and malolactic fermentation, wine before and after finishing and wine during the storage. Pesticide residues in grapes were determined with two multi-residual analyses using GC/MS and LC/MS and the analysis of dithiocarbamates using GC/MS. Adjustments of methods were done for the analysis of other samples. The results of 2006 vintage allow better insight in the problem of pesticide residues found in IPM.

Mandipropamid – nova aktivna snov namenjena varstvu rastlin pred plesnivkami v pripravkih Revus in Pergado

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Mandipropamid je nova aktivna snov, ki je plod razvoja družbe Syngenta in je prvi komercializiran derivat kemične skupine mandelamidov. Mandipropamid je foliarno izredno učinkovit na patogene plesnivke (Oomycetes). Med ciljne patogene vključujemo ekonomsko pomembne bolezni kot so: peronospora vinske trte (*Plasmopara viticola)*, krompirjeva plesen (*Phytophthora infestans)* na krompirju in paradižniku ter kumarna plesen (*Pseudoperonospora cubensis)* na kumarah. Mandipropamid je izredno učinkovit pri preprečevanju kalitve spor poleg tega pa deluje tudi kot inhibitor rasti micelija in sporulacije. Poleg preventivne rabe, ki zagotavlja visoko učinkovitost na ciljne patogene, pa mandipropamid zagotavlja kurativno delovanje v inkubacijski dobi. Po foliarni aplikaciji se velik del mandipropamida vnese v voščene plasti rastlinskih tkiv. Vnos mandipropamida v rastlinsko tkivo omogoča dobro translaminarno delovanje. Mandipropamid je varen pred spiranjem z dežjem, čim se obloga na površini rastline posuši. Mandipropamid zagotavlja stalno odlično delovanje na bolezni tudi v neugodnih vremenskih razmerah. Je izredno učinkovit v nizkih hektarskih odmerkih, ki znašajo od 100 – 150 gramov aktivne snovi na hektar ali 10 – 15 g a.s./100 L vode. Aktivno snov odlikuje tudi visoka selektivnost do gojenih rastlin. Nenazadnje pa ima mandipropamid izredno ugoden toksikološki profil na področju humane toksikologije in toksikologije okolje ter živali. Pripravki kot so Revus, Revus MZ ter Pergado so tržna imena formulacij čistega mandipropamida ali pa kombinacij z dodano kontaktno komponento.

ABSTRACT

Mandipropamid a new fungicide against Oomycete pathogens is a basis for products Revus and Pergado

Mandipropamid is a new fungicide developed by Syngenta. It is the first derivative of the chemical class of mandelamide fungicides to be commercialized. It is highly effective against most foliar Oomycete pathogens. The main targets include economically important plant diseases such as: *Plasmopara viticola* in grapes, *Phytophthora infestans* in potatoes and tomatoes and *Pseudoperonospora cubensis* in cucurbits. Mandipropamid is highly effective in preventing spore germination. It also inhibits mycelial growth and sporulation. Mandipropamid is best used as a preventive spray against the target diseases, but also provides curative activity during the incubation period. Following foliar application, a large proportion of mandipropamid is adsorbed into the wax layer of plant surfaces. Uptake of mandipropamid into plant tissue assures good translaminar activity. Mandipropamid is fully rainfast as soon as the spray deposit has dried. Mandipropamid provides consistently excellent disease control even under adverse weather conditions. It is highly effective at low application rates of 100-150 g a.i./ha or 10-15 g a.i./100 litres spray solution. The compound is characterized by excellent crop safety. It also has a very favourable profile with regard to human safety and safety to wildlife and the environment. Product such as Revus, Revus MZ and Pergado will be commercialized as pure mandipropamid and in combination with contact fungicides.

Funkcionalna orodja za ugotavljanje tveganja in upravljanje s fitofarmacevtskimi sredstvi v okolju – evropski projekt FOOTPRINT

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FOOTPRINT je raziskovalni projekt v okviru 6. okvirnega programa s ciljem razvoja niza treh orodij za ugotavljanje tveganja in upravljanje s fitofarmacevtskimi sredstvi v okolju, namenjen uporabi pri treh različnih končnih skupinah uporabnikov: kmetom in svetovalni službi na nivoju kmetije, upravljalcem voda na nivoju povodij (vodozbirnih območij) in ustvarjalcem politik / strokovnjakom registracijskih postopkov na državnem in/ali EU nivoju.
Orodja bodo zasnovana na najnovejših spoznanjih procesov v tleh, posebnosti pokrajin in dejavnikov, ki vplivajo na usodo fitofarmacevtskih sredstev v okolju. Z integracijo inovativnih pristopov bo uporabnikom omogočeno: identificirati glavne poti in vire onesnaženja z omenjenimi sredstvi v pokrajini; oceniti njihovo vsebnost v lokalnih virih podtalnice in površinskih virih voda; na osnovi znanstvenih spoznanj izdelati oceno, kako

bo izvajanje omilitvenih strategij zmanjšalo onesnaženje s temi sredstvi v obravnavanih vodnih virih.
Vsem trem orodjem bo skupna celotna filozofija, kot tudi znanstvene podlage, zato bodo omogočala skladne in enotne rešitve pri ugotavljanju tveganja in pri zmanjševanju onesnaženja okolja s fitofarmacevtskimi sredstvi od nivoja kmetije do EU nivoja. Zanesljivost napovedi in uporabnost orodij bo dosežena s ključnim programom pilotnih testov in vrednotenja na različnih ravneh: polje, kmetija, povodje in država. Orodja, razvita v okviru FOOTPRINT-a bodo omogočala deležnikom izdelavo skladnih ocen tveganja pred onesnaženjem vodnih teles glede na namen (upravljanje, omilitveni ukrepi, zakonodaja) in obseg (polje, kmetija, povodje in država). Orodja bodo prvenstveno omogočala uporabnikom fitofarmacevtskih sredstev oceno ali njihova praksa rabe omogoča varstvo lokalnih vodnih teles ter zagotavljala krajevno specifična omilitvena priporočila.
Pričakuje se, da bodo FOOTPRINT orodja direktno vplivala na revizijo Direktive Sveta 91/414/EEC, implementacijo Vodne direktive in k prihodnji Tematski strategiji trajnostne rabe pesticidov.

ABSTRACT

Functional tools for pesticide risk assessment and management - the EU project FOOTPRINT

FOOTPRINT is a research project in the 6th Framework Programme which aims at developing a suite of three pesticide risk prediction and management tools, for use by three different end-user communities: farmers and extension advisors at the farm scale, water managers at the catchment scale and policy makers/registration authorities at the national/EU scale.
The tools will be based on state-of-the-art knowledge of processes, factors and landscape attributes influencing pesticide fate in the environment and will integrate innovative components which will allow users to identify the dominant contamination pathways and sources of pesticide contamination in the landscape; estimate pesticide concentrations in local groundwater resources and surface water abstraction sources; make scientifically-based assessments of how the implementation of mitigation strategies will reduce pesticide contamination of adjacent water resources.
The three tools will share the same overall philosophy and underlying science and will therefore provide a coherent and integrated solution to pesticide risk assessment and risk reduction from the scale of the farm to the EU scale. The predictive reliability and usability of the tools will be assessed through a substantial programme of piloting and evaluation tests at the field, farm, catchment and national scales.
The tools developed within FOOTPRINT will allow stakeholders to make consistent and robust assessments of risk of contamination to water bodies at a range of scales relevant to management, mitigation and regulation (i.e. field/farm, catchment and national/EU). They will in particular allow pesticide users to assess whether their pesticide practices ensure the protection of local water bodies and provide site-specific mitigation recommendations. The FOOTPRINT tools are expected to make a direct contribution to the revision of the Council Directive 91/414/EEC, the implementation of the Water Framework Directive and the future Thematic Strategy on the Sustainable Use of Pesticides.

Možnosti zmanjševanja pojavov zanašanja (drifta) herbicidov pri zatiranju plevelov v koruzi z uporabo standardnih ali antidriftnih šob

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Pri aplikaciji herbicidov v koruzi v stadiju 3-4 listov smo merili količino škropilne brozge zanesene 1 do 10 m vstran od roba njive z uporabo fluorescentnega sledilca. Primerjali smo obseg zanašanja pri dveh standardnih šobah (Lechler LU in Albuz API) in pri dveh antidriftnih šobah (Lechler ID in Albuz AVI) pri nanosu 125, 200, 300 ali 400 l škropilne brozge na hektar. Antidriftni šobi sta za 40-55% zmanjšali obseg zanašanja na vseh merjenih razdaljah. Povečana poraba vode za škropljenje na način, da pri isti šobi ob enaki hitrosti vožnje povečamo pretok s povečanjem pritiska značilno poveča zanašanje škropilne brozge. Povečana poraba vode na način, da za škropljenje ob enaki hitrosti vožnje uporabimo šobo z večjim pretokom, zmanjša obseg zanašanja. Pri uporabi različnih tipov šob z različnimi pretoki, vendar s primerljivimi VMD vrednostmi kapljic je obseg zanašanja enak. Zanašanje herbicidov izven območja nanašanja je možno enakovredno zmanjšati z uporabo antidriftnih šob, ali s prilagoditvijo delovnih parametrov pri uporabi standardnih šob.

ABSTRACT

Possibilities for the reduction of herbicide drift at weed control in maize by use of standard end/or drift-reducing nozzles

Measurements of spray drift (1-10 m from the filed edge) were performed during herbicide application in maize field at growth stage of 3-4 leaves with different types of nozzles and at different spray volumes by use of fluorescent tracer technique. Two standard (Lechler LU and Albuz API) and two drift-reducing nozzles (Lechler ID and Albuz AVI) were compared at 125, 200, 300 and 400 l/ha spray volume. Use of drift-reducing nozzles caused 40-55% reduction of spray drift at all studied distances from the field edge. Enlargement of a spray volume by increase of operating pressure to increase output of nozzles at the unchanged driving speed caused significant drift increase, whereas an enlargement of the spray volume by increase of nozzle output by altering type of nozzle at the same operating pressure and driving speed, reduced drift. Drift values measured at different nozzle types (standard verses drift-reducing) at different operating parameters were comparable if nozzles produced droplets with comparable VMD values. This indicates that the comparable level of drift reduction could be reached either by use of drift-reducing nozzles, or by changing operating parameters at standard nozzles.

Vpliv kota curka šob na biotično učinkovitost pripravkov za zatiranje bolezni in škodljivcev jablane

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V nasadu jablan gojitvene oblike zelo vitko vreteno smo v letu 2004 in 2005 izvedli poskuse, v katerih smo preučevali vpliv kota curka šob na biotično učinkovitost pripravkov za zatiranje bolezni (jablanov škrlup - *Venturia inaequalis* in jablanova pepelovka - *Podosphaera leucotricha*) ter škodljivcev jablan (zelena jablanova uš - *Aphis pomi* in jabolčni zavijač - *Cydia pomonella*). Pri pršenju smo uporabljali šest različnih vrst šob z različnimi izstopnimi koti curka šob (80°, 90°, 110°, 120°). Te šobe so bile: Albuz AVI, ATR in Lechler ID, ITR ter TR. Poskuse za ugotavljanje biotične učinkovitosti različnih pripravkov smo izvedli tako, da smo iste pripravke z enakim pršilnikom nanašali vse leto v enakih odmerkih in pri enaki porabi vode na hektar (350 l/ha). Uporabili smo klasično zasnovo naključnih blokov v štirih ponovitvah. Parcelice so bile široke 5 vrst (5 x 2,8 m) in dolge 30 metrov (približno 400 m^2). Stopnjo okužbe od bolezni in napada škodljivcev smo ocenjevali na šestih položajih v krošnji dreves (dva položaja spodaj, dva v sredini in dva v vrhovih dreves). V povprečju, gledano na vseh šest ocenjevanih položajev na drevesih so šobe z širšim izstopnim kotom curka (110-120°) pri fungicidih dale nekaj boljše ali popolnoma primerljive rezultate, kot klasične šobe s kotom 80-90°. Glede učinkovitosti insekticidov za zatiranje uši in jabolčnega zavijača so bile razlike med širokokotnimi in ozkokotnimi šobami, še manjše kot pri fungicidih. Pri ocenjevanjih v vrhovih krošenj (položaj – zgoraj zunaj in - zgoraj znotraj) smo ugotovili, da z uporabo antidriftnih širokokotnih šob s pahljačastim izstopnim curkom dosežemo v povprečju nekoliko boljšo učinkovitost fungicidov in insekticidov, kot z uporabo ozkokotnih šob. Glede na rezultate poskusov lahko trdimo, da so v nasadih jablan z gojitveno obliko zelo vitko vreteno, širokokotne šobe s ploščatim curkom (AVI in ID) enako uporabne za nanašanje fungicidov in insekticidov, kot ozkokotne šobe z votlim stožčastim curkom (ATR, TR ali ITR).

ABSTRACT

Impact of nozzle jet angle on the efficacy of plant protection products applied for control of pests and diseases of apple

In a plantation of apple trees trained in the super-spindle form, in 2004 and 2005 field trials were conducted to examine the impact of nozzle jet angles on the biological efficacy of plant protection products for control of pests (green apple aphid – *Aphis pomi* and codling moth – *Cydia pomonella*) and diseases of apple (scab – *Venturia inaequalis* and powdery mildew – *Podosphaera leucotricha*). Different nozzles types (Albuz AVI, ATR and Lechler ID, ITR TR) with different jet angles (80°, 90°, 110°, 120°) were used for application of all the preparations throughout the whole season, in equal doses and with equal spray volume used per hectare (i.e. 350 l/ha). The same spray programme was applied with different types of nozzles. Standard randomised block design in four replications was used. The plots were five rows wide (5 x 2.8 m) and 30 m long (approx. 400 m^2 each). Assessments of disease severity and pest attack rate were conducted in six crown positions; two in the bottom, two in the middle and two at the top of the tree crown. On average, on all of the six positions assessed on the trees, the nozzles with wider spray jet angles (110-120^o) gave slightly better or comparable disease control results than nozzles with narrower jets (80-90^o). With regard to the efficacy of insecticides applied for control of aphids and codling moth, the differences between wide- and narrow-angle nozzles were even smaller than in case of fungicides. At comparisons of results at tree tops (position top-inside and top-outside) we established that biological performance of fungicides and insecticides applied with wide-angle drift-reducing nozzles (AVI and ID) was better than when applied with narrow-angle nozzles with hollow cone jets (ATR and

TR). According to the results of trials it could be concluded that, when applying fungicides and insecticides to apple tress trained in a super spindle form, the wide-angle flat fan nozzles (AVI and ID) will provide equal biological performance of preparations to the narrow-angle hollow cone nozzles (ATR and TR).

Vpliv gojitvene oblike jablan na stopnjo pokrovnosti obloge škropilne brozge v različnih sektorjih krošnje dreves

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V nasadih jablan z gojitvenimi oblikami zelo vitko vreteno - ZVV, modificirano vitko vreteno - MVV, vitko vreteno sajeno po sistemu dvojček – VVx2 in zelo vitko vreteno sajeno po V sistemu – VVS smo preučevali vpliv gojitvene oblike na stopnjo pokrovnosti obloge škropilne brozge v 12 različnih točkah v krošnji. Stopnjo pokrovnosti obloge škropilne brozge (% pokrovnosti – angl. % coverage) smo ovrednotili z meritvami deleža površine prekrite s škropilno brozgo pri WSP lističih (angl. water sensitive papers – za vodo občutljivi lističi) z napravo za računalniško fotografsko analizo slike (Optomax image analyser). Škropilno brozgo smo v vseh nasadih nanašali z istim klasičnim aksialnim pršilnikom s tremi različnimi šobami (Lechler TR, Lechler ID90 in Lechler ID120) pri dveh porabah vode (350 in 700 l/ha). Gojitvena oblika jablan je imela značilen vpliv na izenačenost stopnje pokrovnosti WSP lističev med dvanajstimi točkami krošnje. Ugotovili smo interaktivni učinek tipa šobe, količine porabljene vode in gojitveno obliko na stopnjo pokrovnosti škropilne obloge. S povečanjem porabe vode iz 350 na 700 l/ha se je stopnja pokrovnosti značilno povečala pri vseh gojitvenih oblikah, najmanj pri ZVV (za 30%) in najbolj pri MVV (za 48%). Tip šobe je imel značilen vpliv na pokrovnost. Pri gojitveni obliki ZZV je imela največjo skupno povprečno pokrovnost šoba ID120 (40,3%), pri MVV šoba ID 90 (26,3%), pri VVx2 šoba ID90 (24,6%) in pri VVS šoba ID 90 (30,3%). Antidrifne šobe tipa ID so pri vseh gojitvenih oblikah vsaj v polovici opazovanih točk krošnje dosegale večjo pokrovnost kot standardne šobe tipa TR. Največji razpon vrednosti med 12 točkami v krošnji smo ugotovili pri gojitveni obliki VVx2 in najmanjši pri ZVV. Pri gojitvenih oblikah MVV, VVx2 in VVS smo ugotovili značilno nižje povprečne pokrovnosti kot pri ZZV, kar kaže na to, da s konfiguracijo pršilnika in delovnimi parametri, ki so prilagojeni gojitveni obliki ZVV pri uporabljenem tipu pršilnika, pri ostalih treh gojitvenih oblikah, ne moremo zagotoviti dovolj visoke pokrovnosti za kvalitetne delovanje pripravkov. Posebej izrazito se pokrovnost zmanjšala v vrhovih dreves pri porabi vode 350 l/ha in je pogosto znašala pod 10%.

ABSTRACT

The impact of apple tree training system on spray deposit coverage values within the tree crown

The impact of apple tree training system on spray deposit formation within the tree crown was studied in the apple tree plantations with super-spindle (SS), modified slender-spindle (MSS), slender-spindle in a twin row (SSTR) or V-system super-spindle (VSS) training

systems. The formation of spray deposit within twelve crown positions was evaluated by measurements of spray coverage values obtained on water sensitive papers (WSP; % coverage) and measured by Optomax image analyser. At all plantations, sprays were applied by the same standard axial fan sprayer equipped with three types of nozzles (Lechler TR, Lechler ID90 or Lechler ID120) and calibrated to deliver 350 or 700 litre of spray per hectare.
The tree training system had a significant impact on the uniformity of spray coverage values detected in the twelve different crown regions and also on the absolute spray coverage values measured. The interactive effects of nozzle type, spray volume and type of tree training system on spray coverage were observed. By increasing the spray volume from 350 to 700 l/ha the spray coverage was increased significantly in all plantations. The increase was the least in the SS tree training system (30%) and the highest in the MSS trained trees (48%). The influence of nozzle type on achieved coverage values was significant but not the same for all the studied tree trainings systems. In case of SS trees, the highest coverage (average of twelve crown positions) was achieved by ID120 nozzle (40,3%), in MSS trees by ID90 (26,3%), in SSTR trees when using ID90 nozzle (24,6%) and in VSS trained trees by ID90 nozzle (30,3%). Drift-reducing nozzles of ID type provided higher coverage values than standard TR nozzles in all four types of plantations in at least half of the observed crown positions. The highest variability of coverage values among 12 crown positions was observed in SSTR trees and the smallest in SS trees. The coverage values measured in SSTR, VSS and MSS trees were significantly lower than in case of SS trees. It can be assumed, that spraying tress of SSTR, VSS and MSS training systems by the same sprayer whose nozzle configuration and operating parameters are adapted to the SS trees, can not provide spray coverage high enough for sufficient disease and pest control. The nozzle type, nozzle configuration and operating parameters of sprayer therefore must be adapted to the specific tree training systems.

Vpliv gojitvene oblike jablan na porazdelitev škropilne brozge v krošnji dreves

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Z uporabo tehnike fluorescentnega sledilca smo preučevali vpliv gojitvene oblike jablan (zelo vitko vreteno - ZVV, modificirano vitko vreteno - MVV, vitko vreteno sajeno po sistemu dvojček – VVx2 in zelo vitko vreteno sajeno po V-sistemu - VVS) na porazdelitev škropilne brozge. Porazdelitev škropilne brozge smo ovrednotili z meritvami depozita sledilca v šestih točkah krošnje. Škropilno brozgo smo v vseh nasadih nanašali z istim klasičnim aksialnim pršilnikom s tremi različnimi šobami (Lechler TR, Lechler ID90 in Lechler ID120) pri dveh porabah vode (350 in 700 l/ha). Gojitvena oblika jablan je imela značilen vpliv na izenačenost depozita in na absolutne izmerjene količine depozita škropilne brozge v šestih točkah krošnje. Ugotovili smo interaktivni učinek tipa šobe, količine porabljene vode in gojitvene oblike na porazdelitev depozita škropilne brozge. Variabilnost depozita med šestimi opazovanimi točkami je bila največja pri gojitveni obliki MVV in najmanjša pri ZVV. Pri manjši porabi vode je bila večja, kot pri večji porabi vode. Večja poraba vode za škropljenje (700 l/ha) je najbolj povečala absolutni depozit škropilne brozge pri gojitveni obliki VVS in najmanj pri obliki ZVV. Vpliv tipa šobe na

porazdelitev depozita je bil različen pri različnih gojitvenih oblikah. Pri ZVV je najboljši povprečni depozit (povprečje vseh šest točk krošnje) dala šoba ID120, pri MVV šoba ID 90, pri gojitvenih oblikah VVx2 in VVS razlike med šobami niso bile značilne. Z uporabo istega pršilnika z uniformno konfiguracijo in vrsto vgrajenih šob v nasadih jablan različnih gojitvenih oblik ni mogoče doseči primerljivo izenačenih depozitov škropilne brozge po celotnem volumnu krošnje. Konfiguracijo in vrsto šob vgrajenih v pršilnik je potrebno prilagajati gojitvenim oblikam jablanovih dreves.

ABSTRACT

The impact of apple tree training system on spray deposit partitioning within the tree crown

The impact of apple tree training system on the spray deposit partitioning within the tree crown was studied in the apple tree plantations with super-spindle (SS), modified slender-spindle (MSS), slender-spindle in a twin row (SSTR) or V-system super-spindle (VSS) training systems. The partitioning of spray deposit within six crown positions was evaluated by measurements of fluorescent dye (tracer) deposit on the filter paper collectors. Sprays containing fluorescent dye were applied in all plantations by the same standard axial fan sprayer equipped with three types of nozzles (Lechler TR, Lechler ID90 or Lechler ID120) and calibrated to deliver 350 or 700 litre of spray per hectare. The tree training system had a significant impact on the uniformity of spray deposits detected in different crown regions and also on the absolute spray deposit values measured. The interactive effects of nozzle type, spray volume and type of tree training system on the spray deposit partitioning were observed. The variability of absolute deposit values detected within sex observed crown positions was the highest in the MSS trained trees and the lowest in the SS trained trees. The variability was higher when spraying was performed with 350 l/ha volume than when 700 l/ha of spray was applied. Higher spray volume (700 l/ha) increased the absolute deposit values the most in the VSS trained trees and the least in the SS trained trees. The influence of nozzles on deposit partitioning was not the same in all the studied tree trainings systems. In SS training system the best results in terms of absolute deposit (average of six crown positions) were obtained by use of IDE 120 nozzles and in MSS trained trees, by ID90 nozzles. In the SSTR and VSS trained trees, the differences in absolute deposits formed by different nozzles were not significant. If trees of different training systems are sprayed with the same sprayer equipped with the same nozzle types which deliver the same spray volume, comparable spray deposit partitioning and uniformity within the different crown positions can not be achieved. The nozzle type, nozzle configuration and operating parameters therefore must be adapted to the specific tree training systems.

Silwet L-77, a new super spreader

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Environment-friendly crop-protection technologies becoming more and more common, adjuvants to be added to spray liquids become more important. Such additives are designed to improve the efficacy of crop-protection processes, and enhance safe usage of crop-protectants.
Silwet L-77, a new-generation surfactant (or surface-active agent), is designed for the same purpose. Silwet will reduce the surface tension of the spray liquid in a unique manner, facilitating the spreading of the spray over the surface of waxy leaves or plants

covered with glandular hairs and, hence, helping crop-protectants to reach places on or inside plants where action is desirable, to an extent depending on the concentration applied. In addition, Silwet will accelerate the drying process of the spray and reduce the risk of drift-away as well as improve the rainfastness of the spray.
Based on several years of international experience, the benefits offered by Silwet L-77 can be summarized as follows: increase of the spray coverage of large target plants, increase of the control of stem base diseases and ear sprays on cereals with fungicides and insecticides, increase of the activity of fungicides, herbicides, insecticides, and desiccants, effective spray volume reduction, reduced spray drift, increase of the wash-down effects, increase of the distribution of soil pesticides across the soil surface, and increase of foliar micronutrient uptake.

Slovenski izvleček ni bil predložen.

Delan 700 WG - Standard v novi WG formulaciji

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Delan 700 WG je kontaktni fungicid, namenjen zatiranju številnih rastlinskih bolezni, brez nevarnosti nastanka rezistence. To dokazuje njegova dolgoletna uporaba z nezmanjšano učinkovitostjo. Dosedanja SC formulacija je bila manj primerna za uporabnike in okolje.
Z letom 2007 je tudi v Slovenijo prišel na trg Delan v novi WG formulaciji, katere prednosti so dobro dispergiranje sredstva, aktivna snov se v zrncih ne razgrajuje, formulacija je prijaznejša za uporabnika, saj omogoča natančno doziranje, lažje mešanje, brez ostankov sredstva v izpraznjeni embalaži.

ABSTRACT

Delan 700 WG – the standard in the new WG formulation

Delan 700 WG is a contact fungicide, intended for suppression of various plant diseases, with no risk of resistance. This has been proved by its extensive use and its consistent efficiency. The current SC formulation, however, was not as appropriate for users and the environment.
2007 has seen Delan arrive on the Slovenian market in a new WG formulation, whose benefits include good dispersion of the agent, whereby the active substance does not decompose in the granules, the formulation is more user-friendly, as it allows precise dosing, easier mixing, and no residue is left in the emptied container.

Steward - nov insekticid firme DUPONT

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Steward je nov insekticid firme DuPont z novim načinom delovanja. Aktivna učinkovina v pripravku, indoksakarb, predstavlja nov razred v kemiji insekticidov z edinstvenim načinom delovanja. Že to, da se škodljivci po tretiranju s Steward – om prenehajo hraniti že po štirih urah, je rezultat odličnega delovanja pripravka. Steward je kontaktni in želodčni insekticid, ki se aktivira v prebavnem traktu žuželke.
Steward je ustrezen pripravek za integrirano varstvo rastlin. Zaradi novega načina delovanja je dobrodošel tudi v antirezistenčni strategiji. Značilnost pripravka Steward je tudi ta, da odvisno od vrste škodljivca, pritiska populacije in okoljskih dejavnikov, v optimalnih razmerah nudi 14 dnevno rezidualno delovanje. Pripravek pridobi že po dveh urah po škropljenju odlično odpornost proti izpiranju in je foto (UV) stabilen. Steward po svojem načinu delovanja ne spada med sistemične pripravke.

ABSTRACT

Steward – new insecticide from Dupont

Steward is a new insekticide from DuPont that has a novel mode of action. The active ingredient in DuPont Steward, indoxacarb, is a new class of insekticide chemistry with a novel mode of action. Exposed pests stop feeding in zero to four hours, resulting in exellent crop protection. Steward is a contact and stomach poison which becomes active inside the insects gut.
This means Steward has an exccellent fit in Integrated Pest Management (IPM) and Insect Resistance Management (IRM) programs. At label rates, Steward can provide 14 days residual protection of treated crops, depending on the type of insect, population pressure and crop/environmental conditions. Additionally, Steward has a 12-hour reentry interval and provides excellent rainfastness (after two hours drying time) and photo (UV) stability. Steward is not systemic and does not protect new growth.

Zakonodaja

Vloga Urada RS za kemikalije pri varovanju zdravja ljudi in okolja pred vplivi nevarnih kemikalij

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Urad RS za kemikalije (URSK) je bil ustanovljen leta 1999 in zaposluje visoko izobražene strokovnjake s področja kemije, agronomije, biologije, prava itd. Njegovo poslanstvo je skrb za varovanje zdravja ljudi in okolja pred vplivi nevarnih kemikalij. To poslanstvo se izraža predvsem preko pred kratkim sprejetega Nacionalnega programa za kemijsko varnost in Mednarodne strategije ravnanja s kemikalijami (SAICM).
Slovenska kemijska zakonodaja sicer temelji na trenutno veljavni EU zakonodaji, kljub temu pa so bili v Sloveniji vzpostavljeni določeni dodatni mehanizmi za večjo kemijsko varnost. Pri tem sta najpomembnejša sistem sporočanje podatkov o nevarnih kemikalijah in pridobitev dovoljenj za opravljanje dejavnosti prometa, uporabe in proizvodnje z nevarnimi kemikalijami.
Izvajanje nalog na določenih področij, ki obravnavajo kemikalije s širšega oziroma drugega aspekta, kot so: strateško blago posebnega pomena za varnost in zdravje, kozmetični proizvodi, biocidni proizvodi in predhodne sestavine za prepovedane droge, je prav tako naloga URSK. Poleg aktivnega sodelovanja pri oblikovanju nove EU kemijske zakonodaje (pri tem je še posebej vredno omeniti uredbo REACH, ki je bila sprejeta koncem leta 2006), je pomembna tudi udeležba URSK v različnih mednarodnih telesih in organizacijah, še posebej Organizaciji za ekonomsko sodelovanje in razvoj (OECD), Mednarodnem Forumu za kemijsko varnost (IFCS), Organizaciji za prepoved kemičnega orožja (OPCW) itd. URSK pa je tudi imenovan pristojni organ za izvajanje sistema Dobre laboratorijske prakse v Sloveniji.
Kot zaokrožitev aktivnostmi za povečanje kemijske varnosti so tu tudi akcije ozaveščanja javnosti, ki jih URSK še posebej intenzivno organizira v zadnjih nekaj letih. URSK si prizadeva tudi za poslovno odličnost in gradi sistem kakovosti za poslovanje v državni upravi. URSK si bo tudi v prihodnje prizadeval za povečevanje kemijske varnosti v Sloveniji, ter po svojih najboljših močeh prispeval k tovrstnemu razvoju tako na nivoju EU kot tudi v svetovnem merilu.

ABSTRACT

Role of National Chemicals Bureau at protection of health and the environment against dangerous chemicals

National Chemicals Bureau (NCB) was established in 1999 and employs highly educated experts from the area of chemistry, agronomy, biology, law, etc. Its mission is protection of human health and the environment against dangerous chemicals. The mission is expressed mainly through recently accepted National program on Chemicals Safety and Strategic Approach to International Chemicals Management (SAICM).
Slovene chemicals legislation is based on current EU legislation, nevertheless certain additional mechanisms for achieving higher level of chemical safety were established. The most important are system of data reporting and licences for marketing, use and production of dangerous chemicals.
Execution of certain tasks on fields, which cover chemicals from wider or other aspect, such us: strategic goods of special importance for safety and health, cosmetic products, biocide products and drug precursors, are also task of NCB. Besides active co-operation at preparation of new EU chemicals legislation (here is worth mentioning regulation

REACH, which was accepted at the end of year 2006), participation of NCB in different international bodies and organisations, especially Organisation for Economic Cooperation and Development (OECD), International Forum on Chemical Safety (IFCS), Organisation for the prohibition of chemicals weapons (OPCW), etc. NCB is also competent authority for implementation of Good laboratory practice in Slovenia.
To round up activities for better chemicals safety, NCB is organizing awareness raising programs, with special intensity in the last few years. NCB is also striving for excellent operation and building quality system according to public administration requirements. NCB is going to, in the future, with all available means try to increase chemical safety in Slovenia, and according to its possibilities, tried to contribute to such development also on the level of EU and on global level.

REACH - nova EU kemijska zakonodaja

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Evropski parlament in Svet sta v decembru 2006 sprejela novo kemijsko zakonodajo, ki bo stopila v veljavo 1. junija 2007. Glavni namen nove zakonodaje je varovanje človekovega zdravja in okolja in pomeni primarno kemijsko zakonodajo, ki bo imela določen vpliv tudi na zakonodajo na drugih področjih (biocidi, sredstva za zaščito rastlin, varnost in zdravje pri delu itd). Do sedaj je bilo na voljo premalo podatkov za veliko število kemikalij. Po novi kemijski zakonodaji bo vzpostavljena Evropska kemijska Agencija, kamor bodo zavezanci (proizvajalci in uvozniki) sporočali zahtevane podatke v centralno bazo. Vzpostavljen bo sistem registracije (splošna obveznost proizvajalcev in uvoznikov kemikalij, ki so v prometu v količinah nad 1 tono/leto – gre za okrog 30.000 različnih kemikalij, da pridobijo dovolj podatkov o teh kemikalijah, tako da je na podlagi teh podatkov mogoče zagotoviti njihovo varno uporabo in ustrezno zmanjševanje tveganja, ki ga te kemikalije lahko povzročajo. Drugi element sistema je evalvacija, ki predstavlja podroben pregled za okrog 5.000 kemikalij s prioritetnega seznama. Čisto nov element je avtorizacija kemikalij. Uvajanje postopka avtorizacije je za vse kemikalije, ki lahko zaradi svojih nevarnih lastnosti predstavljajo posebno zaskrbljenost, tako da jih je treba obravnavati po posebnem postopku, ki omogoča oceno tega tveganja že pred začetkom njihove uporabe oziroma dajanja v promet. Tu gre za različne kemikalije, med katerimi so rakotvorne, mutagene in strupene za razmnoževanje (CMR lastnosti) kategorije 1 in 2. V skupino, ki potrebuje avtorizacijo sodijo tudi POP's (obstojni organski onesnaževalci) oziroma druge obstojne, bioakumulativne in strupene kemikalije.

ABSTRACT

New chemical legislation - REACH

In December 2006, European Parliament and Council have been adopted a new Chemical Legislation which will enter into force on 1st June 2007. The main aim of new legislation is protection of human health and environment and it presents a primary chemical legislation which will have certain effect also at legislation on other fields (biocides, plant protection products, health and safety at work etc). Up to now there is not enough data available for huge number of chemicals. With new Chemicals legislation

European Chemicals Agency will be established, where the companies (manufacturers and importers) which will have obligations under REACH will have to report requested data in central database. The system of registration will be established (general obligation for manufacturers and importers of chemicals, which are putting on the market in tonnage band more than 1 tonne per year- this is about 30.000 different chemicals for which is necessarily to get enough information which will than further enable to provide save use and relevant risk reduction measures. The next element is evaluation, which presents detailed examination for around 5.000 chemicals from priority list. Completely new element is authorisation of chemicals. Introducing of authorisation procedure is for all those chemicals, which can due to their specific hazardous properties cause high concern and because of that need special procedure, which enables risk assessment to be done already before beginning of their use. This procedure will be for different chemicals, among which are carcinogenic, mutagenic and toxic for reproduction (substances with CMR properties) categories 1 and 2. In the group which requires authorisation belong also POPs (persistent organic pollutants) and other persistent, bioaccumulative and toxic chemicals.

Pomen nadzora in omejevanja širjenja karantenskih vrst iz družine Tephritidae

Primož PAJK

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V Evropo se zaradi spremembe klimatskih razmer nadzorovane vrste sadnih muh (družina Tephritidae) v zadnjem času širijo iz tretjih držav, zato je nadzor vnosa vse pomembnejši. V mednarodnem prometu se sadne muhe prenašajo preko gostiteljskih rastlin na krajše in daljše razdalje. V večini primerov gre za vrste, ki so zastopane predvsem na agrumih in grenivkah. Sadne muhe so bile še pred kratkim zelo eksotične vrste, zastopane predvsem na območjih z bolj milim podnebjem. V glavnem gre za termofilne vrste, ki imajo tudi zelo visok populacijski potencial in so s tega vidika pomembne pri širjenju v okolja, kjer lahko najdejo primerne prehranske niše. Evropska zakonodaja upošteva nevarnost vnosa teh organizmov, zato je na seznam organizmov I.A.I, ki ga opredeljuje Direktiva Sveta 2000/29/ES, uvrstila vrste iz rodov *Anastrepha*, *Dacus*, *Epochra*, *Pardalaspis*, *Pterandrus*, *Rhacochlaena* in *Rhagoletis*. To so vrste, katerih vnos in širjenje na območju držav članic Evropske skupnosti je prepovedano. V prispevku je predstavljena vrsta *Rhagoletis completa*, ki je bila ugotovljena tudi v Sloveniji. Biotično varstvo sadnih muh je z vidika njihove mobilnosti težavno. S strani mednarodne konvencije za varstvo rastlin (FAO-IPPC) je bil sprejet mednarodni standard ISPM št. 26, ki bo zavezujoč pri vzpostavitvi neokuženih in okuženih območij v skladu s konvencijo. Evropska in mediteranska organizacija za varstvo rastlin (EPPO) med bolj nevarne uvršča vrsto *Bactrocera invadens*.

ABSTRACT

Importance of survey and limitation of spread of quarantine species of the family Tephritidae

Species of fruit flies (Tephritidae family) under survey have recently spread into Europe from third countries as a result of climatic changes, which makes control of introduction

increasingly important. In international trade fruit flies are carried by host plants on a long or short distance. The species are in most cases those present mostly on citrus fruits. Until lately, fruit flies were considered exotic species, found mostly in areas with mild climate. These are first of all thermophilous species with very high population potential. In this aspect they are assumed to be very important when spreading into the environment, where they can find suitable food niches. European legislation takes account of the risk posed by import of these species, therefore the species of the following genera are listed in List I.A.I of harmful organisms, which is provided for by Council Directive 2000/29/EC: *Anastrepha*, *Dacus*, *Epochra*, *Pardalaspis*, *Pterandrus*, *Rhacochlaena* and *Rhagoletis*. Import and spread of these species in the European Union are prohibited. This article presents species *Rhagoletis completa*, which has been found also in Slovenia. Due to their mobility, biological control of these species is difficult. International standard ISPM 26 was adopted by the International Plant Protection Convention (FAO-IPPC), which establishes delimitation of infected and pest free areas. According to the European and Mediterranean Plant Protection Organization (EPPO) species *Bactrocera invadens* is classified among very dangerous species.

Ureditev biotičnega varstva rastlin v Sloveniji

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Integrirani način varstva rastlin združuje različne načine varstva, ki so sprejemljivi z gospodarskega, ekološkega in toksikološkega vidika. Njegov bistveni del je biotično varstvo rastlin. Ko govorimo o biotičnem varstvu rastlin kot o doseljevanju neke domorodne populacije ali pa celo o naseljevanju tujerodne vrste koristnih organizmov v naravo, presegamo okvire varstva rastlin. Zato moramo upoštevati ne le načela učinkovitosti in kakovosti biotičnega varstva, pač pa tudi pravila in morebitno tveganje za ohranjanje narave in njene biotske raznovrstnosti.
Podrobnejše postopke za vnos, gojenje in uporabo koristnih organizmov ureja Pravilnik o biotičnem varstvu rastlin (Uradni list št. 45/06), ki je začel veljati 13. maja 2006. Pravilnik ureja tiste koristne organizme za biotično varstvo rastlin, ki so živi naravni sovražniki, antagonisti ali kompetitorji ali njihovi produkti, in drugi organizmi, ki se morejo sami razmnoževati, vključno s tistimi, ki so pakirani ali formulirani kot komercialni proizvod. Določbe tega pravilnika se ne uporabljajo za vnos in uporabo mikroorganizmov, ki jih urejajo predpisi s področja fitofarmacevtskih sredstev in so podvrženi drugačnim ocenam tveganja v postopku registracije.
Koristni organizmi, ki se lahko uporabljajo za namen biotičnega varstva rastlin, so lahko domorodne ali tujerodne vrste organizmov. Seznam domorodnih in seznam tujerodnih vrst organizmov za namen biotičnega varstva rastlin vodi Fitosanitarna uprava RS na spletni strani (www.furs.si). Pri tujerodnih organizmih je še posebej potrebna previdnost pri vnosu v naravo, zato je ob vlogi za vnos potrebno poskrbeti za oceno tveganja za naravo, v skladu s predpisom o izvedbi presoje tveganja za naravo. V prispevku bodo predstavljene zahteve za gojenje kot tudi za vnos in uporabo koristnih organizmov v Sloveniji.

ABSTRACT

Organisation of biological control of plant pests in Slovenia

Integrated control of plant health combines various types of control, which are acceptable from the economic, ecological and toxicological perspective. Biological control of plant pests represents its essential part. Speaking of biological control of plant pests in terms of re-population of an indigenous population or even establishment of an exotic species of a useful organism into nature would go beyond the scope of plant health. Thus not only the principles of effectiveness and quality of biological control should be taken into consideration but also the rules and eventual risk for nature conservation and for biological diversity thereof.
More detailed procedures for introduction, rearing and use of useful organisms are subject to the Rules on biological control of plant pests (Official Gazette RS, No 45/06), which came into force on 13 May 2006. The Rules regulate useful organisms for biological control of plant pests, which are living natural enemies, antagonists or competitors or their products, and other self-replicating biotic entities, including those which are packed and formulated as commercial products. Provisions of these Rules do not apply for the introduction and use of microorganisms, which are governed by regulations in the field of plant protection products and are subject to different risk assessment in the registration procedure.
Useful organisms, which may be used for the purposes of biological control of plant pests may be indigenous or exotic species of organisms. The list of indigenous as well as the list of exotic species of organisms for the purposes of biological control of plant pests are managed by the Phytosanitary Administration RS on the website (www.furs.si). Great care should be taken at introducing exotic species into the nature, therefore risk assessment for nature should be made when lodging an application for introduction, as provided for with the regulation governing the implementation of assessment of risk to nature. The paper shall present the requirements concerning rearing as well as introduction and use of useful organisms in Slovenia.

Varstvo poljščin in vrtnin

Previcur Energy[1] - prednosti pripravka pri varstvu vrtnin pred boleznimi

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Previcur Energy je nov sistemični fungicid, ki je namenjen varstvu paradižnika, kumar, paprike in melon pred padavico sadik (*Pythium* spp.), kumarno plesnijo (*Pseudoperonospora cubensis*) in solatno plesnijo (*Bremia lactuc*ae). Vsebuje dve učinkovini – propamokarb in fosetil, ki delujeta na različnih mestih (multi-side) v razvojnem krogu parazitske glive. Zaradi specifičnega načina delovanja propamokarb-fosetilata razvoj rezistence na Previcur Energy ni mogoč. Propamokarb ovira rast in razvoj micelija škodljive glive, zavira razvoj trosovnikov in sproščanje zoospor ter ovira gradnjo celične membrane parazitske glive.
Fosetil deluje na dva načina: 1) neposredno: ob preventivni uporabi preprečuje kalitev spor in prodiranje patogena v rastlino; 2) posredno: povečuje naravno odpornost rastline pred patogeni. Optimalna uporaba sredstva Previcur Energy je po setvi, po kalitvi in po vzniku ter neposredno pred pikiranjem. Z njim lahko zalivamo ali škropimo.
Previcur Energy uporabljamo preventivno. Pred uporabo pripravka morajo biti tla dovolj vlažna. Poleg fungicidnega delovanja spodbuja rast in razvoj listov, cvetov in sadežev. Lahko ga uporabljamo v kapljičnem namakalnem sistemu, saj je popolnoma topen v vodi.

ABSTRACT

Previcur Energy[1] - advantages of the fungicide for the control of vegetable diseases

Previcur Energy is a new systemic fungicide. It controls *Pythium* spp. in tomato, cucumber, pepper and melons, *Pseudoporonospora cubensis* and *Bremia lactucae*. It contains two active ingredients – propamocarb and fosetyl. They have multi-side action. Due to specific mode of action there is almost no possibility of developing resistance. Propamocarb reduces the mycelial growth, inhibits the formation of zoosporangia and relatively increases the direct non-pathogenic germination. Within the plant, propamocarb disturbs the building-up of cell membrane of fungus.
Fosetyl has two mode of action: 1) direct: if used preventive it inhibits the formation of spores and prevents the mycelium penetration into the plant; 2) indirect: re-establish natural resistance to control disease. Previcur Energy can be used after seeding, after germination and emergence and before picking as drip application or spraying.
Previcur Energy should be used preventive and on well humid soil. Beside fungicide effect it also increases the growth of leafs, flowers and fruits. Due to its solubility in water it can be used for irrigation system.

Sezonska dinamika treh vrst škodljivih žuželk v nasadu zelja

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[1] v postopku registracije

Od začetka aprila do začetka novembra 2006 smo v nasadu zelja na Laboratorijskem polju Biotehniške fakultete v Ljubljani preučevali sezonsko dinamiko treh vrst škodljivih žuželk: kapusove hržice (*Contarinia nasturtii* [Kieffer], Diptera, Cecidomyiidae), kapusovih bolhačev (*Phyllotreta* spp., Coleoptera, Chrysomelidae) in kapusovega molja (*Plutella xylostella* [L.], Lepidoptera, Plutellidae). Številčnost samcev smo spremljali s feromonskimi vabami; samce kapusove hržice smo lovili z vabami švicarskega proizvajalca (Agroscope FAW, Wädenswill), hroščke kapusovih bolhačev (tip vab KLP+) in metulje kapusovega molja (tip vab RAG) pa z vabami madžarskega proizvajalca (Plant Protection Institute, Hungarian Academy of Sciences). Feromonske kapsule smo menjavali v štiritedenskih intervalih, v vabe ulovljene samce pa smo šteli na približno 7 dni. Prvi masovnejši pojav kapusovega molja (1,6 osebka/vabo/dan) smo ugotovili že v 2. dekadi aprila, škodljivec pa se je v nasadu pojavljal do 2. dekade septembra. Metulji so bili najštevilčnejši od konca maja do sredine junija, a tudi tedaj njihovo število ni preseglo tri ulovljene osebke na dan. V 1. dekadi maja smo v vabah našli prve hroščke kapusovih bolhačev, prvo zaznavnejše število pa beležimo v 3. dekadi maja (0,8 osebkov/vabo/dan). Hroščki so bili daleč najštevilčnejši v 2. (19 osebkov/vabo/dan) in 3. dekadi julija (25 osebkov/vabo/dan), v zaznavnejšem številu pa so se pojavljali do začetka oktobra. Prvi številčnejši pojav kapusove hržice (0,4 osebka/vabo/dan) beležimo od 2. dekade maja, absolutno največ samcev (8/vabo/dan) pa se je na vabe ujelo v 2. dekadi julija. V 3. dekadi oktobra smo v vabah našli zadnje osebke škodljivca. Na podlagi rezultatov monitoringa treh škodljivcev zelja ugotavljamo, da ima kapusov molj v celinskem delu Slovenije 3-4 rodove, kapusovi bolhači 1-2 rodova, kapusov molj pa 4 rodove.

ABSTRACT

Seasonal dynamics of three harmful insect species on cabbage

From the beginning of April to the beginning of November 2006, a seasonal dynamics of three harmful insect species – Swede midge (*Contarinia nasturtii* [Kieffer], Diptera, Cecidomyiidae), flea beetles (*Phyllotreta* spp., Coleoptera, Chrysomelidae), and diamondback moth (*Plutella xylostella* [L.], Lepidoptera, Plutellidae) - was investigated at the Laboratory Field of the Biotechnical Faculty in Ljubljana. The males were monitored with pheromone traps; the males of Swede midge were trapped with the traps of Swiss producer (Agroscope FAW, Wädenswill), while the adult flea beetles (trap type KLP+) and diamondback moths (trap type RAG) were trapped with the Hungarian traps (Plant Protection Institute, Hungarian Academy of Sciences). The pheromone capsules were changed in 4-week intervals, while the males were counted on about every 7th day. The first massive occurrence of diamondback moth (1.6 males/trap/day) was established in the 2nd decade of April, and the pest remained active until the 2nd decade of September. The adults were the most numerous in the period between the end of May to the middle of June, but even then their number did not exceed three males caught per day. In the 1st decade of May, the first adult flea beetles were recorded in the pheromone traps, while their notable number (0.8 males/trap/day) was stated in the 3rd decade of May. Absolutely the highest number of the beetles was recorded in the 2nd (19 adults/trap/day) and in the 3rd (25 adults/trap/day) decade of July, and the pest occurred until the beginning of October. The first massive occurrence of Swede midge (0.4 males/trap/day) was established in the 2nd decade of May, while the highest number of males (8/trap/day) were caught in the 2nd decade of July. In the 3rd decade of October, the last adults were found in the traps. Based on the results of monitoring of three cabbage insect pests we ascertained that in the central Slovenia the Swede midge has 3-4 generations, the flea beetles has 1-2 generations, and the diamondback moth has 4 generations.

Izkušnje pri zatiranju poljskega majskega hrošča (*Melolontha melolontha* L.) na Idrijskem

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Predstavljena je prerazmnožitev populacije poljskega majskega hrošča (*Melolontha melolontha* L.) na Idrijskem od leta 2002 do leta 2006. V letu 2002 je poprečno 100 ogrcev na m^2 v stadiju 3. levitve (L_3) popolnoma uničilo travno rušo na 370 ha travnikov. V letu 2003 se je škoda še stopnjevala na travnikih, kjer niso izvedli mehanskega zatiranja. V letu 2004 so delali škodo tudi odrasli osebki. Po izleganju jajčec je populacija še narasla, saj smo na planoti našteli več kot 200 ogrcev na m^2. Ogrci so že v stadiju 1. levitve (L_1) poškodovali travno rušo do 50%. Na vseh travnikih je bilo v letu 2005 poprečno 226 ogrcev/m^2 (L_2), kar je povzročilo uničenje travne ruše na 760 ha oziroma na 62% vseh kmetijskih zemlkišč na območju. Pri zatiranju so bile uporabljene mehanske metode zatiranja s frezami, kemično zatiranje z a. s. foksim in biotično zatiranje. Vsi načini zatiranja so bili le delno uspešni. Biotično zatiranje z glivo *Beauveria brogniartii* (Sacc.) Petch, 1924 je bilo izvedeno v juniju 2005 na 92 ha travnikov. Učinkovitost zatiranja z glivo *Beauveria brongniartii* je bila 38,7 %. Skupno zmanjšanje števila ogrcev na travnikih tretiranih z glivo *Beauveria brongniartii* se bilo 88,2 %.

ABSTRACT

Experience in the control of common cockhafer (*Melolontha melolontha* L.) in Idrija region in Slovenia

During 2002 and 2006 a great increase of population of common cockhafer (*Melolontha melolontha* L.) was observed in Idrija region in Slovenia. In 2002 the third larval stage of cockchafer by average of 100 grubs per m^2 completely damaged 370 ha of grasslands. In 2004 damage was caused by adult cockchafer. After eggs deposition the population increased on 200 grubs per m^2. The grass was damaged up to 50 % by the grubs of the first larval stage. In 2005 an average of 226 grubs per m^2 was observed in region. 760 ha of grasslands were damaged, that represents 62% of all agricultural land in the region. Different methods (mechanical, biological and chemical treatments) were used to reduce the population of the pest, but they were only partly successful. In the June 2005 92 ha of grasslands were treated by *Beauveria brongniartii.* The efficiency of *Beauveria* was 38,7 %. The total decrease in number of grubs on treated area was 88,2 %.

Uporaba sistemov elektroograj za varovanje obdelovalnih zemljišč pred divjim prašičem (*Sus scrofa* L., Mammalia, Suidae)

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Med prostoživečimi živalmi v Sloveniji povzroča divji prašič (*Sus scrofa* L., Mammalia, Suidae) na kmetijskih zemljiščih največ škode. Na nekaterih območjih naše države povzroči ta velika divjad več kot 50 % vse ocenjene škode na gojenih rastlinah. Znanih je več načinov odvračanja te gozdne živali in s tem tudi preprečevanja škode na njivah in travinju. V poskusu varovanja koruzne njive pred napadi divjega prašiča in s tem tudi povzročanja škode smo uporabili sistem elektroograj. Glavna prednost tega načina varovanja pred ostalimi odvračalnimi sredstvi je bolečina, ki jo dobi žival ob srečanju s to oviro. In pri divjemu prašiču kot živaljo z dobrim spominom se ta prednost še stopnjuje. Poskus varovanja koruzne njive smo postavili v letu 2005 na območju Šmihela pri Postojni. Konec julija, ko je bilo opravljeno zadnje dognojevanje smo se odločili njivo ograditi. Izbrane oblike sistema elektroograje so bile: 1) plastični količek z elektrovrvico in dvema elektrotrakoma in z razmikom 15, 15 in 30 cm med njimi; 2) plastični količek z elektrovrvico in elektrotrakom na višini 25 in 50 cm od tal ter 3) železni količek v obliki distančnika, na katerega so bili priviti trije izolatorji na višini 15, 30 in 55 cm od tal. Posebnost tretje oblike sistema je bila v tem, da je trak, ki je bil na višini 30 cm, dajal ograji tretjo dimenzijo, tako imenovano globino. Na njivi, ki je bila ograjena z začasno elektroograjo, do spravila koruze za silažo nismo opazili vdora prašičev. Sledi živali na travni ruši ob zunanji strani ograje so bile dokaz, da so se prašiči množično zadrževali ob njivi. Hkrati smo na bližnjih neograjenih njivah opazili škodo od divjih prašičev.

ABSTRACT

The use of electric fence systems for protecting arable fields from wild pig (*Sus scrofa* L., Mammalia, Suidae)

Among free living animals in Slovenia, wild pig (*Sus scrofa* L., Mammalia, Suidae) damages agricultural land by rooting and by directly feeding at most. On some areas of our country this big wildlife animal causes more than 50 % of all estimated damage to cultural plants grown on arable and forage fields. Many techniques to control wild pig and to prevent the damage are known. In a trial to control pig ingress into maize field an electric fence system was used. The main advantage of this type of control by comparison to other repellents means is a painful shock, which is delivered to the animal when it touches the fence. And by wild pig with good memory this is even easier achievable. A trial in which we used electric fence to prevent wild pigs to enter the maize field was erected in the area of Šmihel near by Postojna. We decide to erect the electric fence at the end of July, after the last application of fertiliser to maize field. Selected types of electric fence system were used: 1) a plastic post with a poly wire and two poly tapes with spacings of 15, 15 and 30 cm between them; 2) a plastic post with poly wire and a poly tape with spacings 25 and 50 cm between them and 3) a steal post as a wire offset on which three screw on rod insulators were fixed on a height of 15, 30 and 55 cm from the ground. A poly tape which was on the height of 30 cm acted as a depth and it was so-called three dimensional type of electric fence. No breaks through fencing were observed till the harvesting time of maize for silage, although pig's tracks on the outside of the fenced field were observed. And damage on arable fields in the vicinity of protected field was also recorded.

Možnosti zatiranja odraslega koruznega hrošča *(Diabrotica virgifera virgifera* LeConte*)* z uporabo različnih tehnik aplikacije

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V Sloveniji pridelujemo koruzo na več kot 40 odstotkih njiv, kar je daleč največji delež med vsemi evropskimi državami. Zato se velik del koruze prideluje v monokulturi ali v zelo ozkem dvoletnem kolobarju. Pri takšnem načinu pridelave je večja verjetnost pojava bolezni in škodljivcev kot je npr. koruzni hrošč (*Diabrotica virgifera virgifera* LeConte), ki se je v Sloveniji prvič pojavil leta 2003 in se nezadržno širi tudi na območja, kjer ga do sedaj še nismo zasledili. V prispevku obravnavamo pregled in izbor obstoječih tehnologij nanašanja fitofarmacevtskih sredstev, katere so, ali pa bi bile z ustreznimi modifikacijami v Sloveniji ustrezne za tretiranje posevkov koruze v razvojni fazi, ko je zatiranje odraslih osebkov koruznega hrošča optimalno. Predstavljeni so tudi prvi rezultati preliminarnega poskusa zatiranja koruznega hrošča z uporabo pršilnika (pršilnega topa) tip VRP 500 proizvajalca Tifone. Primerjali smo dva postopka škropljenja in sicer v prvem primeru smo škropili vzporedno z vrstami koruze, v drugem obravnavanju pa smo izvajali aplikacijo pravokotno na vrste koruze. Kakovost nanosa smo kvalitativno ocenili na osnovi merjenja števila impaktov na cm^2 in odstotka pokritosti površine na testnih kolektorjih. Meritve so bile opravljene z pomočjo analizatorja slike OPTOMAX V. V poskusu smo ugotovili, da je s omenjenim pršilnikom mogoče opraviti kvaliteten nanos insekticidov, če škropimo vzporedno na vrste koruze do razdalje 10 metrov od roba njive. Pri tem je potrebno poudariti, da je mogoče z ustreznimi modifikacijami stroja, izvesti kvalitetno aplikacijo tudi do razdalje 20 metrov od roba njive.

ABSTRACT

Possibilities for control of the western corn rootworm adults (*Diabrotica virgifera virgifera* LeCont) with different application techniques

In Slovenia maize is grown on over 40 per cent of fields, which is by far the largest share among all the European countries that is why a large share of it is grown as a monoculture, or as a two-year rotation crop. This kind of production increases the likelihood of disease occurrence and pests such as western corn rootworm (*Diabrotica virgifera virgifera* LeConte) which appeared in Slovenia for the first time in 2003 and is now spreading rapidly to new areas where it has not been detected so far. This paper provides a review and the choice of the existing technologies and techniques for applying phytopharmaceuticals in Slovenia which are or could with some modifications be suitable for treating maize crops in the phenophase when control of western corn rootworm adults is optimum. This paper also looks at the first results of the preliminary trial to control western corn rootworm by using Tifone spray cannon type VRP 500. Two different ways of spraying were compared: first application was parallel to the maize rows and second rectangular. The results of application were assessed by measuring the number of impacts per cm^2 and the percentage of area coverage on test collectors. The measurements were carried out with the use of OPTOMAX V image analyser. It was found that quality application of insecticides is possible if we spray parallel to corn rows up to 10 metres

from the field edge. However, it must be emphasized that appropriate machine modifications can lead into quality application even up to 20 metres from the field edge.

Axial – herbicid za zatiranje plevelov v žitih na osnovi pinoksadena

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Pinoksaden je aktivna snov odkrita v razvojnih laboratorijih družbe Syngenta. Povsem nova molekula spada kemično v skupino fenilpirazolinov in je razvita za uporabo v žitih. Pinoxaden, ki se uporablja po vzniku plevelov v odmerku 30-60 g a.s./ha, je učinkovit na širok spekter pomebnih enoletnih plevelov *(Alopecurus myosuroides, Apera spica-venti, Avena* spp*., Lolium* spp*., Phalaris* spp. in *Setaria* spp*.)*. Selektivnost na ključna žita, kot sta pšenica in ječmen, omogoča varovalo klokuintocet-meksil. Komercializirana formulacija pinoksadena Axial, omogoča enostavno rabo, ki daje zanesljive rezultate tudi zaradi dodanega posebnega močila. Še posebej so redki herbicidi za uporabo po vzniku v ozimnem ječmenu in tu je postal Axil standard na področju zatiranja enoletnih trav. Zaradi visoke učinkovitosti na ključne travne plevele, visoke selektivnosti do žit, dolgega časa uporabe in neomejevanja pri izbiri naslednjih posevkov, bo Axial postal nov standard med herbicidi za zatiranje trav v žitih. Prav prilagodljivost uporabe omogoča kmetovalcu izbor časa uporabe in preprečuje terminske vrhunce kmetijskih opravil.

ABSTRACT

Axial - herbicide for broad spectrum grass weed in cereal on a basis of Pinoxaden

Pinoxaden is a new grass active compound discovered by Syngenta Crop Protection AG, Basel, Switzerland. The innovative molecule belongs to the phenlypyrazolin chemistry and is being developed for global use in cereal crops. Pinoxaden is applied post-emergence at use rates of 30-60 g ai/ha and active against a wide range of important grass weed species *(Alopecurus myosuroides, Apera spica-venti, Avena* spp*., Lolium* spp*., Phalaris* spp. and *Setaria* spp*.)*. Tolerance in key cereal crops – including both wheat and barley – is obtained by incorporating the proprietary safener cloquintocet-mexyl into an easy to-use liquid formulation, which delivers maximal performance when used with a specially optimized adjuvant. Particularly in winter barley, where relatively few post-emergence herbicides are available, Axial offers a new standard in grass weed control. Due to its high level of activity against most important grass weeds, its tolerance in wheat and barley crops combined with a wide application window from early to late post-emergence and rotational freedom to following crops, pinoxaden will set a new standard in grass weed control in cereals. Starting from 2006, pinoxaden will be introduced as Axial® into cereal markets globally. Through the excellent flexibility in application and uses of Axial, it is possible for the grower to prevent workload peaks. As all crops, even in an early re-cropping situation, following an Axial application can be re-planted a flexible and unrestricted crop rotation is possible.

Prosaro - nov standard v varstvu žit

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Glive iz rodu *Fusarium* spp. lahko močno poškodujejo posevke in zmanjšajo količino ter kakovost pridelka žit. Močnejše okužbe žit z glivami iz rodu *Fusarium* spp. so se pojavile v začetku devetdesetih let prejšnjega stoletja. Podjetje Bayer CropScience je skupaj s strokovnjaki različnih panog (prehrambena industrija, fitofarmacija, kmetijstvo) začelo z načrtnimi raziskavami in razvojem aktivne snovi, s katero bi še izboljšali učinkovitost zatiranja gliv iz rodu *Fusarium* spp. Rezultat načrtnega raziskovanja je bilo odkritje aktivne snovi protiokonazol, ki spada v skupino triazolnih aktivnih snovi.
Sistemični fungicid Prosaro je sestavljen iz dveh aktivnih snovi: tebukonazol, ki je bil že do sedaj standard pri zatiranju gliv iz rodu *Fusarium* spp. in nova aktivna snov, protiokonazol. Pripravek Prosaro odlično zatira vse najpomembnejše bolezni žit, prav tako pa povečuje količino in kakovost pridelka, saj se delovanje obeh aktivnih snovi zelo dobro dopolnjuje. Prosaro tudi dosega najvišje učinkovitosti zatiranja gliv iz rodu *Fusarium* spp., s tem pa zmanjšuje količino mikotoksinov v pridelku. Pripravek je v postopku registracije za zatiranje glivičnih bolezni na pšenici, ječmenu, rži, tritikali in oljni ogrščici.

ABSTRACT

Prosaro – a new standard for control of the most important cereal diseases

Fusarium species can seriously damage cereals and reduce quantity and quality of cereals yield. Stronger infections of cereals with *Fusarium* spp. appeared in early '90s of last century. Bayer CropScience and different experts from food industry, phytopharmacy and agriculture started carefully planned investigations and developing of new active ingredient. They wanted to improve control of *Fusarium* species. Active ingredient prothioconazole was discovered. Prothioconazole belongs to chemical group of triazoles.
Systemic fungicide Prosaro has two active ingredients: tebuconazole, which is already standard at control of *Fusarium* spp. and new active ingredient prothioconazole. Prosaro has very good efficacy on most important diseases in cereals. Use of Prosaro also increases quantity and quality of yield. Activity of tebuconazol complements with activity of prothioconazol and comparing to other products Prosaro is achieving highest control of *Fusarium* spp. and reducing mycotoxin level in cereals. Prosaro is in registration process for use as fungicide in wheat, barley, rye, triticale and oilseed rape.

Možnosti kemičnega zatiranja plevelov v posevkih sirka (*Sorghum bicolor* [L] Moench)

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V enoletnem poljskem poskusu smo preučevali možnosti zatiranja plevelov v krmnem sirku (sorta Sucrosorgho, seme obdelano z varovalom) in v sirku za seme (sorta Alföldi, seme brez varovala). Uporabili smo 22 kombinacij herbicidov na podlagi pendimetalina, linurona, metolaklora, mezotriona, prosulfurona, 2,4-D, bentazona, dikambe, terbutilazina, izoksaflutola, bromoksinila, floralsulama in pentoksamida. Analizirali smo stopnjo učinkovitosti herbicidov, fitotoksičnost za sirek in pridelek sirka (sveža zelena masa rastlin na ha). Pri analizi stopnje fitotoksičnosti smo ugotovili, da pri sorti Alföldi obstaja značilna povezava med stopnjo fitotoksičnosti herbicida in pridelkom, medtem ko pri sorti Sucrosorgho statistično značilne povezave ni bilo. Kot primerne variante v smislu ustrezne učinkovitosti na plevele in sprejemljive fitotoksičnosti za sorte brez dodanih varoval predlagamo kombinacije na podlagi 2,4-D, pendimetalina, bentazona, dikambe, bromoksinila, pentoksamida in floralsulama. Herbicidi na podlagi linurona, izoksaflutola in mezotriona so bili preveč fitotoksični, da bi jih lahko priporočili za uporabo v sortah brez specifičnih varoval. Herbicide na podlagi metolaklora in terbutilazina je možno uporabiti pri sortah brez varoval po vzniku, če sprejmemo 5 do 10% izgube pridelka zaradi fitotoksičnosti.

ABSTRACT

Possibilities of chemical weed control in sorghum (*Sorghum bicolor* (L) Moench) fields

A field experiment was conducted to evaluate herbicides in order to find suitable ones for the control of weeds in sorghum in Slovenia. 22 herbicide combinations based on pendimethalin, linuron, metolachlor, mesotrion, prosulfuron, 2,4-D, bentazon, dicamba, terbutylazin, isoksaflutole, bromoxynil, floralsulam, and penthoxamid were evaluated in terms of efficacy to control weeds and phytotoxicity for sorghum plants. The Cultivar 'Succrosorgho' (forage sorghum) was treated with a herbicide safener whereas the second cultivar 'Alföldi' (grain sorghum) was not. Yields of fresh green mass per hectare were also determined. Contrary to the cultivar Succrosorgho, a statistically significant correlation between the rate of herbicide phytotoxicity and the yield of sorghum plants was established in the case of cultivar Alföldi. The herbicides and/or herbicide combinations based on 2,4-D, pendimethalin, bentazon, dicamba, bromoxynil, pentoxamide and floralsulam could be recommended for the use in sorghum without safeners, as they showed high yields with low phytotoxicities. Herbicide combinations based on linuron, isoksaflutole and mesotrion were severely phytotoxic to sorghum, therefore they can not be applied without specific safeners. Herbicides based on metolachlor and terbuthylasin could be used in sorghum untreated with specific safeners, when 5 to 10 % yield losses are tolerated.

Nematologija

Vrednotenje odpornosti nekaterih sort krompirja na napad ogorčice *Globodera rostochiensis*

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V Sloveniji že vrsto let poteka sistematični nadzor nad krompirjevimi ogorčicami *Globodera rostochiensis* in *G. pallida.* Rumena krompirjeva ogorčica, *G. rostochiensis* je bila v Sloveniji prvič najdena leta 1971 v Dobravi pri Dravogradu, kasneje pa je bila ugotovljena tudi v Libeličah pri Dravogradu (1999), Šenčurju (2000), Okroglem pri Kranju (2003), Žabnici na Gorenjskem (2004), Posočju, v dolini Trente (2004) in Čepovanu na Primorskem (2006). Zazdaj smo ugotovili le eno biološko raso vrste *G. rostochiensis* in sicer Ro1/4. Bele krompirjeve ogorčice, *G. pallida* v slovenskih obdelovalnih tleh še nismo ugotovili. Glede na gospodarski pomen krompirjevih ogorčic in naraščajoče število pozitivnih najdb v Sloveniji ter zaradi specifičnosti kmetijske pridelave v Posočju smo želeli ugotoviti, katere sorte krompirja, odporne na vrsto *G. rostochiensis,* so najustreznejše za te podnebne razmere. V poskusu smo uporabili naslednje sorte: na Ro1/4 občutljivo sorto Desire, odporne sorte White lady, Miranda, Aladin, Sante in Adora ter križanec KIS 94-1/5-14, katerega občutljivost na *G. rostochiensis* ni bila predhodno opredeljena. Ugotavljali smo vpliv rumene krompirjeve ogorčice *G. rostochiensis* na pridelek preizkušanih sort krompirja ter na razmerje med drobno in debelo frakcijo gomoljev. Najboljše rezultate smo dobili pri sorti White lady, najslabše pa se je po pričakovanjih odrezala občutljiva sorta Desire.

ABSTRACT

Evaluation of resistance of some potato cultivars to Trenta valley population of *Globodera rostochiensis*

Regular phytosanitary survey on the potato cyst nematodes *G. rostochiensis* and *G. pallida* in Slovenia has been carried out for several years. After its first finding in Dobrava near Dravograd in 1971, *G. rostochiensis* was also found in Libeliče near Dravograd (1999), Šenčur near Kranj (2000), Okroglo near Kranj (2003), Žabnica near Kranj (2004), Posočje, Trenta valley (2004) and Čepovan, Litoral region (2006). So far, only pathotype Ro1/4 of *G. rostochiensis* has been discovered in Slovenia. White potato cyst nematode *G. pallida* has not been recoved from the fields in Slovenia so far. Due to increasing number of positive findings and economic importance of *G. rostochiensis* we determined which potato cultivars are most suitable for growing in the climate conditions around Posočje and most resistant to *G. rostochiensis*. The following potato cultivars were grown that exhibit different degrees of resistance to Trenta valley population of *G. rostochiensis*: the susceptible cultivar Desire, the resistant cultivars White lady, Miranda, Aladin, Sante and Adora, and the clone KIS 94-1/5-14. The influence of *G. rostochiensis* on different potato cultivars was determined by weight of harvested tubers, number of tubers and ratio between large and small tubers. The yield of cv. White lady was the greatest and that of susceptible cv. Desire the lowest.

Genetske osnove virulence rumene krompirjeve ogorčice *Globodera rostochiensis*

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Pomemben vidik pridelave zadostnih količin zdrave hrane je obvladovanje rastlinskih bolezni in škodljivcev. Rumena krompirjeva ogorčica *Globodera rostochiensis* in sorodna bela krompirjeva ogorčica *G. pallida* (Heteroderidae, Nematoda) sta z gospodarskega vidika najpomembnejši rastlinsko-parazitski ogorčici krompirja, ki poleg krompirja zajedata tudi paradižnik, jajčevec in druge vrste rodu *Solanum*. V Sloveniji je vrsta *G. rostochiensis* razširjena na območju Posočja in Sorškega polja od l. 2004. Vrsta *G. pallida* sicer še ni bila odkrita v obdelovalnih tleh v Sloveniji, smo jo pa večkrat prestregli v uvoznih pošiljkah krompirja. Različne populacije krompirjeve ogorčice so različno virulentne za različne sorte krompirja. Tako znotraj vrste *G. rostochiensis* ločimo pet patotipov glede na zmožnost razmnoževanja na različnih kultivarjih in hibridih iz rodu *Solanum*. Določitev patotipa krompirjeve ogorčice omogoča izbor odpornega kultivarja krompirja za pridelavo v napadenih območjih. Parazitizem je kompleksna interakcija med rastlino in ogorčico, ki ga regulira na eni strani izražanje številnih parazitskih dejavnikov v ogorčici in na drugi strani obrambnih mehanizmov rastline. V zadnjih letih so bili odkriti in opisani številni geni, ki uravnavajo parazitizem pri rastlinsko parazitskih ogorčicah. V parazitski interakciji igrajo ključno vlogo parazitski dejavniki, ki jih ogorčica izloča iz subventralnih in dorzalnih požiralniških žlez preko bodala v rastlinske celice. Ogorčice uporabljajo številne encime za razgradnjo rastlinske celične stene kot so ekspanzin, pektat liaza in celulaza, hkrati pa tudi druge produkte kot so superoksid dizmutaza, horizmat mutaza, RanBPM, itd. vpletene v druge korake parazitizma. Podatkov o variabilnosti parazitskih dejavnikov praktično ni. Ker so se različni patotipi sposobni razmnoževati in zajedati različne sorte krompirja, pričakujemo variabilnost v nukleotidnem zaporedju parazitskih dejavnikih *G. rostochiensis*. V sklopu naše raziskave smo ocenili genetsko variabilnost dveh ključnih parazitskih genov (ekspanzin B2 in superoksid dizmutaza) znotraj patotipov in med patotipi *G. rostochiensis*. Korelacija med raznolikostjo parazitskih dejavnikov in patotipi bi lahko bila osnova za razvoj nove molekulske metode za identifikacijo patotipov *G. rostochiensis*.

ABSTRACT

Genetic basis of virulence in golden potato cyst nematode *Globodera rostochiensis*

An important aspect in production of healthy food in large quantities is management of plant diseases and pests. Golden potato cyst nematode *Globodera rostochiensis* and closely related pale potato cyst nematode (PCN) *G. pallida* (Heteroderidae, Nematoda) are economically most important plant-parasitic nematodes sponging on potato, tomato, eggplant and other species of genus *Solanum*. In Slovenia, *G. rostochiensis* has been spreading in the areas of Posočje and Sorško polje since 2004. *G. pallida* has not been detected at the fields yet, but was intercepted at the Slovenian border for several times. PCN populations vary in degree of virulence for different potato cultivars. Within *G. rostochiensis* five pathotypes can be distinguished based on the ability to develop on certain cultivars and hybrids of *Solanum*. Identification of the pathotype enables selection of the resistant cultivar to be grown in infested areas. Parasitism is a complex plant-nematode interaction, regulated by expresion of the parasitic factors in the namatode and the defence mechanism in the plant. Many genes responsible for parasitism of plant-parasitic nematodes were characterized in the last few years. Parasitic factors secreted by

the nematode into plant cells from subventral and dorsal oesophageal gland cells via the stylet are assumed to play key roles during parasitism. Nematodes use a number of plant cell wall degradation enzymes like expansins, pectate lyase or cellulase, and other products such as superoxide dismutase, chorismate mutase, RanBPM etc. in other steps of parasitism. However, information on sequence variability of these parasitism factors is scarce. Since different pathotypes affect different potato cultivars, we expect variability in nucleotide sequences of parasitic factors of *G. rostochiensis*. In this study we have evaluated genetic variability of two key parasitism genes (expansin B2 and superoxide dismutase) within and between pathotypes of *G. rostochiensis*. The correlation between variability in the parasitic factors and pathotypes could be a basis for development of a novel, molecular based methode for pathotype identification of *G. rostochiensis*.

Po prvi najdbi entomopatogenih ogorčic v Sloveniji

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Entomopatogene ogorčice so talni organizmi, ki živijo v simbiozi z bakterijami. Po vstopu v gostitelje sprostijo ogorčice vanje bakterije, ki žuželke v kratkem času ubijejo s toksini. Uporaba entomopatogenih ogočic v biotičnem varstvu rastlin pred škodljivimi žuželkami je v svetu dobro znana. Prve raziskave s temi biotičnimi agensi v Sloveniji segajo v leto 2004, ko so v laboratorijskih razmerah začeli preučevati njihovo učinkovitost zoper različne škodljive žuželke. V letu 2006 smo dokazali njihov obstoj v naših tleh in s tem so entomopatogene ogorčice v Sloveniji izgubile status tujerodnih organizmov. Njihova uporaba se bo tako iz laboratorijev lahko prenesla tudi na prosto in v rastlinjake, kot je to že stalnica v številnih drugih državah po svetu. V samem prispevku bomo spoznali bionomijo teh organizmov, prednosti in slabosti njihove uporabe v biotičnem varstvu rastlin, primerjali njihovo učinkovitost zoper rastlinske škodljivce v primerjavi s kemičnimi insekticidi in ovrednotili njihov bodoči pomen pri nas. Namen prispevka je seznaniti domače strokovnjake in kmetovalce o uporabni vrednosti entomopatogenih ogorčic kot alternativi kemičnim insekticidom.

ABSTRACT

After the first record of entomopathogenic nematodes in Slovenia

Entomopathogenic nematodes (EPNs) are soil organisms that are mutually associated with bacteria. After EPNs enter the host, the symbiotic bacteria are released, causing death of the insect in a very short time. Use of EPNs in biological control against insect pests is well known worldwide. The first laboratory experiments with these agents started in Slovenia in 2004. The aim was to determine their efficacy against different harmful insects. In 2006, we collected some soil samples in which we proved the presence of EPN in our country. For this reason the EPNs lost their status of an exotic organisms in Slovenia. Their use will be able to transmit from the laboratories to the fields and greenhouses, like in many other countries in the world. The article presents the bionomics, advantages and disadvantages of their use in biological control, and comparison of their efficacy with the use of chemicals insecticides. The future role of

EPNs in Slovenia will be discussed. The aim of this paper is to acquaint the experts and the farmers with the use of EPNs as alternative to chemical insecticides.

Preučevanje učinkovitosti entomopatogenih ogorčic (Rhabditida) za zatiranje ličink in odraslih osebkov koloradskega hrošča (*Leptinotarsa decemlineata* Say, Coleoptera, Chrysomelidae)

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V laboratorijskem poskusu smo preučevali učinkovitost štirih vrst entomopatogenih ogorčic (*Steinernema feltiae*, *S. carpocapsae*, *Heterorhabditis bacteriophora* in *H. megidis*) za zatiranje ličink in odraslih osebkov koloradskega hrošča. Delovanje biotičnih agensov smo preučevali pri treh različnih temperaturah (15, 20 in 25°C) in koncentracijah (200, 1000 in 2000 infektivnih ličink/osebek). Smrtnost treh različnih razvojnih stadijev škodljivca (mlade ličinke, starejše ličinke in odrasli osebki) smo ugotavljali 2, 4 in 7 dni po aplikaciji. Pri 15°C so entomopatogene ogorčice pokazale najslabšo učinkovitost in najpočasnejše delovanje na vse tri razvojne stadije škodljivca. Za zatiranje prezimelih odraslih osebkov, z namenom preprečiti masoven pojav koloradskega hrošča, priporočamo aplikacijo suspenzije *S. feltiae* pri višjih koncentracijah. Pri 20 in 25°C nismo ugotovili večjih razlik v učinkovitosti ogorčic pri zatiranju različnih razvojnih stadijev žuželke, pač pa so pri višji temperaturi ogorčice hitreje povzročile smrt njihovih žrtev. Mlade ličinke so bile pri vseh temperaturah najbolj občuljive na napad entomopatogenih ogorčic in priporočamo njihovo zatiranje, če želimo uporabo v tej raziskavi preučevanih biotičnih agensov narediti čim bolj gospodarno.

ABSTRACT

Testing the efficacy of entomopathogenic nematodes (Rhabditida) against larvae and adults of Colorado potato beetle (*Leptinotarsa decemlineata* Say, Coleoptera, Chrysomelidae)

Four entomopathogenic nematode species (*Steinernema feltiae*, *S. carpocapsae*, *Heterorhabditis bacteriophora*, and *H. megidis*) were tested in a laboratory bioassay studying the efficacy of these parasites in controlling the larval and adult forms of the Colorado potato beetle, *Leptinotarsa decemlineata*. The activity of these biological agents was assessed at three different temperatures (15, 20, and 25°C) and three concentrations (200, 1000, and 2000 infective juveniles per individual). Mortality levels at three developmental stages (young larvae, old larvae, and adults) was determined 2, 4, and 7 days after treatment. At 15°C entomopathogenic nematodes showed the lowest efficacy and the slowest activity on all three developmental stages of the pest. However, when controlling overwintered adults for the purpose of preventing the mass appearance of Colorado potato beetle, we recommend an application of *S. feltiae* suspension at higher concetrations. No significant differences in efficacy of entomopathogenic nematodes in controlling different developmental stages of larvae were determined at 20 and 25 °C, yet all nematodes caused prompt death of their victims at these higher temperatures. At all temperatures young larvae were the most sensitive to the attack of entomopathogenic

nematodes; therefore we recommend their control in cases where the application of these biological agents can be economicaly justified.

Neciljno delovanje entomopatogenih ogorčic na naravne sovražnike: zgled navadne tenčičarice (*Chrysoperla carnea* Stephens, Neuroptera, Chrysopidae)

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Entomopatogene ogorčice so začeli v namene biotičnega varstva intenzivno raziskovati, ko je postala raba insekticidov bolj omejena, dražja in manj učinkovita. Njihova uporaba je bila še do nedavno vezana zlasti na zatiranje talnih škodljivcev, saj so entomopatogene ogorčice talni organizmi. V zadnjem obdobju pa se omenjeni agensi vse bolj uporabljajo tudi za zatiranje nadzemskih škodljivcev. Tako jih danes v nekaterih državah že uspešno vključujejo v sisteme pridelave živeža.
Entomopatogene ogorčice so neselektivne za členonožce in delujejo tudi na neciljne organizme, če so le-ti zastopani na mestih aplikacije. V prispevku bodo predstavljeni rezultati neciljnega delovanja treh vrst entomopatogenih ogorčic (*Steinernema feltiae*, *S. carpocapsae* in *Heterorhabditis bacteriophora*) na ličinke navadne tenčičarice (*Chrysoperla carnea*) pri treh različnih temperaturah (15, 20 in 25°C) in treh koncentracijah (50, 250 in 500 infektivnih ličink/osebek). Laboratorijski poskus smo izvajali pri 85 % zračni vlagi in popolni temi, saj so entomopatogene ogorčice občutljive na izsušitev in ultravijolično sevanje. Vse tri vrste entomopatogenih ogorčic smo naročili pri nizozemskem proizvajalcu Koppert.
Učinkovitost entomopatogenih ogorčic smo preverjali drugi in četrti dan po aplikaciji suspenzije s štetjem mrtvih ličink tenčičaric. Pri 15°C se je kot najbolj učinkovita pokazala ogorčica *S. feltiae*, pri 20 in 25°C pa vrsta *S. carpocapsae* in mešani suspenziji ogorčic *S. carpocapsae* in *S. feltiae* ter *S. carpocapsae* in *H. bacteriophora*. Zanimiv podatek predstavlja tudi kanibalizem med tenčičaricami, ki je bil največji pri 25°C.

ABSTRACT

Non-target effect of entomopathogenic nematodes on natural enemies: an example of green lacewing (*Chrysoperla carnea* Stephens, Neuroptera, Chrysopidae)

The investigations of entomopathogenic nematodes as biocontrol agents has started when the insecticides become more restricted, much more expensive and less effective. Entomopathogenic nematodes are soil organisms, therefore they were used against soil pests until recently. Today this biocontrol agents are used also against foliar insect pests, and in some countries they are successfully implemented in the systems of food production.
Entomopathogenic nematodes are non-selective for arthropods and can act on non-target organisms when they occur in the place of application. In this paper, the results on non-target effect of three entomopathogenic nematode species (*Steinernema feltiae*, *S. carpocapsae*, and *Heterorhabditis bacteriophora*) on the larvae of green lacewing (*Chrysoperla carnea*) at three different temperatures, (15, 20, and 25°C) and at three

different concentrations (50, 250, and 500 infective juveniles per larvae) is discussed. The laboratory trial was performed at 85% relative humidity and in darkness, because the entomopathogenic nematode are sensitive to dry conditons and ultraviolet radiation. The entomopathogenic nematodes were provided from the Dutch producer Koppert.
The efficacy of entomopathogenic nematodes were checked two and four days after application with counting the dead larvae of the predator. The results indicated that *S. feltiae* was the most efficient at 15°C, while at 20°C and 25°C *S. carpocapsae* and two mixed suspensions of two entomopathogenic nematode species showed the best efficacy (*S. carpocapsae* + *S. feltiae,* and *S. carpocapsae* + *H. bacteriophora*). Also the cannibalism between the larvae of green lacewing, which was the most intensive at 25°C, deserves all attention.

Fitobakteriologija

Bakterije *Pseudomonas* spp. na sadnem drevju

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Bakterije rodu *Pseudomonas* so v naravi pogoste in prisotne na rastlinah, v zemlji, vodah in tudi v ozračju. Njihova vloga v življenju rastlin je zelo raznolika, nekatere sodelujejo pri obrambi pred škodljivci, izboljšujejo rast, druge povzročajo bolezni. Te se večinoma kažejo kot črtavost listov pri enokaličnicah ali madeži na listih in sadežih dvokaličnic. Na sadnem drevju jih najpogosteje opisujemo kot bolezni, ki povzročajo manjšo škodo, ker lahko zmanjšajo kvaliteto sadja, čeprav lahko v povezavi z zmrzaljo povzročijo tudi odpadanje cvetov in s tem občutno zmanjšanje pridelka ali oslabijo drevesa s povzročanjem razjed na vejah in deblih.
V zadnjih letih smo opazili porast bolezenskih znamenj, ki jih povzročajo te bakterije, pogosto so le-ta tudi izrazitejša, pri jablanah so lahko na videz in po obsegu neločljiva od znamenj bakterijskega hruševega ožiga. Iz obolelih rastlin smo izolirali večje število sevov bakterij iz rodu *Pseudomonas*, ter z različnimi laboratorijskimi metodami preverili njihove lastnosti ter jih primerjali s kontrolnimi sevi. V prispevku bomo predstavili rezultate primerjav.

ABSTRACT

Bacteria from *Pseudomonas* spp. on fruit trees

Bacteria of *Pseudomonas* spp. are common in nature. They are present on plants, in soil, water and in atmosphere. Their role in the life of plants is very diverse. While some contribute to the plant fitness, promoting growth and protecting from harmful organisms, others cause diseases. Usual symptoms include leaf streaks in monocotyledonous and leaf and fruit spots in dicotyledonous plants. In fruit tress *Pseudomonas* spp. is usually considered a minor pathogen causing only qualitative damage. In fact damage can be high when associated with frost damage. Blossom blast can cause high economic losses while twigs and bark cankers weaken general fitness of trees increasing their susceptibility.
In the last years we have observed an increase in frequency and severity of the symptoms caused by *Pseudomonas* spp. In apple trees they can be indistinguishable from fire blight both in severity and extent. A large number of isolates was obtained from diseased plants, characterized with various laboratory methods and compared with control strains. Results of these comparisons will be presented.

Razvoj hitrih presejalnih testov za laboratorijsko določanje prikrite okužbe z *Erwinia amylovora* (Burill) Winslow *et al.*

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Testiranje rastlin na prikrito (latentno) okužbo z bakterijo *Erwinia amylovora* se v Sloveniji izvaja že od leta 1998. Testiranje se izvaja po EPPO diagnostičnem protokolu in tudi z uporabo novejših metod. Trenutno obstoječe in validirane presejalne serološke metode so ELISA in obogatitvena ELISA ter test indirektne imunofluorescence. Ker je pričakovano število bakterij *Erwinia amylovora* v vzorcih brez bolezenskih znamenj zelo nizko, je to ponavadi omejujoči dejavnik pri seroloških metodah. Novejša hitra metoda, ki se uporablja, je molekularna metoda PCR (verižna reakcija pomnoževanja DNA s polimerazo). Vendar reakcijo lahko motijo snovi, ki so v ekstraktu (polifenolne substance iz rastlinskega soka, ostanki fitofarmacevtskih sredstev,…) in s tem zmanjšajo občutljivost reakcije; možne so tudi navzkrižne reakcije s sorodnimi bakterijami. V zadnjih nekaj letih se je razvoj molekularnih metod usmeril iz konvencionalnega PCR v PCR v realnem času, ki poleg kvalitatitvnih omogoča tudi kvantitativne analize. Zaradi direktne detekcije signala med pomnoževanjem ni več potrebe po dodatnem koraku detekcije produktov na agoroznem gelu. Tako nam PCR v realnem času omogoča analizo velikega števila vzorcev z zmanjšano možnostjo navzkrižne kontaminacije in je zato primeren kot presejalna metoda pri velikem številu vzorcev. Za detekcijo *Erwinia amylovora* je bil razvit PCR v realnem času z oligonukleotidnimi začetniki in sondo, ki nalegajo na plazmidno DNA pEA29 (Salm *et al*., Plant Pathology, 53, 5). Slabost testa je, da je tarčni plazmid sicer relativno stabilen, ni pa prisoten v vseh bakterijah v naravi. Bakterij brez plazmida s to metodo ne zaznamo, kljub temu, da so še vedno sposobne povzročati bolezenska znamenja. V ta namen smo razvili PCR v realnem času s tarčo na kromosomski DNA, ki naj bi zajemal vse izolate *Erwinia amylovora*.

ABSTRACT

Development of rapid screening methods for testing *Erwinia amylovora* (Burill) Winslow *et al.* from asymptomatic plant material

Testing of Erwinia amylovora from latent samples is conducting in Slovenia since 1998 using methods described in EPPO diagnostic protocols as well as using new approaches. Rapid validated, serological screening tests are ELISA, enrichment ELISA and immunofluorescence (IF). Due to low concentration of *Erwinia amylovora* in asymptomatic plant material samples, serological methods are not sensitive enough in some cases. Novel screening molecular based test is PCR (polymerase chain reaction). However different compounds in the extract (polifenol compounds, phytopharmaceutical residues,…) can inhibit PCR and therefore lower sensitivity of the reaction. Cross reaction with related bacteria was also noticed. In the last few years introduction of Real time PCR based method has started instead of conventional PCR. With Real time PCR quantitative analysis can also be performed. Another advantage of Real time PCR method is that detection with gel electophoresis can be omitted which lower the risk of cross contamination. Because of high throughput of samples Real time PCR is useful for screening tests. For *Erwinia amylovora* a detection Real time PCR based on plasmid DNA has already been developed (Salm *et al*., Plant Pathology, 53, 5). This plasmid, pEA29, is relatively stable but not present in all isolates in nature. *Erwinia amylovora* without pEA29 is still capable causing symptoms. For this reason a new Real time PCR targeting chromosomal DNA is being developed.

Fitoplazmologija

Fitoplazme na koščičarjih

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Fitoplazme, najmanjši znani celični organizmi, živijo v sitastih ceveh floema in povzročajo številne gospodarsko pomembne bolezni rastlin. Prenašajo se z žuželčjimi vektorji in vegetativnim razmnoževanjem. Sadno drevje iz skupine koščičarjev v Evropi resno ogroža fitoplazma leptonekroza koščičarjev (European stone fruit yellows, ESFY, '*Candidatus* Phytoplasma prunorum', ki spada v skupino 16SrX). V letih od 2004 do 2006 je bilo skupno testiranih približno 300 vzorcev koščičarjev iz različnih predelov Slovenije, večina vzorcev je bila nabranih v okviru programa posebnega nadzora ESFY, nekateri brez in nekateri z bolezenskimi znamenji. Testirali smo tudi češnje (*Prunus avium*) iz jugozahodne Slovenije z znamenji venenja in odmiranja dreves. Vzorce smo testirali z molekularno biološko metodo vgnezdene verižne reakcije s polimerazo (nested PCR) in metodo, ki temelji na polimorfizmu dolžin restrikcijskih fragmentov (RFLP) ter z ugotavljanjem nukleotidnega zaporedja DNA. V prispevku bomo predstavili rezultate testiranj.

ABSTRACT

Phytoplasmas in stone fruits (*Prunus* spp.)

Phytoplasmas are small wall-less prokaryotes that live exclusively in sieve tubes of their host plants, and cause many important vector-borne and graft-transmissible plant diseases. In Europe, stone fruits are seriously affected by the European stone fruit yellows (ESFY) phytoplasma (‘*Candidatus* Phytoplasma prunorum’), belonging to the group 16SrX. In years 2004-2006 about 300 stone fruits sampled in different regions of Slovenia were tested for ESFY. The majority of the sampling was done in frame of a survey of the presence of ESFY in the country, and samples were taken from the trees with and without expressed symptoms of ESFY. In addition, wilting and dying cherries (*Prunus avium*) from Western Slovenia were sampled. All samples were tested using methods of nested PCR, RFLP, and sequencing. The results of this testing are going to be presented.

Prvi pojavi zlate trsne rumenice v Sloveniji. Kako naprej?

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V letu 2005 je bila v okviru sistematičnega nadzora trsnih rumenic (Grapevine yellows) v okolici Ankarana prvič ugotovljena tudi zlata trsna rumenica (povzročitelj Grapevine flavescence dorée phytoplasma - FD). V letu 2006 sta bili v pet kilometrskem pasu ugotovljeni še dve žarišči in sicer še eno v okolici Ankarana in na Debelem rtiču. Vse tri lokacije so oddaljene od slovensko italijanske meje le dober kilometer. Okužba skoraj

zagotovo izvira iz Furlanije Julijske krajne v Italiji, ni pa znan način prenosa. Okužba je bila ugotovljena pri sortah 'beli pinot', 'chardonnay' in 'malvazija'. Sadilni material je bil nabavljen v Italiji, razen pri sorti 'chardonnay', ki je slovenskega izvora.
Povzročitelj je nevaren karantenski škodljivi organizem razvrščen na seznam II.A.II, ki je zelo pomemben za slovensko vinogradništvo. Zato se na okuženem območju izvajajo ustrezni fitosanitarni ukrepi za eradikacijo bolezni in preventivni ukrepi za preprečevanje njenega nadaljnjega širjenja. Ukrepi v glavnem zajemajo poostren sistematični nadzor trsnih rumenic na ozemlju RS, posebno v primorski vinorodni deželi, obvezno odstranjevanje trsov z značilnimi bolezenskimi znamenji za trsne rumenice ter obvezno zatiranje ameriškega škržatka (*Scaphoideus titanus* Ball), ki je naravni prenašalec bolezni na okuženem območju. Iz preventivnih razlogov se obvezno zatiranje prenašalca izvaja tudi v vseh matičnih vinogradih in trsnicah na območjih, kjer je ugotovljena zastopanost ameriškega škržatka. V prispevku bo podrobneje prikazano sedanje stanje razširjenosti in okuženosti v Sloveniji, razširjenost in tehnologija zatiranja ameriškega škržatka v Sloveniji.

ABSTRACT

First occurrence of Grapevine flavescence dorèe in Slovenia. How to proceed?

In the framework of the Grape yellows survey in 2005, the Grapevine flavescence dorée phytoplasma (FD) was found out to occur around Ankaran (South-west Slovenia). This is the first appearance of FD in Slovenia. In 2006, two further focuses of FD were discovered inside of the five-kilometre buffer zone, one near Ankaran and another one in the locality Debeli Rtič. All three focuses are situated close to the Slovene-Italian border. Almost certainly, the disease has spread from Friuli – Venezia Giulia (Italy) onto Slovene territory, but its real pathway remains unknown. Until now, the infected vine stocks were only found inside the vineyards with the varieties 'Pinot gris', 'Chardonnay' and Malvasia. The major part of the planting material in the infected vineyards was provided in Italy more than ten years ago, except 'Chardonnay', which is of Slovene origin.
Grapevine flavescence dorée phytoplasma is a harmful organism listed on II.A.II list of quarantine pests in EU and it may be a potential risk for the Slovene viticulture and wine production. Therefore, in the infected area, appropriate phytosanitary measures were immediately implemented in order to eradicate the disease and to prevent its further spread. These measures include more intense inspection in the infected and adjacent vineyards, as well as in other wine regions. In the infected area, more frequent sampling of suspicious wine stocks, mandatory elimination of infected and suspicious wine stocks and a mandatory control of *Scaphoideus titanus* as the vector of FD are carrying out. Obligatory treatments against *Scaphoideus titanus* are provided in all vine nurseries and in the vine mother stands, when the presence of pest has been established. More detailed data about the current distribution of FD, its natural vector as well as the measures to prevent a rapid spread of the disease will be presented in the final report.

Zlata trsna rumenica v Sloveniji in nove metode detekcije

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Na Nacionalnem inštitutu za biologijo izvajamo diagnostiko trsnih rumenic v okviru posebnega nadzora, ki ga vrši Fitosanitarna uprava RS. Do leta 2006 smo za diagnostiko uporabljali metode PCR (verižna reakcija s polimerazo) in nested PCR, kombinirano z RFLP s katerimi smo leta 2005 prvič določili zastopanost fitoplazem tipa FD (Flavescence dorée). Slednjo smo potrdili tudi z določitvijo nukleotidnega zaporedja in potrditvijo v tujem laboratoriju. Glede na povečano število vzorcev v zadnjih letih smo razvili metodo PCR v realnem času, ki velja za občutljivejšo in bolj specifično, zlasti pa hitrejšo od klasičnih obstoječih molekularnih metod. Razvili smo dva specifična testa – za fitoplazme tipa FD in BN (Bois noir) in univerzalni test, ki v vzorcu pomnožuje fitoplazme na splošno. Metodo smo primerjali s klasično na vseh vzorcih (153), ki so na analizo prispeli v letu 2005. S klasičnimi analizami smo določili 9 FD pozitivnih vzorcev, 99 BN pozitivnih vzorcev, 4 vzorce z mešano okužbo, 38 negativnih vzorcev in 3 vzorce pozitivne na fitoplazme na splošno. S PCR v realnem času smo določili 10 FD pozitivnih vzorcev, 110 BN pozitivnih vzorcev 3 vzorce z mešano okužbo, 26 negativnih vzorcev in 4 vzorce, pozitivne na prisotnost fitoplazem. Prednosti nove metode so se pokazale v povečani občutljivosti saj smo v 14 od 38 vzorcev, negativnih s klasično metodo, določili zastopanost fitoplazem (10 BN pozitivnih in 4 pozitivne na fitoplazme). Prav tako smo v enem od 3 vzorcev, pozitivnih na fitoplazme nedoločljivega tipa s klasično metodo, določili fitoplazme tipa BN. V letu 2006 smo z novo metodo analizirali 164 vzorcev, od tega jih je bilo 13 FD pozitivnih, 99 BN pozitivnih, 44 negativnih in 8 pozitivnih na zastopanost fitoplazem.
Nova metoda je bila preizkušena na velikem številu BN pozitivnih vzorcev. FD tip fitoplazem je bil v Sloveniji odkrit šele pred kratkim, zato je tudi število preizkušenih vzorcev z novo metodo manjše. PCR v realnem času bomo v naslednjih letih dodatno prilagodili za analizo žuželčjih prenašalcev in njeno delovanje opazovali na možnih novih FD pozitivnih vzorcih.

ABSTRACT

Flavescence dorée in Slovenia and nw detection methods

At the National Institute of Biology, Grapevine yellows diagnostics is carried out in the frame of a survey, supervised by Slovenian Plant Protection Service. Until 2006 molecular methods PCR and nested PCR in combination with RFLP were used for the detection of phytoplasmas also in case of the first finding of the FD (Flavescence dorée) phytoplasma in Slovenia in 2005. Presence of FD type was confirmed by sequencing the PCR products and by determination in a diagnostic laboratory outside Slovenia. Due to the increased amount of samples in recent years a more sensitive, specific and considerably less time-consuming real-time PCR method was developed. Two specific tests for the detection of FD or BN (bois noir) types of phytoplasmas and one universal test for detection of phytoplasmas in general were designed. The newly developed method was compared to the normally used PCR on 153 samples in 2005. Using PCR method we could detect, 9 FD positive samples, 99 BN positive samples, 4 samples with mixed infection, 38 negative samples and 3 samples positive for the presence of phytoplasma in general. Using real-time PCR method 10 FD positive, 110 BN positive, 4 phytoplasma positive, and 26 negative samples were detected along with 3 mixed infected samples. The newly developed method proved to be more sensitive, since 14 out of 38 negative samples (according to PCR results) were shown to be positive for the presence of phytoplasma (10 BN and 4 phytoplasma in general positive). Also 1 out of 3 phytoplasma positive samples after PCR was later shown to be BN positive. In 2006 we analysed 164 samples using

real-time PCR: 13 samples tested FD positive, 99 BN positive, 44 samples were negative and 8 were positive for the presence of phytoplasma in general.
The real-time PCR method was tested on many BN positive samples but, considering that the FD type was only detected in 2005, on few FD positive samples. In future we will further adapt the method for testing insect vectors samples and follow the effect of the method on possible new FD positive samples.

Okužba s fitoplazmami spremeni izražanje genov vinske trte

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Glavna povzročitelja trsnih rumenic sta fitoplazmi flavescence dorée (FD) in bois noir (BN). Fitoplazme živijo v floemskih celicah rastlin, na kar so se tekom evolucije prilagodile in morda prav kot posledico tega izgubile velik del genoma (nekaterih metabolnih poti, ki so v bakterijah, fitoplazme nimajo več). Tako je njihovo preživetje v celoti vezano na gostitelje (rastline ali prenašalne žuželke).
Namen naše raziskave je bil spremljati odziv vinske trte na okužbo s fitoplazmami na ravni izražanja genov (mRNA). S PCR v realnem času smo preverili izražanje treh genov, saharozne sintaze (Ssh), alkoholne dehidrogenaze I (Adh1) in Heat shock proteina 70 (Hsp70) v vzorcih sort Chardonnay, Barbera in Prosecco. Zanimalo nas je tudi ali so uporabljeni geni primerni kot markerji izražanja simptomov bolezni. Vzorčili smo osrednje listne žile zdravih, simptomatičnih ter »ozdravljenih« rastlin (recovered plants), skupaj 123 vzorcev. Prva dva gena sta povezana z metabolnimi potmi, na katere naj bi vplivale fitoplazme v floemu, Hsp70 pa naj bi bil povezan z odzivom rastline na okužbo s patogenom. Uporabili smo pristop z relativno kvantifikacijo, v vsakem vzorcu pa smo s PCR v realnem času preverili prisotnost fitoplazem.
Raven izražanja vseh treh genov smo primerjali med zdravimi in simptomatičnimi trtami Chardonnaya, ter med »ozdravelimi« in simptomatičnimi trtami Barbere in Prosecca. V simptomatičnih rastlinah sorte Chardonnay (okužene z BN) sta bila Ssh in Adh1 statistično značilno bolj izražena kot v zdravih rastlinah (t-test, $p < 0.05$), izražanje Hsp70 pa se ni spremenilo. Podobne rezultate smo dobili v primeru simptomatičnih rastlin Barbere in Prosecca (okužene z FD). Izražanje se ni spremenilo.
Sklenemo lahko, da okužba s fitoplazmami povzroči spremembe na ravni izražanja genov, ki se lahko izrazijo v spremembah metabolnih poti, te pa skupaj s fizično prisotnostjo fitoplazem v floemskih celicah in odzivom rastline na okužbo privedejo do nastanka bolezenskih znamenj. Oba gena povezana z metabolizmom vinske trte lahko uspešno uporabimo kot markerja bolezni trsne rumenice.

ABSTRACT

Phytoplasma infection causes changes at the level gene expression in grapevine

Flavescence dorée (FD) and bois noir (BN) are the main cause of grapevine yellows. Phytoplasmas have a decreased genome size, a possible consequence of adaptation to living inside the plant phloem cells (some metabolic pathways present in other bacteria are not encoded in phytoplasma genome).
The aim of this study was to monitor the response of grapevine to the phytoplasma infection at the gene expression level (mRNA). Relative expression of sucrose synthase (Ssh), alcohol dehydrogenase I (Adh1) and heat shock protein 70 (Hsp70) was monitored with real time PCR in cultivars Chardonnay, Barbera and Prosecco. We were also interested to see if the expression values of these genes reflect the presence of the disease symptoms. Samples were prepared from central leaf midribs of healthy, symptomatic and "recovered" plants (123 samples altogether). Ssh and Adh1 are involved in metabolic pathways that should be affected after infection with phytoplasma. Hsp70 is involved in plant's response to pathogen. Relative expression approach was used and each sample was additionally screened for phytoplasma presence with real-rime PCR.
The level of gene expression was compared between healthy and symptomatic samples of Chardonnay and between "recovered" and symptomatic samples of Barbera and Prosecco. Ssh and Adh1 were significantly more expressed (t-test, $p<0.05$) in symptomatic plants of Chardonnay (infected with BN), whereas the expression level of Hsp70 did not change. Similar results were obtained in symptomatic plants of Barbera and Prosecco (infected with FD). The expression of Hsp70 showed the same trend but the difference was not statistically significant.
We can conclude that the infection with phytoplasmas causes changes at the level of gene expression. These changes can be translated into changes in metabolic pathways and together with physical presence of phytoplasmas in phloem cells and plant's response to pathogen they cause grapevine yellows symptoms. We showed that expression values for Ssh and Adh1 could be used as markers for the disease.

Fitomikologija

Prve raziskave razvoja glive *Monilinia vaccinii-corymbosi* v nasadih ameriških borovnic na Ljubljanskem barju

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V okviru spremljanja pojava škodljivih organizmov smo v nasadu ameriških borovnic na Ljubljanskem barju raziskovali potek razvoja glive *Monilinia vaccinii-corymbosi*. Gliva, ki velja za enega najnevarnejših povzročiteljev bolezni na ameriških borovnicah (*Vaccinium corymbosum*) v njihovi domovini, je bila v Sloveniji prvič ugotovljena poleti leta 2004. Že naslednje leto je povzročila do 50 % izpad pridelka v nasadih na Ljubljanskem barju. Povzroča dve vrsti poškodb: propadanje mladih poganjkov, listov in socvetij ter mumifikacijo plodov. Propadanje mladih poganjkov in socvetij je posledica primarnih okužb z askosporami. V raziskavi smo spremljali vremenske razmere in ugotavljali razvoj apotecijev, trajanje obdobja sproščanja askospor in čas pojava prvih znamenj primarnih okužb pri različnih sortah ameriških borovnic. Dobili smo prve podatke o značilnostih razvoja te nove bolezni v Sloveniji, ki bodo osnova za načrtovanje ustreznega varstva pred boleznijo.

ABSTRACT

The first research on epidemiology of *Monilinia vaccinii-corymbosi* on high-bush blueberries in Ljubljansko barje

During the survey of harmful organisms, the phenology of *Monilinia vaccinii-corymbosy* was studied in high-bush blueberry plantations in Ljubljansko barje. The fungus is the causative agent of the mummy berry disease, the most destructive disease of high-bush blueberry (*Vaccinium corymbosum*) throughout North America. The disease was first documented in Slovenia in summer 2004. In the next year it caused 50 % yield loss in high-bush blueberry plantations in Ljubljansko barje. It causes two kinds of damage: blighting of emerging leaves, shoots and flower clusters and mummification of maturing fruits. Dieback of young shoots and flower clusters is caused by primary infections via ascospores. The aim of the present study was to monitor the first appearance of apothecia, duration of ascospore release and occurrence of disease symptoms as related to weather conditions. Different high-bush cultivars were studied. The preliminary data on phenology of *M. vacinii-corymbosi* will contribute to better plan the control of this new pathogen in our production system.

Fitovirologija

Študije prenosa nepovirusov v Sloveniji

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Nekatere vrste ogorčic lahko na kmetijskih rastlinah povzročajo posredno škodo s prenašanjem rastlinskih virusov. Prenos virusov iz okužene na zdravo rastlino poteka med hranjenjem ogorčic, pri čemer se virusi zadržijo v prednjem delu prebavnega trakta ogorčic ter se kasneje sprostijo pri hranjenju na zdravi rastlini. Največ rastlinskih virusov, ki jih prenašajo ogorčice uvrščamo v rod *Nepovirus*, mnogi med njimi se nahajajo na A1 ali A2 EPPO in/ali EU karantenski listi škodljivih organizmov. Nepoviruse prenašajo različne vrste ogorčic rodov *Xiphinema* in *Longidorus*. V Sloveniji smo do sedaj ugotovili 11 vrst rodu *Xiphinema* in 4 vrste rodu *Longidorus*, med katerimi so le 4 vrste znane kot prenašalke nepovirusov: *X. index* (GFLV)*, X. diversicaudatum* (ArMV in SLRSV)*, X. rivesi* (PRMV, CRLV, TRSV in ToRSV) ter *L. elongatus* (RRSV in TBRV). Sposobnost prenosa nepovirusov testiramo pri različnih vrstah ogorčic rodov *Xiphinema* in *Longidorus*. Raziskave opravljamo na testnih rastlinah, ki jih po končanem testu analiziramo s pomočjo ELISA in drugih molekularnih metod. Uvedli smo tudi metodo za detekcijo nepovirusov v ogorčicah. Metoda, ki se nekoliko razlikuje od običajno uporabljenih postopkov, temelji na izolaciji skupne RNA iz ogorčic. Z enostopenjsko RT-PCR metodo smo dokazali prisotnost GFLV v ogorčicah *X. index*.

ABSTRACT

Nepovirus transmission studies in Slovenia

Some nematode species can cause indirect damage to crop plants by transmitting plant viruses. Virus transmission occurs during nematode feeding on infested plant roots where viruses become attached at the anterior part of nematode feeding apparatus. Viruses are consequently detached from sites of retention when the nematode feeds on healthy plant roots.
Most of nematode transmitted viruses belong to the *Nepovirus* genus. Many nepoviruses are listed as an A1 or A2 quarantine organisms on the EPPO and EU list of harmful organisms. Nepoviruses are transmitted by the nematodes belonging to *Xiphinema* and *Longidorus* genus. 11 *Xiphinema* and 4 *Longidorus* species have been discovered in Slovenia so far, of which 4 species are well known nepovirus vectors: *X. index* (GFLV)*, X. diversicaudatum* (ArMV and SLRSV)*, X. rivesi* (PRMV, CRLV, TRSV and ToRSV) and *L. elongatus* (RRSV in TBRV). Nepovirus transmission abilities of different *Xiphinema* and *Longidorus* species were tested. Nematode transmission abilities were studied using bite plant tests which are finally analysed using ELISA test and other molecular methods. In addition to that we implemented the method for nepovirus detection within a nematode. Whole genomic RNA is extracted from nematodes by modified RNA extraction method followed by one-step RT-PCR. In that way, GFLV was established in the nematode vector *X. index*.

Razvoj nove metode za razlikovanje PVY^{NTN} in PVY^{N}

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Krompirjev virus Y (*Potato virus Y*, PVY) je zastopan v Evropi že od sredine osemdesetih let in povzroča vsakoletne izgube v pridelavi poljščin iz družine Solanaceae. Različki virusa Y so razdeljeni v tri skupine - PVY^{N}, PVY^{O} in PVY^{C}. V zadnjih desetletjih so se pojavile nove podskupine virusov kot so PVY^{NTN}, PVY^{W} in PVY^{Z}. PVY^{NTN}, ki je uvrščen v skupino PVY^{N}, predstavlja največji problem v poljedelstvu, saj med skladiščenjem, okuženi krompirjevi gomolji razvijejo znamenja bolezni znane kot obročkasta nekroza gomoljev (tuber necrotic ringspot disease, PTNRD). PVY^{NTN} izolati se serološko ne razlikujejo od PVY^{N} izolatov. Za razlikovanje PVY^{NTN} in PVY^{N} smo razvili metodo lovljenja virusnih delcev na protitelesa in jo združili z metodo pomnoževanja DNA z verižno reakcijo s polimerazo v realnem času, kjer smo uporabili specifične oligonukleotidne začetnike in vzorce. Virus najprej ujamemo na PVY specifična protitelesa in potem virusno RNA nasprotno prepišemo in pomnožimo v isti reakcijski mešanici. Poleg tega smo razvili metodo pomnoževanja DNA z verižno reakcijo s polimerazo v realnem času z uporabo univerzalnih oligonukleotidnih začetnikov in vzorcev, ki učinkovito zaznajo vse skupine in podskupine izolatov PVY. Metoda je bolj občutljiva kot ELISA, ki je najpogosteje uporabljena metoda za določanje PVY.

ABSTRACT

Development of a new method for distinguishing of PVY^{NTN} and PVY^{N}

Potato virus Y (PVY) has been present in Europe from the mid eighties and is still responsible for huge loss of *Solanaceaus* crops each year. Commonly, PVY strains are subdivided into three subgroups – PVY^{N}, PVY^{O} and PVY^{C} and in last decades new strains, like PVY^{NTN}, PVY^{W} and PVY^{Z}, emerged. PVY^{NTN}, which is classified in PVY^{N} group, presents the worst problem in potato production, since infected potato tubers develop external necrotic rings, a disease known as a tuber necrotic ringspot disease (PTNRD). PVY^{NTN} isolates can not be serologically distinguished from PVY^{N} isolates. We developed a new immuno capture method coupled with real-time RT-PCR with specific primers and probes that enables reliable differentiating of PVY^{NTN} and PVY^{N}. Virus is first caught on the PVY antibodies and than viral RNA is reverse transcribed and amplified in the same reaction tube. Besides, we developed a real-time RT-PCR assay with universal primers and probe designed to efficiently detect all subgroups and strains of PVY isolates that is more sensitive than ELISA, which is usually used for PVY detection.

Genska raznovrstnost virusa pahljačavosti listov vinske trte (GFLV) in njen biološki pomen

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Virus pahljačavosti listov vinske trte (GFLV) povzroča bolezen imenovano kužna izrojenost vinske trte, ki je razširjena po vseh vinorodnih deželah sveta in ki povzroča zmanjšanje pridelka in njegove kakovosti, ter tudi propad trsov. GFLV se prenaša s talno ogorčico *Xiphinema index*, ter z uporabo okuženega sadilnega materiala. Klasični način omejevanja širjenja virusa temelji na uporabi neokuženega sadilnega materiala in na zatiranju ogorčic. Novejša možnost, ki je še vedno v fazi raziskav, je uporaba gensko spremenjene vinske trte, odporne na okužbo z virusom GFLV. Ker odpornost temelji na izražanju vnesenega plaščnega proteina GFLV v gensko spremenjenih trtah, je za gojenje take vinske trte v vinogradih potrebna predhodna ocena tveganja, ki zajema analizo genske variabilnosti virusa GFLV in možnost rekombinacij med genotipskimi variantami virusa GFLV, ki so v naravi. V naših raziskavah smo s testom ELISA testirali trse različnih sort, nabrane na različnih lokacijah Primorske, ki so kazali znamenja okužbe na 9 najpogostejših virusov pri vinski trti. Ugotovili smo, da je bilo izmed vseh trsov, ki so bili okuženi z GFLV, dve tretjini takih, ki je poleg GFLV vsebovalo še enega ali več drugih virusov. Z metodo RFLP smo ocenili variabilnost genov virusa GFLV, ki se nahajajo na RNA2: 2A (produkt tega gena najverjetneje sodeluje pri podvajanju RNA2), 2B (gen za gibalni protein) in 2C (gen za plaščni protein). Ugotovili smo, da je gen 2A bolj variabilen kot gen 2B ter da sta oba manj variabilna kot gen 2C. Z določitvijo nukleotidnega zaporedja RNA2 nekaterih restrikcijskih tipov GFLV in njihovo analizo smo potrdili obstoj več restrikcijskih tipov virusa znotraj ene rastline. Na izbranih trsih različnih sort smo nato skozi 3 rastne sezone opazovali bolezenska znamenja in iskali morebitne povezave med restrikcijskimi tipi GFLV ter izražanjem določenih bolezenskih znamenj. Ugotovili smo, da velika genska variabilnost ni prispevala k variabilnosti bolezenskih znamenj pri veliki večini testiranih trsov. Rezultati so pokazali, da različne sorte vinske trte, okužene samo z GFLV, izražajo različna bolezenska znamenja.

ABSTRACT

Genetic variability of Grapevine fanleaf virus (GFLV) and its biological impact

Grapevine fanleaf virus (GFLV) is a causal agent of grapevine fanleaf degeneration disease, which is one of the most important viral disease of grapevine that results in

progressive decline of infected vines, yield loss and poor fruit quality in all wine producing areas in the world. The virus is spread naturally by a nematode vector *Xiphinema index* and through the use of infected planting material. Classical control measures are the use of healthy planting material and control of the vector. New methods comprise the introduction of transgenic grapevines, resistant to GFLV. Because the resistance is mainly based on expressing GFLV coat protein transgene, the assessment of environmental risks, including a measure of the GFLV variability baseline, must be done prior to the release of transgenic grapevines. Initially we used ELISA to test grapevines of different cultivars collected in different locations of the Primorska region (Slovenia), that were expressing symptoms, for the presence of the nine most common grapevine viruses. Among all samples that tested positive for the GFLV, two thirds tested positive to other one or more viruses. Using RFLP analysis, we estimated the genetic variability of all the three genes located on the viral RNA2: 2A gene (homing protein gene), 2B gene (movement protein gene) and 2C gene (coat protein gene). The results showed that the 2A gene is more variable than the 2B gene, and that both are less variable than the 2C gene. We also determined the RNA2 nucleotide sequence of some of the GFLV variants and confirmed the presence of more than one GFLV variant in a single plant. Furthermore, we have selected grapevines infected with GFLV for detailed recording of visual symptoms which was performed during three consecutive years on different locations, and compared them with RFLP and sequencing data. In the great majority of the analyzed vines we could not confirm any connection between GFLV sequence variability and expressed symptoms. Our study has shown that the expression of types of GFLV symptoms is cultivar specific.

Pomen, določanje in razširjenost viroidov v Sloveniji

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Viroidi so kovalentno zaprta krožna RNA velikosti od 246 do 399 baznih parov. Ne kodirajo beljakovin, zato morajo za pomnoževanje, procesiranje in transport v rastlinah uporabljati beljakovine gostitelja. Povzročajo lahko resne bolezni gospodarsko pomembnih zelnatih, okrasnih in sadnih rastlin. Edini učinkovit način preprečevanja širjenja viroidov je čim zgodnejše uničenje vsega okuženega materiala. Za določanje okuženosti so zato potrebne hitre, občutljive in zanesljive metode detekcije in identifikacije, še posebno pri latentnih okužbah. Za detekcijo viroidov so na voljo biološki testi in neposredna detekcija viroidne RNA s pomočjo molekulske hibridizacije ali obratne transkripcije in verižne reakcije s polimerazo (RT-PCR). Na Kmetijskem inštitutu Slovenije smo že uvedli RT-PCR metodo za detekcijo Peach latent mosaic viroida (PLMVd), Hop stunt viroida (HSVd) in Potato spindle tuber viroida (PSTVd). Poleg tega smo v letih 2003 in 2005 v severovzhodni in jugozahodni Sloveniji zbrali 240 vzorcev različnih vrst iz rodu *Prunus,* ki so jih v okviru medsebojnega sodelovanja z Instituto Agronomico Mediterraneo v Bariju analizirali na navzočnost PLMVd in HSVd s pomočjo ne-izotopske hibridizacije točkovnega odtisa. Navzočnost HSVd smo potrdili v enem vzorcu marelice in 5 vzorcih breskev, navzočnost PLMVd pa v 12 vzorcih breskev. To je bila prva potrditev navzočnosti teh viroidov v Sloveniji. Konec leta 2006 smo s pomočjo RT-PCR prvič potrdili tudi okužbo s PSTVd, in sicer na okrasnih rastlinah *Brugmansia cordata* in

Solanum jasminoides. Ker ta viroid lahko povzroča znatne izgube pridelka paradižnika in krompirja, smo takoj začeli s posebnim nadzorom PSTVd.

ABSTRACT

Importance, detection and presence of viroids in Slovenia

Viroids are the smallest known plant pathogenic agents consisting of a non-translated, single stranded, circular RNA of 246 to 399 bases. They can cause serious diseases in economically important herbaceous crops, ornamentals and fruit trees. Eradication of all infested material at a very early stage of infection is the only way to control viroid spread. Rapid, sensitive and reliable detection methods are thus needed for detection of infections, especially latent ones. Since serological techniques cannot be applied for detection of viroids, their detection relies on bioassay or on direct detection of viroid genomic RNA, using either molecular hybridisation or reverse transcription and polymerase chain reaction (RT-PCT). RT-PCR for Peach latent mosaic viroid (PLMVd), Hop stunt viroid (HSVd) and Potato spindle tuber viroid (PSTVd) has been introduced in virological laboratory of Agricultural Institute of Slovenia. Apart from that 240 samples of different *Prunus* species have been collected in 2003 and 2005 in south-western and north-eastern Slovenia and tested in Instituto Agronomico Mediterraneo in Bari by non-isotopic tissue printing hybridisation for the presence of PLMVd and HSVd. HSVd was confirmed in one apricot and 5 peach samples and PLMVd in 12 peach samples. This was the first detection of HSVd and PLMVd in Slovenia. At the end of 2006 PSTVd was detected in *Brugmansia cordata* and *Solanum jasminoides* by RT-PCR. Since this viroid can cause severe yield loss in potato and tomato and can easily spread, a systematic survey was immediately established.

Hmeljev latentni viroid: diagnostične tehnike in obvladovanje

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Hmeljev latentni viroid (HLVd) je pomemben škodljiv organizem na hmelju (*Humulus lupulus* L.), ki je razširjen v večini svetovnih pridelovalnih območjih hmelja. Okužbe z omenjenim povzročiteljem slabijo rastline na celični ravni in povzročajo odzive rastlin, ki so podobni fiziološkem stresu ali virusnim okužbam. Raziskave so pokazale, da HLVd vpliva na zmanjšanje količine pridelka, kar je posledica predvsem slabšega razvoja storžkov, prav tako pa ima vpliv na zmanjšanje kakovosti oz. vsebnosti alfa kislin v pridelanem hmelju. Zaradi omenjenega Evropska organizacija za varstvo rastlin (EPPO) v certifikacijsko shemo pridelave sadilnega materiala hmelja vključuje testiranja in eliminacijo HLVd. V Sloveniji sta bili v obdobju 1997-2001 za določevanje HLVd uvedeni dve diagnostični tehniki (R-PAGE in RT-PCR). V letu 2004 je sledil razvoj točkovne hibridizacijske metode, ki je primernejša za rutinske analize in ob kombinaciji z RT-PCR zagotavlja zanesljiv identifikacijski sistem za testiranje sadilnega in

žlahniteljskega materiala. V Sloveniji je bila dokazana vsesplošna razširjenost HLVd v matičnih rastlinah, tkivnih kulturah, brezvirusnih sadikah in pridelovalnih nasadih hmelja, čemur je v največji meri pripomoglo vegetativno razmnoževanje okuženih rastlin. Na Inštitutu za hmeljarstvo in pivovarstvo Slovenije smo z namenom zagotovitve kakovostnega in neokuženega sadilnega materiala v skladu s sprejeto certifikacijsko shemo pričeli z eliminacijo HLVd in vzgojo prvih brezviroidnih matičnih rastlin.

ABSTRACT

Hop latent viroid: diagnostic techniques and control

Hop latent viroid (HLVd) is an important harmful agent on hops (*Humulus lupulus* L.), which is widely distributed in the majority of world hop production areas. HLVd infections weaken plants on the cellular level and induce responses resembling physiological stress or virus infections. Studies have revealed that HLVd is capable of causing moderate to severe yield loss in terms of total cone yields, individual cone weights and alpha-acid content. In view of this, the European and Mediterranean Plant Protection Organisation (EPPO) has included testing and HLVd elimination in the certification scheme for the production of hop planting material. In Slovenia, two diagnostic techniques (R-PAGE and RT-PCR) were introduced for HLVd detection from 1997-2001. Dot-blot hybridisation was introduced in 2004 for large scale analysis, which, in combination with RT-PCR, enables the development of a reliable identification system for testing planting and breeding material. HLVd is widespread in Slovenian hops and has been detected in mother plants, tissue cultures, virus-free planting material and in commercial hop gardens, which is a result of vegetative propagation of infected plants. In order to produce high quality and healthy planting material, the Slovenian Institute for Hop Research and Brewing has started the elimination of HLVd and has obtained the first viroid-free mother plants.

Entomologija

Nova metoda spremljanja pojava oljčne muhe (*Bactrocera oleae* L.) v Slovenski Istri v okviru projekta SIGMA, Interreg IIIA

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Oljčna muha *(Bactrocera oleae* L.*)*, znana kot največji škodljivec oljk Sredozemlja, ima velik vpliv na kakovost oljčnega olja. Ličinka oljčne muhe, ki se hrani z vrtanjem mesnatega dela plodov oljke vpliva na povečanje kislinskega števila v oljih, kar znatno zniža kakovost oljčnega olja. Z namenom, da bi izboljšali kakovost oljčnega olja in zmanjšali negativni vpliv fitofarmacevtskih sredstev na okolje, smo na območju Slovenske Istre v okviru projekta SIGMA (Program pobude skupnosti INTERREG IIIA Slovenija-Italija) uvedli mrežo za nadzor oljčne muhe. Spremljanje okuženosti oljčnih plodov in dinamike leta oljčne muhe poteka od leta 2005 z uporabo feromonskih vab, nameščenih v 30 vzorčnih oljčnikih. Na podlagi tedenskih podatkov spremljanja oljčne muhe in meteoroloških podatkov sedmih lokacij, smo določili najprimernejši čas ukrepanja proti oljčni muhi in tako zagotovili učinkovito zatiranje oljčne muhe. Ugotovili smo, da se zaradi geografske in mikroklimatske heterogenosti Slovenske Istre pojavlja različna intenzivnost napada oljčne muhe.

ABSTRACT

New method of monitoring of olive fruit fly (*Bactrocera oleae* L.) in Slovenian Istria as a part of SIGMA project, Interreg IIIA

The olive fruit fly *(Bactrocera oleae L.),* the Mediterranean's the most important pest of olives has the great impact on olive oil quality. The larva of the olive fly feeds inside the fruit destroying the pulp and causes the acidity of the oil, which reduce the olive oil quality. To improve the quality of olive oil and to reduce negative environmental effects of pesticides applied in control of olive fruit fly, we had implemented monitoring network for controlling olive fruit fly in Slovene Istria area, which was carried out by the project SIGMA (INTERREG IIIA Italy-Slovenia). Olive fruit fly population and olive infestation monitoring has been conducted from 2005, and is based on pheromone traps located in thirty olive orchards. Based on monitoring results and meteorological data collected at 7 locations during the study period, were determined the most effective treatment time and improved the control of olive fruit flies. The results demonstrate that the olive fruit fly occurrence depends on geographical position of olive orchards and their microclimatic conditions.

Populacijska dinamika koruznega hrošča (*Diabrotica v. virgifera*) v Sloveniji

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Koruzni hrošč, *Diabrotica v. virgifera* LeConte (Coleoptera, Chrysomelidae), je neavtohtona žuželčja vrsta v Evropi. V Sloveniji smo ga prvič ugotovili v letu 2003. V okviru sistematičnega nadzora smo nalet in širjenje vrste ugotavljali s PAL feromonskimi vabami in rumenimi lepljivimi ploščami. V letu 2005 smo na lokacijah v Pomurju in v Podravju dodatno namestili še spolno prehranske KLP flor vabe, na katere se lovijo tudi samičke. Nalet koruznega hrošča smo s PAL feromonskimi vabami in pregledovanjem cvetov spremljali tudi v nasadih buč (*Cucurbita pepo* L.). Prvih 19 osebkov vrste smo na PAL vabe ujeli v Pomurju in v Podravju v bližini meje z Madžarsko in Hrvaško ter na območju severne Primorske blizu slovensko italijanske meje v letu 2003. Medtem, ko v obdobju 2003 - 2006 populacija hrošča na Primorskem ni naraščala, je število ujetih hroščev v napadenih območjih SV Slovenije v letu 2006 doseglo skupno število 4082. Prostorsko se je škodljivec v Sloveniji od leta 2003 dalje postopoma širil proti notranjosti države in v letu 2006 dosegel rob širšega območja Savinjske doline, natančneje okolico Dramelj. V času naleta hroščev smo na KLP flor vabe ujeli v povprečju več samičk kot samčkov. Na rumene lepljive plošče smo prve osebke koruznega hrošča ujeli leta 2005 na mejnem območju z Madžarsko (2 hroščka/rumeno lepljivo ploščo/teden). Tudi v letu 2006 je ulov ostal v enakih okvirih tako, da gospodarski prag škodljivosti ni bil presežen. V nasadih buč smo odrasle osebke koruznega hrošča na feromonske vabe prvič ujeli leta 2004, dve leti kasneje pa smo hroščke z vizualnimi opazovanji ugotovili tudi neposredno v cvetovih buč. V sklopu dosedanjega spremljanja naleta koruznega hrošča smo ugotovili, da se prvi osebki pojavijo vsako leto v drugem tednu julija, vrh naleta pa je v začetku avgusta. Hroščke smo na posameznih koruznih njivah zasledili vse do oktobra.

ABSTRACT

Population dynamics of the western corn rootworm (*Diabrotica v. virgifera*) in Slovenia

The western corn rootworm (WCR), *Diabrotica v. virgifera* LeConte (Coleoptera, Chrysomelidae), is not autochthonous to Europe. It was first identified in Slovenia in 2003. The outbreak and spreading of the species was determined in a systematic surveillance using PAL pheromone traps and yellow sticky traps. In 2005, KLP flor trap, which also attract females, were placed on locations in Pomurje and Podravje. The outbreak of WCR was also monitored in pumpkin plantations (*Cucurbita pepo* L.) using PAL pheromone traps and the visual control of blossoms. The first 19 specimens were caught in 2003 with PAL traps in Pomurje and Podravje near the borders with Hungary and Croatia and in the area of northern Primorska near the Slovene – Italian border. Between 2003 and 2006 the population of WCR in Primorska did not increase, but the number caught in the attacked areas of NE Slovenia in 2006 reached a total of 4082 specimens. From 2003 onwards, the pest has spread gradually towards the interior of Slovenia and in 2006 it reached the wider area of the valley Savinjska dolina, more precisely the surroundings of Dramlje. At the time of the WCR outbreak, using KLP floral traps, more females than males were caught on average. The first specimens of WCR caught by means of yellow sticky traps were obtained in 2005 at the borderland with Hungary (2 beetles/yellow sticky trap/week). The catch was similar in 2006 so that the economically damaging level had not been exceeded. Adult specimens were caught for the first time in 2004 in pumpkin plantations by means of pheromone traps, and two years later the WCR were observed visually in pumpkin blossoms. In the previous monitoring of the WCR outbreak it was established that the first specimens appear each year in the second week of July, while the peak of outbreak occurs at the beginning of August. WCR were observed on individual fields up to the month of October.

Prehranske navade hroščev hmeljevega bolhača (*Psylliodes attenuatus* Koch)

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Hmeljev bolhač (*Psylliodes attenuatus* Koch) je pomemben škodljivec hmelja (*Humulus lupulus* L.), ki se prehranjuje tudi z navadno konopljo (*Cannabis sativa* L. spp. *sativa* var. *sativa*) in veliko koprivo (*Urtica dioica* L.). V *in vitro* razmerah smo ugotovili, da se hrošči hmeljevega bolhača ne prehranjujejo s pleveli kot so bela metlika (*Chenopodium album* L.), drobnocvetni rogovilček (*Galinsoga parviflora* Cav.) ter srhkodlakavi ščir (*Amaranthus retroflexus* L.). V primerjavi s hmeljem sorte Aurora so se hrošči hmeljevega bolhača *in vitro* statistično značilno najraje prehranjevali z listi velike koprive ter s hmeljem sorte Savinjski Golding, Cekin in Taurus. Statistično značilno manjšo preferenco, v primerjavi s hmeljem sorte Aurora, so imeli bolhači do rastlin navadne konoplje sorte Bialobrzeskie ter hmeljem sorte Apolon, Blisk, Buket, Bobek, ter japonskim in slovenskim divjim hmeljem.

ABSTRACT

Nutrition habits of hop flea beetles (*Psylliodes attenuatus* Koch)

Hop flea beetle *(Psylliodes attenuatus* Koch) is the most important pest on hop (*Humulus lupulus* L.) which also feeds on hemp (*Cannabis sativa* L. spp. *sativa* var. *sativa*) and stinging nettle (*Urtica dioica* L.). It was found that *in vitro* hop flea beetles did not feed on weeds such as lambs quarters (*Chenopodium album* L.), gallant soldier (*Galinsoga parviflora* Cav.) and redroot pigweed (*Amaranthus retroflexus* L.). In comparison with Aurora hop cultivar, hop flea beetles *in vitro* statistically significantly preferred to feed on nettle leaves and on Savinjski Golding, Cekin and Taurus hop cultivars. In comparison with Aurora, hop flea beetles showed statistically significantly smaller preference to Bialobrzeskie strain hemp plants and Apolon, Blisk, Buket, Bobek hop cultivars and Japanese and Slovenian wild hops.

Ekologija jabolčnega zavijača (*Cydia pomonella* Linnaeus, 1758) v severovzhodni Sloveniji

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Jabolčni zavijač je najbolj znan škodljivec jabolk, pa tudi hrušk in orehov. V zadnjem desetletju so se sadjarji v severovzhodni Sloveniji, predvsem zaradi zelo ugodnih vremenskih razmer za razvoj tega škodljivca, soočili z velikimi težavami pri zatiranju tega

škodljivca. Odstotek črvivih plodov je v marsikaterem tržnem nasadu presegel tudi 20%, kar priča o močnem biotičnem potencialu vrste. V okviru delovanja opazovalno napovedovalne službe na Kmetijsko gozdarskem zavodu Maribor smo v zadnjih tridesetih letih zbrali kar precej zanimivih podatkov iz bionomije in ekologije jabolčnega zavijača. V prispevku prikazujemo podatke o začetku pojava prvih metuljčkov posameznega rodu, spolni indeks izletenih metuljčkov in insektariju.

ABSTRACT

Phenology and life cycle of codling moth (Cydia pomonella Linnaeus, 1758) in northeastern part of Slovenia

Codling moth is the most known pest of apple, pear and walnut. Because the weather conditions in the past ten years was favourable for development and spreading of this pest, the orchard producers in northeast part of Slovenia were confront with problems, when applied chemical control. In many intensive apple orchards the percent of damaged fruits was over 20%. In the past 30 years the prognostic service on the Agricultural and Forestry institution Maribor has collected data about life cycle and phenology of codling moth in northeastern part of Slovenia. In article we present data about first occurrence of both generation of codling moth, sexual index of moth rearing in captivity.

Varstvo sadnega drevja

Nekajletne izkušnje pri zatiranju breskovega zavijača (*Cydia molesta* Busck.) z metodo zbeganja

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Breskov zavijač ostaja najpomembnejši škodljivec breskev na Primorskem. Številčnost populacije narašča iz leta v leto, z njo pa tudi škoda, ki jo povzroča na pridelku. V nasprotju s porastom škodljivca, pa se izbor v Sloveniji registriranih insekticidov oz. aktivnih snovi iz različnih vzrokov neprestano krči. Metoda zbeganja oz. konfuzije z uporabo sintetičnih feromonov v obliki dispenzorjev ECODIAN CM predstavlja novo možnost za uspešno obvladovanje škodljivca.
V letih 2004–2006 smo v nasadu breskev v Potočah v Vipavski dolini preizkušali in primerjali tri različne metode: metodo zbeganja, kombinacijo uporabe insekticida in metode zbeganja ter klasično zatiranje z insekticidi. V vseh treh letih smo dosegli najboljšo učinkovitost pri kombinaciji uporabe insekticida in metode zbeganja. Delež črvivih plodov je bil po posameznih letih 1%, 1,7% in 1,4% kar je bolje ali najmanj primerljivo z rezultati klasičnega zatiranja z insekticidi.

ABSTRACT

Some years experience in the control of oriental fruit moth (Cydia *molesta* Busck.) by mating disruption method

Oriental fruit moth remains the most important pest on peaches in Littoral region in Slovenia. The population increases from year to year and consequently damage caused on the yield. In contrast with pest population increasing, the selection of authorised insecticides against the Oriental fruit moth has been reduced due to the different reasons. The mating distribution method with low synthetic pheromone rate represents a new chance for successful control of Oriental fruit moth.
From 2004 to 2006 three different protocols were compared: mating disruption method alone, chemical control and mating disruption method combined and classical chemical control. The chemical control and mating disruption method combined gave the highest level of effectiveness in all three yeas. The portion of attached fruits was 1%, 1.7% and 1.4% respectively and was comparable to the results given by classical chemical control at least.

Raziskava možnosti zatiranja breskove muhe (*Ceratitis capitata* W.) s tehniko steriliziranja žuželk v dolini Neretve

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Breskova muha (*Ceratitis capitata* W.) je prodrla v dolino Neretve pred četrt stoletja. Zdaj je škodljivka razširjena povsod in povzroča resne poškodbe na sadju. Najbolj napadeni so

plodovi smokve – *Ficus carica*, breskve – *Prunus persica*, slive oz. češplje – Prunus domestica, marelice – *Prunus armeniaca*, mandarine – *Citrus reticulana* in kakija – *Dyospirus lotus*. Dolina Neretve je sorazmerno izoliran ekosistem in njegova prednost za nadaljnje projekte je v tem, da okolna gorovja z izolacijo močno omejujejo vnos divjih odraslih osebkov obravnavane škodljivke v to dolino. Dolina Neretve je razdeljena v del, ki pripada Republiki Hrvaški (ki se odlikuje z blagim podnebjem in pridelavo agrumov, večinoma mandarin) in del, ki pripada Republiki Bosni in Hercegovini (in je značilen z bolj celinskim podnebjem, ustreznim za pridelovanje koščičarjev). Ugotovljeno je, da breskova muha povzroča največje škode ob robu tega območja in da lahko na mandarini povzroči škodo tudi do 30%. Dolina Neretve je z njenim severnim delom meja za geografsko razširjenost te škodljivke. To pomeni, da vrsta *C. capitata* na tem območju nima najboljših razmer za razvoj. Če bi začeli z ustreznim programom zatiranja, bi imel ta velike prednosti od omejitev divjih populacij škodljivke v hladnem obdobju leta. Hrvaška skupina, ki jo vodi Ministrstvo za kmetijstvo, gozdarstvo in upravljanje z vodami, namerava začeti z dvoletnim programom kot delom IAEA projekta med letoma 2007 in 2008. Raziskava možnosti zatiranja breskove muhe v dolini Neretve je osnovno izhodišče za nadaljnje aktivnosti. Zatiranje omenjene škodljivke s tehniko SIT bi pomenila ekonomske koristi za vse krajevne zasebne pridelovalce, vključno z večjimi pridelovalci in z javnostjo, ki bi dobila več možnosti za nakup svežega sadja. Če bo ta program izveden in bo dosegel gospodarski pomen pri pridelavi, bo to prispevek v prid lokalnih oblasti, kot tudi pridelovalcem in izvoznikom.

ABSTRACT

Feasibility study of medfly (*Ceratitis capitata* W.) control by sterile insect technique in Neretva river valley

The medfly invaded Neretva river valley 25 years ago. Today the pest is spread everywhere and cause seriously fruit damage. The most attacked fruit types are: fig – *Ficus carica,* peach - *Prunus persicae*, plum – *Prunus domestica*, apricot – *Prunus armeniaca*, mandarine tree – *Citrus reticulata* and kaki – *Dyopirus lotus*. The Neretva river Valley is a relatively isolated ecosystem and this advantage provides high chance of succes for a future project, since such isolation by mountines would strongly limit the "import" of wild medfly adults into the valley. The Neretva Valley is devided into part of Republic of Croatia (mostly characterized by mild climate and citrus (mostly mandarines) production, and part of Bosnia and Herzegovina (mostly characterized by continental climate with stone fruits production). It has been noted that highest damage caused by medfly is along the border area and can cause up to 30% damage on mandarins. The Neretva Valley is at the northernmost limit of the geographic distribution of the medfly. This means that the pest is not in the most suitable conditions for its development. Should a programme be launched, it would largely benefit from the limitation of wild medfly population during the cold season. The Croatian team leaded by Ministry of Agriculture, Forestry and Watter Management will start two years program as a part of IAEA TC project during the 2007.-2008. years. A feasibility study of medfly suppresion in Neretva valley is basic point for further activities. The medfly control by using of SIT tehnique would ecconomically benefit all local stakeholders including growers and the public at large in view more access to fresh fruits. Should such a program be launched and given the economic importance of the production in the region, it would benefit from the support of the local authorities as well as of the growers and exporters.

Prognoza in možnosti zatiranja škodljivih vrst sovk (Noctuidae) v trajnih nasadih

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V vinogradih in sadovnjakih jugovzhodne Slovenije je bil v zadnjih letih v času brstenja opažen množičen pojav gosenic sovk vrst *Noctua comes* in *N. fimbriata*. Gosenice so obžrle 30-60 % brstov. Škodljivec je bil ob pojavu neznan in vrste, ki so povzročale škodo, so bile predhodno na tem območju le občasno zabeležene. Razlog za to je tudi aktivnost metuljev in gosenic v nočnem času ter povzročanje škode v temi. Prvi množičnejši pojavi gosenic ledvičastih sovk je bil prvič opažen leta 1999, nato pa se je vsako leto pojavljal z različnimi stopnjami gospodarske škode. V letih 2001 – 2003 smo raziskali bionomijo škodljivih vrst. 2004 in 2005 smo raziskovanje nadaljevali z namenom razvoja napovedi in preučevanja možnosti zatiranja. V ta namen smo uporabili piramidne ter avtomatske svetlobne vabe in feromonske vabe. Razen že znanega mehaničnega načina zatiranja smo v naravnih in laboratorijskih razmerah preverili tudi možnosti uporabe fitofarmacevtskih sredstev. Izbrali smo insekticide z aktivnimi snovmi: teflubenzuron, metoksifenozid, klorpirifos-metil, spinosad ter SYN324A (naturalit). Pri statistični obdelavi rezultatov smo ugotovili najvišjo učinkovitost pripravka z aktivno snovjo metoksifenozid. Pri ocenjevanju učinkovitosti pripravka je bil najpomembnejši dejavnik čas delovanja pripravka (gosenice škodo naredijo v zelo kratkem času).

ABSTRACT

Forecasting and the possibility of suppression of the harmful Noctuid species in vineyards and orchards

In vineyards and orchards of southeast Slovenia was in the last few years registered increased appearance of caterpillars of Noctuid species *Noctua comes* and *N. fimbriata*. These caterpillars damaged 30-60 % of buds. The pest was before the appearance of the damage unknown and the diagnosed Noctuid species appeared in this area before that time only sporadically. The reason for this could be also solely nocturnal activity of moths and caterpillars. The first mass appearance of Noctuid caterpillars was seen in the year 1999, and after that they appeared every year with different stages of economic loss. In the years 2001 – 2003 we researched bionomics of the pests. In 2004 and 2005 we continued the research with intention of predicting this phenomenon and the possibility of its extermination. For this purpose, we used pyramid and automatic light traps and also pheromone traps. With the exception of the already known mechanical methods, we also conducted field and laboratory trials using phytopharmaceutical means. For the experiments we have chosen insecticides with active substances: teflubenzuron, methoxyfenozide, chlorpyrifos-methyl, spinosad and SYN324A (naturalit). While processing statistical data, we established the highest efficacy of insecticides with active substance methoxyfenozide. At the statistical data evaluation was the most important factor the time of effectiveness, because of the caterpillar's capability to make damage in a short time.

Bionomija vrtnega zavrtača (*Xyleborus dispar* [Fabricius], Coleoptera, Scolytidae) v jablanovih nasadih jugovzhodne Slovenije

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V letu 2006 smo na štirih lokacijah na Dolenjskem in v Posavju (Otočec pri Novem mestu, Dvor pri Žužemberku, Gora pri Krškem, Arnova sela) spremljali zastopanost vrtnega zavrtača (*Xyleborus dispar* [Fabricius]) v jablanovih nasadih. Nalet hroščev smo spremljali z alkoholnimi vabami (z različni tipi in različnimi koncentracijami etanola) od začetka aprila do konca avgusta 2006. Namen raziskave je bil preučiti sezonsko dinamiko hrošča, njegov razvojni krog in potencialne gostitelje. Rezultati monitoringa so potrdili našo hipotezo, da ima hrošč v jugovzhodni Sloveniji samo en rod na leto in da so jablane v bližini gozda bolj izpostavljene napadom škodljivca. Ugotovili smo, da je let hroščev močno odvisen od vremenskih razmer. V prispevku je predstavljena bionomija škodljivca, s poudarkom na vplivu vremenskih razmer na njegov razvoj ter škodljivost vrste.

ABSTRACT

Bionomics of European shot-hole borer (*Xyleborus dispar* [Fabricius], Coleoptera, Scolytidae) in apple orchards of southeastern Slovenia

In 2006, we have studied the occurrence of European shot-hole borer (*Xyleborus dispar* [Fabricius]). In 2006, alcohol traps were placed in intensive orchards in four locations on Dolenjska and Posavje regions (Otočec near Novo mesto, Dvor near Žužemberk, Gora near Krško and Arnova sela). The flight dynamics was monitored with special alcohol traps (different types and different concentrations of ethanol) from the beginning of April to the end of August 2006. The aim of the research was to study the seasonal dynamics of the pest, its developmental cycle and potential hosts. The results of the monitoring confirmed our hypothesis that the beetle has only one generation per year and that higher attacks of this pest are usually in orchards, which are near to the forest. We established that the weather conditions have high influence on the flight dynamics of the European shot-hole borer. In the paper, the bionomics of the pest, with special emphasis on the influence of weather conditions on its development and the harmfulness of the pest are discussed.

Spremljanje pojava plenilskih pršic iz družine Phytoseiidae Berlese v nasadih jablane v severovzhodni Sloveniji

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Plenilske pršice iz družine Phytoseiidae sodijo med najpomembnejše naravne sovražnike škodljivcev na gojenih rastlinah. V obdobju med letih 1997 in 2003 smo ugotavljali

zastopanost plenilskih pršic iz družine Phytoseiidae v intenzivnih in ekstenzivnih nasadih jablane v Podravju in Prekmurju. Pri identifikaciji smo pripravili skupaj 350 trajnih mikroskopskih preparatov. Odkrili smo 15 vrst iz družine Phytoseiidae in sicer: *T. pyri*, *A. andersoni*, *E. finlandicus*, *K. aberrans*, *D. macropilis*, *P. soleiger*, *S. tiliarum*, *P. talbii*, *P. triporus*, *A. bakeri*, *A. cucumeris*, *A. rademacheri, A. reductus*, *A. rhenanus* in *M. longipilus*.
V intenzivnih nasadih jablane sta bili najbolj pogosto najdeni vrsti *T. pyri* in *A. andersoni*. V ekstenzivnih nasadih jablane so prevladale vrste *E. finlandicus*, *K. aberrans* ter *D. macropilis*, ostale vrste: *T. pyri*, *A. andersoni*, *P. soleiger A. rhenanus*, *A. rademacheri*, *M. longipilus*, *P. talbii*, *A. bakeri* in *M. longipilus* so bile manj pogoste in številčne. Vrsti *K. aberrans* in *D. macropilis* sta prevladovali na tistih sortah jablan z dlakavimi listi na spodnji strani, medtem ko je vrsta *E. finlandicus* prevladovala na sortah z listi, ki so bili na spodnji strani goli ali z malo dlačicami.

ABSTRACT

Survey of predatory mites of family Phytoseiidae Berlese in apple orchards in northeast part of Slovenia

The predatory mites of the family Phytoseiidae belong to the most important natural enemies of pests on cultivated plants. We ascertained the occurrence of predatory mites from the Phytoseiidae family in intensive and extensive apple orchards in Podravje and Prekmurje region in period 1997 – 2003. During the identification of mites we prepared 350 permanent microscope slides. We found 15 species of phytoseiid species in intensive and extensive apple orchards in Podravje and Prekmurje region: *A. andersoni*, *A. cucumeris*, *D. macropilis*, *E. finlandicus*, *K. aberrans*, *P. soleiger*, *P. talbii*, *P. triporus*, *S. tiliarum*, *T. pyri*, *A. bakeri*, *A. rademacheri*, *A. reductus*, *A. rhenanus*, *M. longipilus*. The dominant species in intensive apple orchards were *T. pyri* and *A. andersoni* and in extensive orchards the predominating species were *E. finlandicus, K. aberrans* and *D. macropilis*, other found species as *T. pyri*, *A. andersoni*, *P. soleiger A. rhenanus*, *A. rademacheri*, *M. longipilus*, *P. talbii*, *A. bakeri*, in *M. longipilus* were rare or they occurred in low population density. *K. aberrans* and *D. macropilis* were dominant on apple varieties with high density of leaf hairs underneath the leaf lamina, but *E. finlandicus* was dominant on apple varieties with low density of leaf hairs underneath the leaf lamina.

Prve izkušnje z zatiranjem orehove muhe (*Rhagoletis completa* Cresson) v severovzhodni Sloveniji

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V letu 2006 smo v nasadu oreha v Mariboru preizkušali učinkovitost delovanja različnih insekticidov za zatiranje orehove muhe. V poskusu smo uporabili Perfektion, Perfektion + Nu Lure, Laser, Laser + Nu Lure, Decis in Proteus. Pri posameznih postopkih smo škropili

celo drevo ali samo spodnjo tretjino krošnje. V kontroli neškropljeno je bil delež napadenih plodov 57,7%. Med preizkušenimi insekticidi smo pri insekticidu Proteus ugotovili 20,0% delež napadenih orehov pri kombinaciji Laser + Nu Lure 21, 3 %, sledijo Perfektion + Nu Lure in Perfection z 23,3% deležem napadanih plodov orehov.

ABSTRACT

First experiences with control of walnut husk fly (*Rhagoletis completa* Cresson) in northeast part of Slovenia

Different insecticides for the control of walnut husk fly *Rhagoletis completa* Cresson has been evaluated in the walnut orchard in Maribor in the year 2006. In the trial we tested four different insecticides (Perfektion, Laser, Decis, and Proteus) and two combinations of insecticides (Perfektion + Nu Lure and Laser + Nu Lure). We treated whole walnut trees or only the inferior third part of walnut trees. In the untreated control the percent of the infested nuts was 57.7%. In the treated plots the lower percent of infested nuts was recorded on trees treated with the insecticide Proteus (20.0 %), 21.3% of infested nuts was recorded on the combination of Laser and Nu Lure and 23.3% on the tress treated with Perfektion + Nu Lure and with Perfection.

Vpliv različnih obdelovalnih metod na zastopanost nekaterih žuželk na orehu

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Madžarska leži blizu severne meje, kjer še lahko pridelujejo orehe. Zaradi tega je učinkovito varstvo oreha pred škodljivimi žuželkami še posebno pomembno. Glavni del ukrepov varstva rastlin je pri orehu namenjenih zatiranju bolezni, dva- do trikrat na leto pa je potrebno tudi zatiranje žuželk. Najpomembnejši škodljivec je jabolčni zavijač (*Cydia pomonella* Linnaeus). Ličinke omenjenega škodljivca neposredno poškodujejo plodove oreha. Hroščke, ki objedajo liste (*Phyllobius* sp., *Polydrusus* sp.), lahko stalno najdemo v krošnjah dreves, vendar pa njihovo hranjenje v redkih primerih pripelje do gospodarske škode. V zadnjih nekaj letih so se na Madžarskem močno povečale populacije murvovega kaparja (*Pseudulacaspis pentagona* Targioni). Gre za gospodarsko pomembnega škodljivca, saj se pojavlja na več kot 100 rastlinskih vrstah. Žuželka živi na deblu in nižjih vejah dreves in s tem slabi njihovo vitalnost. Omenjene tri skupine žuželk smo preučevali z različnimi pridelovalnimi metodami. Raziskovali smo razlike v zastopanosti omenjenih škodljivcev v trajnih nasadih oreha, kot tudi na posamičnih drevesih. V monitoring sta bila vključena dva trajna nasada, prvi pri mestu Lengyeltóti, kjer se nahaja največji nasad orehov na Madžarskem, škodljivce v njem pa zatirajo z insekticidi, drugi pa pri vasici Bölcske, kjer škropljenja niso tako pogosta. V poskus so bili vključeni tudi tri lokacije s posamično porazdelitvijo dreves, kjer kemičnih pripravkov niso uporabili.
Opazen je bil vpliv različnih pridelovalnih metod na zastopanost škodljivcev. Populacija jabolčnega zavijača je bila občutno manjša v trajnih nasadih orehov. Zastopanost listožerih hroščkov je bila nasprotno enaka pri škropljenih in neškropljenih orehih, medtem ko je bila populacija murvovega kaparja najdena le v nasadih z veliko sadilno razdaljo. Rezultati so pokazali, da se zastopanost omenjenih škodljivcev lahko poveča le v večjih orehovih nasadih.

ABSTRACT

The effect of different cultivation methods upon abundance of some insects on walnut trees

Hungary is situated near by the north border of walnut farming. Therefore the effective pest management is particularly important. The main part of the chemical protection on walnut belongs to the disease control, but two-three times spraying are needed against the insects as well. The most important insect pest is the codling moth (*Cydia pomonella* Linnaeus). Their larvae damage directly the nuts. The leaf weevils (*Phyllobius* sp., *Polydrusus* sp.) always can be found on the leaves. Seldom may their feeding cause economic damage. The last years the populations of white peach scale (*Pseudaulacaspis pentagona* Targioni) are strongly increased in Hungary. The economic significance is shown that it has more than 100 host plants. The insects live on trunks and lower branches, and these affected trees are greatly weakened. These three kinds of insect - insect group were monitored at different cultivation methods. We researched the difference of abundance of these insects between the wide walnut field and the sporadically situated walnut trees. There were two walnut fields for our monitoring, one at town Lengyeltóti, where the Hungarian biggest walnut field is located with regular pest controlling, and one at village Bölcske, where the sprayings were not so frequent. Three fields were used for the sporadically situated walnut trees, where were no chemical treatments implicitly.
The effect of the different cultivation on insects was noticeable. The population of the codling moth was much less in the wide walnut fields. The amount of leaf weevils was around equal contrary to the spraying on the walnut field. The white peach scale was found only on the trees of the wide walnut fields. It shows that abundance of this insect can increase only on the bigger walnut fields.

Spremljanje izbruhov askospor jablanovega škrlupa (*Venturia inaequalis* [Coocke] Winter) in vsote efektivnih temperatur pri izvajanju varstva nasadov jablan na območju Celjske regije

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Pri izvajanju varstva nasadov jablan pred primarno okužbo z jablanovim škrlupom spremljamo v okviru opazovalno napovedovalne službe na Inštitutu za hmeljarstvo in pivovarstvo Slovenije izbruhe askospor jablanovega škrlupa (*Venturia inaequalis*) od leta 1968 dalje. Zaradi manjkajočih ali dvomljivih podatkov v nekaterih rastnih dobah (1970, 1983, 1984, 1986 in 1998), datumov pojava prvih askospor nismo vključili v analizo. Za določanje obdobja trajanja zastopanosti askospor v naravi smo analizirali 13-letni niz podatkov. Od meteoroloških podatkov smo za obravnavana leta uporabili povprečne dnevne temperature zraka in množino padavin, izmerjene na klimatološki postaji v Celju, Agencije Republike Slovenije za okolje. Aktivne temperaturne vsote (V_{akt}) in kumulativne vsote padavin so izračunane za obdobje od 1. januarja do datuma začetka oz. konca pojavljanja askospor.
Prve askospore smo ugotovili v povprečju na 97 julijanski dan (j. dan) (7. april). Najbolj zgodaj smo askospore ugotovili na 84 j. dan (25. marec), najbolj pozno pa 115 j. dan (25.

april). Povprečna V_{akt} je ob prvem pojavu askospor dosegla vrednost 346°C, minimalna je bila 209,4°C, maksimalna pa 559,4°C. Vsota padavin je do pojava prvih askopor znašala v povprečju 183 mm, minimalna 66 mm, maksimalna pa 384 mm. Konec izbruhov askospor je v povprečju nastopil na 160 j. dan (9. junij). Najbolj zgodaj prisotnosti askospor nismo več ugotovili na 150 j. dan (30. maj), najpozneje pa na 181 j. dan (30. junij). Obdobje trajanja izbruhov je bilo v povprečju dolgo 62 dni. Linearne odvisnosti med datumom nastopa prvega izbruha in V_{akt} nismo ugotovili (r^2 = 0,054). Ugotovljena ni bila tudi odvisnost med datumom prvega izbruha askospor in vsoto padavin (r^2 = 0,124).

ABSTRACT

Monitoring apple scab ascospore outbreaks (*Venturia inaequalis* (Coocke), (Winter), effective temperature and precipitation sums and apple orchard management in Celje region

Since 1968 systematic management of apple orchards to prevent the spread of primary infection with apple scab has been carried out. The monitoring is done by a disease forecasting service at the Slovenian Institute for Hop Research and Brewing by recording apple scab ascospore outbreaks (Venturia inaequalis). Due to incomplete and questionable data in certain growing periods (1970, 1983, 1984, 1986 and 1998), the occurrence of first ascospores has not been included in the analysis. To determine the duration of ascospore incidence in nature, we analysed 13-year data set. The used meteorological data took into account average daily air temperature and the amount of rainfall, measured at a climatological station in Celje (The Environmental Agency). Active temperature sums (Vakt) and cumulative precipitation sums have been calculated for the period from 1st January to the beginning or end of ascospore incidence.
On average, first ascospores were found on the 97th Julian day (7th April). The earliest the ascospores were found was on the 84th Julian day (25th March) and the latest on the 115th Julian day (25th April). At the first ascospore occurrence mean Vakt reached 346°C, minimum was 209.4°C and maximum 559.4°C. On average, the total amount of rainfall until the occurrence of first ascospores was 183 mm, the minimum was 66 mm and the maximum 384 mm. On average, the end of ascospore outbreaks was recorded on the 160th Julian day (9th June). The earliest incidence of ascospores was no longer found on the 150th Julian Day (30th May), and the latest on the 181st Julian Day (30th July). The whole period of ascospore outbreaks lasted approximately 62 days. Linear dependence between the date of first outbreak and Vakt was not established (r^2 = 0.054). There was also no dependence found between the date of first ascospore outbreak and the amount of rainfall (r^2 = 0.124).

Varstvo vinske trte

Varstvo vinske trte z žveplovimi pripravki

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Domači strokovnjaki opozarjajo, da so blage zime lahko vzrok za močnejši pojav oidija vinske trte (*Uncinula necator*/Schwein./Burill.), ker ne prizadenejo prezimujočega micelija v očesih. Zato moramo to bolezen stalno raziskovati. Poskus smo izvajali leta 2001 v vinogradu na lokaciji Semič, v vinorodnem okolišu Bela krajina, zasajenem s sorto Modra frankinja. Uporabili smo 2 žveplova pripravka Cosan in Pepelin, registrirana za varstvo vinske trte pred oidijem, ter žvepleno-apneno brozgo (kalcijev polisulfid), ki se navadno uporablja za zatiranje pršice trsne kodravosti (*Calepitrimerus vitis* Nal.). Poskus smo postavili po navodilih EPPO. Prvo škropljenje je bilo 20. maja, sledilo mu je še 8 škropljenj v 8 do 14 dnevnih presledkih, zadnje pa 8. avgusta. Druga opravila v vinogradu so bila standardna. Med rastno dobo smo, po skali od 0 do 5 (najmočnejša), ocenjevali (7. julija, 27. julija in 5. septembra) okužbo vinske trte z oidijem. Najmočnejša okužba je bila v času drugega ocenjevanja. Največjo povprečno oceno 4,2 so dobili trsi Modre frankinje v kontroli; sledili so trsi tretirani s Cosanom s povprečno oceno 2,6; s Pepelinom z 2,3, in žvepleno-apneno brozgo z 1,9. Ob trgatvi smo ločeno zmerili količino drozge in stopnjo sladkorja grozdja iz kontrole, grozdja tretiranega s Cosanom, Pepelinom in žvepleno-apneno brozgo. Najmanjši pridelek (1,4 kg drozge/trs in najvišjo stopnjo sladkorja 96 ºOe) smo izmerili v kontroli, sledil je Cosan (1,9 kg drozge/trs in 95 ºOe), zatem Pepelin (2,0 kg drozge/trs in 95 ºOe); največjega pa na trsih, škropljenih z žvepleno-apneno brozgo (2,2 kg drozge/trs in 95 ºOe).

ABSTRACT

Grapevine control with sulphur compounds

Our experts warn that mild winters could be the reason for greater appearance of grape powdery mildew (*Uncinula necator*/Schwein./Burill.), because they do not affect mycelium hibernating in eyes. Therefore, the disease has to be researched permanently. In 2001, a test was performed near Semič, in a vineyard located in Bela krajina viniferous district, planted with Modra frankinja. It included 2 sulphur compounds: Cosan and Pepelin, both registered to control grapevine against powdery mildew, and žvepleno-apnena brozga (based on calcium polysulphide) which is normally used to control grapevine rust mites (*Calepitrimerus vitis* Nal.). The test was set up according to EPPO standards. The first spraying was performed on May 20, followed by other 8 sprayings, repeated in 8 to 14 days' intervals, the last one on August 8. Other agricultural measures were standard. During the growing season, the vine infestation with grape powdery mildew was evaluated (July 7, July 27, and September 5) according to a scale ranging from 0 to 5 (most infected). During the second evaluation the infection was the strongest. The vines growing in control plots got the highest marks, their average value was 4.2; followed by vines treated with Cosan with 2.6, Pepelin with 2.3, and žvepleno-apnena brozga with 1.9. At vintage, the amount of pomace and grape sugar degree were measured for control plots, vines treated with Cosan, Pepelin, and žvepleno-apnena brozga, separately. The smallest yield (1.4 kg pomace/vine and the highest sugar degree 96 ºOe) was measured for control plots, Cosan (1.9 kg pomace/vine and 95 ºOe), and Pepelin (2.0 kg pomace/vine and 95 ºOe), the highest for vines sprayed with žvepleno-apnena brozga (2.2 kg pomace/vine and 95 ºOe).

Vivando® – fungicid za zatiranje oidija vinske trte

Damjan FINŠGAR

BASF Slovenija d.o.o.

Vivando je novi fungicid za zatiranje oidija vinske trte. Vsebuje aktivno snov metrafenon. Pripada novi skupini benzofenonov in je prvi fungicid v tej skupini. Fungicid Vivando nima nobene navzkrižne rezistence s fungicidi, ki se porabljajo za isti namen. Odlikuje ga zelo dobra odpornost na izpiranje in učinkovito delovanje do 14 dni. Deluje translokalno, sredstvo se premešča z vlago in preko plinaste faze. Tretiranja ni potrebno ponoviti, če začne deževati eno uro po aplikaciji. Metrofenon preprečuje penetracijo apresorija v rastlinsko tkivo.
Vivando lahko med rastno dobo uporabimo v različnih stadijih razvoja bolezni. Uporabljen po kalitvi spor, prepreči razvoj apresorija, uporabljen po penetraciji apresorijev, prepreči razvoj sekundarnih hif, micelija in sporulacijo. Delovanje na takšen način omogoča fungicidu Vivando novi pristop in edinstveno moč pri zatiranju oidija vinske trte.

ABSTRACT

Vivando® – a new and unique mode of action for the control of powdery mildew

Vivando, formulated with the new active ingredient metrafenone, has a unique mode of action. Vivando has excellent powdery mildew activity and shows no cross-resistance with any fungicide currently registered for control of powdery mildew. Vivando is rainfast within one hour of application and provides effective protection from powdery mildew for up to 14 days. This protectant activity is enhanced by activity against established infections and by its unique uptake and transport properties. Metrafenone, the active ingredient in Vivando, is classified chemically as a benzophenone and is the first fungicide within this group to be developed.
When metrafenone was applied after germination, the development of appressoria was disrupted and penetration did not occur. When applied after initial penetration had occurred, the further development of secondary hyphae, mycelia and spores was stopped. These combined effects from the active ingredient contribute to the unique strength of Vivando® against powdery mildew.

Kaparji vinske trte: možnosti in težave pri njihovem obvladovanju

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V Sloveniji se na vinski trti kot občasni škodljivci pojavljajo veliki trtni kapar (*Neopulvinaria innumerabilis* (Rathvon)), navadni trtni kapar (*Pulvinaria vitis* (Linnaeus)), češpljev kapar (*Parthenolecanium corni* (Bouché)) in smokvin volnati kapar (*Planococcus*

ficus (Signoret). Omenjene vrste so lahko v primeru prerazmnožitev neposredni škodljivci vinske trte, znana pa je tudi njihova vloga pri prenosu in širjenju virusov, ki povzročajo virusno zvijanje listov vinske trte (Grapevine leaf roll virus) Večjo gospodarsko škodo občasno povzroča za zdaj le veliki trtni kapar, ki se kot priseljena vrsta pojavlja v primorskih vinogradih, zlasti v Slovenski Istri, Goriških Brdih in v Vipavski dolini. Nespecifični plenilci in paraziti kaparjev v primerih prerazmnožitve na splošno niso dovolj učinkoviti, zato je potrebno občasno tudi kemično zatiranje za zmanjšanje populacije in preprečevanje škode. Pri kemičnem zatiranju velikega trtnega kaparja je najboljšo učinkovitost mogoče doseči s predspomladanskim tretiranjem napadenih vinogradov z oljnimi fosfornimi insekticidi, zlasti kombinacije diazinona ali metidationa in mineralnega olja. Drugi ustrezni termin za zatiranje je v času izleganja ličink v začetku julija, ko tretiranje proti kaparju lahko združujemo z zatiranjem 2. rodu grozdnih sukačev. Tudi v tem primeru so bili v poskusih doseženi najboljši rezultati z organskimi fosfornimi insekticidi, zlasti s tistimi na podlagi diazinona, metidathiona in pirimifos-metila. V postopku revizije starejših aktivnih snovi na ravni EU je zaradi zelo restriktivnega pristopa Evropske komisije glede toksikološke in ekotoksikološke ustreznosti večina teh aktivnih snovi izpadla ali pa je njihova uporaba zelo omejena. V Sloveniji za vinsko trto tako nimamo registriranega nobenega pripravka, s katerim bi bilo mogoče učinkovito obvladovati kaparje v vinogradu. V prispevku bodo predstavljeni tudi rezultati preskušanj nekaterih insekticidov proti velikemu trtnemu kaparju in predlagane nekatere druge rešitve za obvladovanje kaparjev na vinski trti.

ABSTRACT

Soft scales on vine: possibilities and current limits in their control

The following soft scales and mealybugs were recorded in Slovenia as periodical pests on vine: cottony maple scale (*Neopulvinaria innumerabilis* (Rathvon)), cottony grape scale (*Pulvinaria vitis* (Linnaeus)), brown scale (*Parthenolecanium corni* (Bouché)) and Mediterranean vine mealybug (*Planococcus ficus* (Signoret). In case of gradations they can provoke serious injuries on vine compromising its growth and production potential. They are also known as efficient vectors of the complex of viruses associated with the Grapevine leaf roll. The most common and harmful is the cottony maple scale, which has spread quite recently in the vineyards of Primorska wine region, mainly in the Vipava valley, Goriška Brda and Slovenska Istra. The efficacy of predators and parasitoids ordinarily found in the infested vineyards is mainly insufficient to keep the soft scale populations below the economic threshold.
This is in particular true in the case of the cottony maple scale. Therefore, a use of specific insecticides is sometimes necessary for their control. In the past the best results were obtained by using the organophosphate insecticides like diazinon, metidathion and parathion combined with mineral oils in the bud burst growth stage. The next appropriate time for the control of cottony maple scale is in the late June and in the early July when larvae hatch. This treatment may be usually shared with the control of the second generation of grape moths. In the trials we made in the past, once again the best results were obtained with the organophosphate insecticides, like diazinon, methidation, pyrimiphos-metyl. Nevertheless, the majority of these active substances were withdrawn from the market on EU level or their uses were widely reduced. Therefore, there are no insecticides authorized for an efficient control of scale insects on vine in Slovenia at the moment. In the final report the results of two trials for the control of cottony maple scale will be presented. Some optional solutions for the control of scale insects on vine are going to be proposed as well.

Petrijeva bolezen, akarinoza ali kaj drugega?

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Leta 2001 smo na Primorskem prvič zasledili obsežnejši pojav nenavadnih simptomov na listih in mladikah pri različnih kultivarjih vinske trte. Simptomi so se izražali v slabši rasti trsov, rumenenju listov, še najbolj pa so bili podobni simptomom, ki jih povzroča pršica šiškarica (*Calipitrimerus vitis* Nal.). Največ omenjenih simptomov smo odkrili pri sortah Sivi pinot in Zeleni sauvignon (prej Furlanski tokaj), pri podrobnejšem spremljanju v letih od 2002 do 2006 pa smo obolele trse našli v vinogradih skoraj vseh razširjenih vinskih sort. Z detajlnimi pregledi okuženih listov smo ugotovili, da navedeni simptomi niso posledica akarinoze, temveč tiči pravi vzrok nekje drugje. Glede na simptomatiko in način pojavljanja bolezenskih znamenj (predvsem pri mladih trsih) domnevamo, da je temu vzrok Petrijeva bolezen, spet ena izmed oblik bolezni lesa vinske trte. Omenjena domnevna bolezen se v primorskih vinogradih širi in dejstvo je, da se bo potrebno v vinogradih soočiti z novo nadlogo.

ABSTRACT

Petri disease, acarinosis or something else?

A mass of unusual symptoms on leaves and branches on different cultivars of grapes were found in year 2001 on Primorska region. Symptoms were expressed on loss of vitality of plants, leaves yellowing, but they were similar to symptoms caused by mite (*Calipitrimerus vitis* Nal.). The most mentioned symptoms were found on cultivars like Sivi pinot and Zeleni sauvignon (before Furlanski tokaj). During detail observations from 2002 to 2006 a lot of plants with symptoms of almost all vine cultivars were found. With detail examinations of infected leaves we found out that mentioned symptoms are not consequence of acarinosis and that the real reason for these is something else. Regards to symptomatic and the way of appearance of symptoms (first of all on young plants) we suppose, that the real reason for this, is Petri disease, one of diseases of wood decline on vine plants. The widespreading of mentioned disease is fact, so we should face with this new trouble.

Izkušnje z zatiranjem peronospore vinske trte v obdobju 2004-2006 v severovzhodni Sloveniji

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Peronospora vinske trte je v severovzhodni Sloveniji v večini let najbolj nevarna glivična bolezen na vinski trti. Za uspešno zatiranje oz. preprečevanje bolezni je običajno potrebno

opraviti sedem do devet tretiranj z učinkovitimi fungicidi. Po podatkih opazovalno napovedovalne in svetovalne službe Kmetijsko gozdarskega zavoda Maribor lahko računamo v večini let s srednje močno okužbo, v zadnjih letih v desetletju pa z izjemno močnim pojavom ali epifitocijo bolezni. V prispevku prikazujemo rezultate triletnih preizkušanj različnih kombiniranih fungicidov, ki so na voljo na našem trgu, kakor tudi novih učinkovin (mandibopropanid, fluopikolid, ciazofamid), ki jih pričakujemo pri nas šele v prihodnjih letih.

ABSTRACT

Experiences with control of downy mildew (*Plasmopara viticola* Berk. et Curtis ex. de Bary) in period between 2004 and 2006 in northeastern part of Slovenia

Downy mildew is most important fungus disease on wine grape in northeast part of Slovenia. For the effectively chemical control of the disease, the wine grape producers must applied the grape seven to ten times. According to the data from prognostic service on the Agricultural and Forestry institution Maribor, the wine grape producers could expect for the long period with middle appear of disease on the grape, but in the last decade with high appear of disease. In the article we present results of chemical control of downy mildew in the past three years with different fungicides, which are sale in Slovenia and which will be sale in next years (mandibopropamid, fluopikod and ciazofamid).

Predstavitev italijansko-slovenskega projekta INTERREG IIIA "Izvedba sistema za meritev okužbe *Plasmopara viticola* na teritorialnem nivoju " (PRADA)

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Oddelek za agrometeorologijo na Uradu za meteorologijo, Agencija RS za okolje (ARSO), je leta 2006 pristopil k mednarodnemu projektu pod okriljem programa Interreg III A. Vodilni partner v projektu je Regionalna agencija za zaščito okolja Furlanije Julijske Krajine (Agenzia Regionale per la Protezione dell'Ambiente del Friuli Venezia Giulia) iz Udin (ARPA-FVG). Pogodbeni partnerji v Italiji so še Univerza v Udinah, Inštitut za raziskave atmosfere in klime (CNR-IATA) v Rimu, Univerza v Firencah, OSMER FVG, ERSA FVG – Regionalna agencija za pomoč podeželju v Furlaniji Julijski Krajini ter številne kmetijske organizacije v Italiji. S slovenske strani je bil poleg ARSO k sodelovanju povabljen tudi Kmetijsko gozdarski zavod Nova Gorica.
Namen projekta PRADA je vzpostavitev agrometeorološkega monitoringa za ocenjevanje razvoja nekaterih rastlinskih bolezni z uporabo simulacijskih modelov, ki jih poganjajo meteorološki podatki izmerjeni na meteoroloških postajah in podatki daljinskega zaznavanja za območje Goriške regije in Furlanije Julijske Krajine. Meteorološke razmere za infekcijo peronospore so bili izračunani s pomočjo spremenljivke trajanja omočenosti lista (TOL) po modelu, ki upošteva teoretske osnove izmenjave energije med listom in okolico. Modelski rezultati so bili preverjeni z meritvami trajanja omočenosti lista na meteoroloških postajah Bilje in Ljubljana in na nekaterih italijanskih meteoroloških postajah.
Projekt PRADA vključuje več izvedbenih faz. Prva faza projekta je zajemala izdelavo procedur za prenos in odlaganje meteoroloških podatkov dnevno izmerjenih na

avtomatskih meteoroloških postajah v mreži ARSO za izbrane lokacije v Sloveniji in podatkov o stanju atmosfere vertikalne sondaže ozračja na meteorološki postaji Udine (Italija). Končni rezultat projekta bo internetna aplikacija, ki bo prikazala prostorsko porazdelitev bolezni v obliki dnevnih kart infekcije za peronosporo vinske trte na vinogradnih območjih v Furlaniji Julijski Krajini in v zahodni Sloveniji. Kasneje bo aplikacija razširjena še na prikaz prostorske porazdelitve infekcije za nekatere druge rastlinske bolezni.

ABSTRACT

PRADA - INTERREG IIIA project between Italy and Slovenia (Establishment of the system for Downy mildew (*Plasmopara viticola*) infection monitoring in the joint region.

The Agrometeorological Department of the Meteorological Office in the frame of Environmental Agency of the Republic of Slovenia (EARS) in 2006 joined an international project PRADA under the coverage of the program INTERREG III A. The leading partner of the project is Regional Agency for the Environment Protection of Friuli Venezia (Agenzia Regionale per la Protezione dell'Ambiente dell Friuli Venezia Giulia) from Udine (ARPA-FVG). Other contract partners from Italy are University from Udine, Institute for Atmospheric and Climate Researches (CNR-IATA) from Rome, University from Florence, OSMER FVG, ERSA FVG – Regional Agency for Province Assistance in Friuli Venezia and a number of agriculture associations in Italy. From Slovenian part beside of EARS, Agriculture Advisory Service from Nova Gorica was invited to join the project.
The Purpose of the PRADA project is establishment of agrometeorological monitoring for plant disease development estimation with the usage of simulation models driven by meteorological and remote sensing data in both regions. Meteorological conditions for downy mildew infections were calculated on the basis of modelled leaf wetness duration (TOL). Theoretical background for the model is leaf energy balance. Model outputs were verified with the leaf wetness measurements at the meteorological stations Bilje and Ljubljana and some Italian meteorological stations.
In the paper first part of the project is presented. The establishment of the procedures for daily transfer and storage of meteorological data in the frame of EARS network for selected locations in Slovenia and daily vertical atmosphere sounding data on meteorological station Udine. Final result of the project is a web application with a spatial distribution of downy mildew infection in the form of daily maps for vine growing areas in both regions. The future outlook of the applications for other plant diseases is going to be discussed.

Postalon 90 SC - nov, izredno učinkovit fungicid za zatiranje oidija na vinski trti

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Oidij vinske trte je zelo poseben parazit. Oidija je ektoparazit. Njen micelij, konidiji in kleistoteciji se nahajajo na površini rastlinskih organov in s haustoriji črpajo hranu iz epidermalnega celičja. V primerjavi z drugimi patogeni, se oidija razvija zelo hitro in je toleranten na pomanjkanje vlage. Pri oidiju je prisotna velika verjetnost pojava rezistence. Vzroki so kratki življenski ciklus, više življenskih ciklusov v eni sezoni, možnost tvorbe ogromnega števila spor in genske rekombinacije. Do danes je dokumentirano veliko število

primerov pojava rezistence na pogosto uporabljene molekule, razen dinokapa, tako da je kontrola pojava rezistence osnova programa zaščite proti oidiju vinske trte.
Postalon 90 SC je kombinacija dveh poznanih učinkovin, miklobutanila (45 g/l) in kvinoksifena (45 g/l). Miklobutanil je ksilemski sistemik širokega spektra. Deluje preventivno, kurativno in eradikativno. Prvenstveno se koristi preventivno v kombinaciji s kontaktnimi fungicidi, pa tudi kurativno pri zelo zgodnjih infekcijah. Dobro prodira v tkivo in je odporen na izpiranje. Miklobutanil je primeren za uporabo v integrirani zaščiti vinske trte. Kot učinkovina se nahaja v sredstvih kot sta Sythane 12 E, Sabithane.
Kvinoksifen deluje kontaktno in delno sistemično aktivno preko plinske faze. Kvinoksifen preprečuje kalitev konidijev. Primeren za uporabo v integrirani zaščiti vinske trte in se kot učinkovina nahaja v sredstvu Crystal.
Prednost sredstva Postalon 90 SC je dodatek kurativnega delovanja kvinoksifenu in dodatek rezidualnega delovanja miklobutanilu. Z dvema učinkovinama, z dveh različnih mest in načinov delovanja, je idealno vklopljen v antirezistentno strategijo zatiranja oidija vinske trte. Z kombinacijo teh dveh različnihj učinkovin se ustvari trojna učinkovitost: dotikalno in sistemično delovanje ter delovanje preko plinske faze, kar omogoča zaščito grozdja in listja, ki niso zaščiteni s kontaktnim ali sistemičnim delovanja. Postalon 90 SC je varen za koristne organizme in ima odličen ekotoksikološki profil, ter se tako idealno vklaplja v program integriranega varstva vinske trte.
Postalon 90 SC se bo uporabljal za preventivno in kurativno varstvo vinske trte (*Uncinula necator*) z intervali do 14 dni, pričakuje pa se tudi registracija na jablanah, jagodah, dinjah itd.Odmerek za zatiranje oidija vinske trte, pri polnem habitusu je 100-125 ml/hl, oziroma 1-1,25 L/ha, odvisno od pritiska bolezni in sortni občutljivosti. Odmerek 1 L/ha je standardni odmerek pri običajnih pogojih; odmerek 1,25 l/ha je potreben samo pri zelo močnem pritisku bolezni.

ABSTRACT

Postalon 90 SC - new, outstanding specialy efficient fingicide for downy mildew – oidium (*Uncinula necator*) control

Oidium of vine plant is a special parasite. It is ectoparsite. Its mycelium, conidies and cleistotecies are situated on the surface of plant organs and are pumping the food from epidermal cellular issues. In comparison with other patogens its is developing very quickly and is tolerant to humidity insufficiency. At oidium, big possibility of resistance appearance is present. The reason is short life cyle, more life cyles in one season, possibility of formation a huge number of spores and gene recombination. Up to now, many number of appearances of resistance on often used molecules are documented, except dinocap, so that the control of resistance appearance is base of the program of protection against oidium of vine plant.
Postalon 90 SC is combination of two known substances, myclobutanil (45 g/L) and quinoxyfen (45 g/l). Myclobutanil is systemic of wide spectrum. Its action is preventive, curative and eradicative. It is especially used preventively in combination with contact fungicides and it is resistant on rinsing. Myclobutanil is suitable for the use in integrate protection of vine plant. The substance is to be found in the products as Sythane 12 E, Sabithane.
Quinoxyfen acts contact and partly systemic actively through gas phase. Quinoxyfen prevents germination of conidies. It is suitable for the use in integrate protection of vine plant and is to be found in the product Crystal.

Priority of the product Postalon is addition of curative action to quinoxyfen and addition of residual action to myclobutanil. With two substances, from two different places and ways of action, it is ideally included in anti resistant strategy for oidium control on vine plant. With combination of these two different substances, triple efficacy is formed: contact and systemic action and action through gas phase which enables the protection of grapes and leaves which are not protected with contact or systemic action. Postalon 90 SC is safe for useful organisms and has excellent ecotox profile and could be ideally included in the program of integrate protection of vine plant.
Postalon 90 SC will be used for preventive and curative protection of vine plant (*Uncinula necator*) with intervals to 14 days; also registration on apples, strawberries, melons etc. is expected. The rate for oidium of vine plant, at full habitus, is 100-125 ml/hl /1 – 1,25 L/ha depending on power of disease and cultivar sensibility. The rate 1 L/ha is standard rate at usual conditions; the rate 1,25 L/ha is necessary only at very strong disease power.

Splošna sekcija

SLOPAK, družba za ravnanje z odpadno embalažo

Barbara TIŠLER

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Slopak je neprofitna družba za ravnanje z odpadno embalažo. Dejavnosti izvaja skladno z Uredbo o ravnanju z embalažo in odpadno embalažo (Ur.l. RS 84/2006). Dovoljenje za ravnanje z odpadno embalažo je družba pridobila za vse vrste embalaž in za celotno območje Republike Slovenije.
Družba Slopak odpadno embalažo prevzema, zbira, sortira, predela in reciklira. Cena teh storitev je strošek ravnanja z odpadno embalažo – embalažnina. Vsa podjetja, ki dajejo embalirane izdelke na trg Republike Slovenije so skladno s Uredbo o ravnanju z embalažo in odpadno embalažo, dolžni kriti stroške ravnanja z odpadno embalažo, svoje obveznosti pa lahko prenesejo na družbo Slopak. Stroški ravnanja z odpadno embalažo – embalažnina, podjetja plačujejo družbi Slopak glede na letno količino embalaže, ki jo dajo z izdelki na slovenski trg. Embalažnina se izračuna glede na embalažni material.
V okviru sistema Slopak je oddaja odpadne embalaže mogoča na vseh 120 zbirnih mestih sistema Slopak. Mogoč je tudi dogovor o posebnih zbiralnicah ločeno zbrane odpadne embalaže. Končni uporabnik izpraznjeno in iztočeno embalažo odda brezplačno.

Angleški izvleček ni bil predložen.

Škodljivi organizmi v topolovih drevesnicah in nasadih

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Znano je, da so nekateri organizmi, ki najdejo ugodne razmere za razvoj in širjenje v topolovih drevesnicah, zelo škodljivi za (odrasle) gojene topole, ker preprečujejo njihovo rast in prirastek in zelo negativno vplivajo na osnovne biotične procese v njih, kar privede do njihovega neugodnega fiziološkega stanja. Nedvomno imajo sedanji škodljivi organizmi na topole različne in specifične učinke, zato je zelo pomembno, da se ugotovi, kateri škodljivi organizmi se pojavljajo bolj pogosto.
Sistematične raziskave in detekcija njihovega pojava in zastopanosti so bile opravljenev obdobju 2003 do 2005 na območju Vojvodine, ker so potrebni tudi drugi elementi za odločitev, kateri ukrepi so potrebni za njihovo zatiranje. Te raziskave so bile opravljene na več desetinah parcel (v drevesnicah in v nasadih) in v laboratorijih Inštituta za ravninsko gozdarstvo in okolje.
Gliva *Marssonina brunnea* (Ell. *et* Ev.) P. Magn. in *Melampsora* sp. so bile ugotovljene na listih ukoreninjenih topolovih potaknjencev, na skorji pa glivi *Dothichiza populea* Sacc. *et* Br. in *Cytospora chrysosperma* (Pers.) Fr. V topolovih drevesnicah in nasadih so bile ugotovljene sledeče žuželčje vrste: *Melasoma populi* L., *Phylodecta vitellinae* L. *Chlorophanus viridis* L., *Nycteola asiatica* Krul., nato žuželke iz rodov *Phyllobius*, *Polydrosus*, *Byctiscus* in žuželke iz družin Aphididae in Noctuidae. Dodatno k naštetim škodljivcem so bili signifikantno zastopani listni zavrtači *Leucoptera sinuella* Rtti., *Phyllocnistis suffusella* Z. in ksilofagi *Cryptorrynchus lapathi* L., *Agrilus suvorovi*

populneus Schaef., *Parnthrene tabaniformis* Rott. in *Melanophila picta* Pall. Raziskava kaže, da se znantno število populacij zgoraj naštetih organizmov pojavlja v precejšnjih gostotah in da je priporočljivo njihovo zatiranje.

ABSTRACT

Harmful organisms in poplar nurseries and plantations

It is known that some organisms, which find favourable conditions for their development and spreading in poplar nurseries and plantations, are very harmful to cultivated plants, preventing their growth and increment, and they also have a very negative effect on the basic biological processes in them, leading to an unfavourable physiological state. Undoubtedly, the present harmful organisms themselves have different and specific effects on host plants and therefore it is very important to know which harmful organisms occur most frequently.
The systematic study and detection of their presence and incidence were organised in the period 2003-2005 in the region of Vojvodina, as well as other elements needed for deciding whether their suppression is necessary. The studies were performed in several tens of plots (nurseries and plantations) and in the laboratories of the Institute of Lowland Forestry and Environment.
The fungi *Marssonina brunnea* (Ell. et Ev.) P. Magn. and *Melampsora* sp. were identified on the leaves of poplar rooted cuttings, and in the bark, the fungi *Dothichiza populea* Sacc. et Br. and *Cytospora chrysosperma* (Pers.) Fr. The following insect species were identified in poplar nurseries and plantations: *Melasoma populi* L., *Phylodecta vitellinae* L. *Chlorophanus viridis* L., *Nycteola asiatica* Krul., then insects in the genera *Phyllobius*, *Polydrosus*, *Byctiscus* and insects in the families Aphididae and Noctuidae. In addition to the above pests, there was a significant presence of leaf miners *Leucoptera sinuella* Rtti., *Phyllocnistis suffusella* Z. and xylophages *Cryptorrynchus lapathi* L., *Agrilus suvorovi populneus* Schaef., *Parnthrene tabaniformis* Rott. and *Melanophila picta* Pall. The study shows that a considerable number of populations of the above organisms occurred in high densities and that in such cases, the need of suppression is imposed.

Novosti na informacijskem sistemu FITO - INFO

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Slovenski informacijski sistem za varstvo rastlin FITO-INFO deluje kot javno dostopen informacijski portal že od leta 1997. Od svojih začetkov do danes je zaradi vedno večjih potreb po novih informacijah, dostopnosti novih tehnologij in povezovanju, ter izmenjavi informacij s sorodnimi informacijskimi sistemi doživel kar nekaj vsebinskih, strukturnih in oblikovnih sprememb. Tako je v letu 2006 stekla že druga vsebinska in oblikovna sprememba platforme, ki poleg tega, da uporabnikom nudi hitrejši in prijaznejši dostop do informacij, sledi tudi novejšim informacijskim tehnologijam. V prispevku so predstavljeni novi in prenovljeni moduli sistema in njihove možnosti uporabe: agrometeorološke informacije, organizmi in varstvo okolja. Razvoj sistema finančno in strokovno podpira Fitosanitarna Uprava Republike Slovenije, razvoj modulov pa poteka v sodelovanju Inštituta za fitomedicino z več raziskovalnimi inštitucijami.

ABSTRACT

Updates of information system FITO – INFO

The Information System for Plant Protection called FITO-INFO has been operating as a public accessible information portal since 1997. Greater needs of new information, accessibility of new technologies and connections and exchange of information with related information systems have from the beginnings till today been causing many changes in the field of the contents, structure and design of the system. In the year 2006 already the second change of the platform has taken place, concerning the content and the form. It is offering a quicker and friendlier access to the information and also following newer information technologies. In the following article new and renovated system modules and their application possibilities are being introduced: agro meteorological information; organisms, and environmental protection. The system development is financially and professionally supported by the Phytosanitary Administration of the Republic of Slovenia, development of the modules is conducted as cooperation of the Institute for phytomedicine with several research institutions.

Posterji

Rezultati ugotavljanja ostankov fitofarmacevtskih sredstev v kmetijskih pridelkih v Sloveniji v letih 2005 in 2006

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V skladu z Zakonom o fitofarmacevtskih sredstvih (Ur.l. RS št.: 98/04) in Pravilnikom o njihovih ostankih v oziroma na živilih in kmetijskih pridelkih (Ur.l. RS št.: 84/04) smo ugotavljali te ostanke v kmetijskih pridelkih slovenskih tržnih pridelovalcev do prometa, to je po obiranju, izkopu ali žetvi in v skladišču.
Spremljanje ostankov fitofarmacevtskih sredstev v kmetijskih pridelkih omogoča ugotavljanje skladnosti z zakonsko predpisanimi najvišjimi dovoljenimi količinami ostankov (MRL), ugotavljanju skladnosti konvencionalne, integrirane ali ekološke pridelave z dobro kmetijsko prakso, ugotavljanje izvora oziroma vzroka najdenih ostankov in oceni tveganja za ostanke omenjenih sredstev, ki so presegli MRL.
Vzorčenje so izvajali kmetijski inšpektorji in je potekalo naključno na pridelovalnih območjih Celja, Kopra, Kranja, Nove Gorice, Novega mesta, Murske Sobote, Maribora in Ljubljane. Vsebnost ostankov fitofarmacevtskih sredstev v vzorcih krompirja, solate in jabolk spremljamo vsako leto, medtem ko izbor ostalih kmetijskih proizvodov letno usklajujemo s smernicami EU. V letih 2005 in 2006 smo skupno analizirali 296 vzorcev in sicer: krompir (49), solato (33), jabolka (53), špinačo (7), stročji fižol (14), kumare (17), hruške (12), korenje (15), grah (4), jagode (19), papriko (16), cvetačo (11), grozdje (20) in žita (26). Vzorčenje je potekalo ob spravilu kmetijskih proizvodov, po poteku karence za uporabljena fitofarmacevtska sredstva ali v skladiščih.
Vse vzorce smo analizirali na vsebnost izbranih aktivnih snovi. V letu 2005 smo v laboratoriju določali ostanke 66, v letu 2006 pa 86 različnih aktivnih snovi, s štirimi različnimi metodami: 1) multirezidualna GC-MS metoda za določitev 64 spojin v letu 2005 in 67 spojin v letu 2006, 2) metoda za določitev skupine ditiokarbamatov: maneba, mankozeba, metirama, propineba, zineba v letu 2005 in 2006, 3) metoda za določitev benzimidazolov: benomila in karbendazima ter tiabendazola v letu 2005 in 2006, ter 4) multirezidualna HPLC-MS metoda za določitev 17 spojin v letu 2006.

ABSTRACT

Results of determination of pesticide residues found in agricultural products in Slovenia in the years 2005 and 2006

Pesticide residues found in agricultural products produced by Slovene market producers were determined until their placement on the market, i.e. after harvesting, in accordance with the Law on Plant Protection Products (Off. G. RS No.: 98/04) and Regulation on Residues of Plant Protection Products Found in and on Agricultural Commodities and Products (Off. G. RS No.: 84/04).
The monitoring of pesticide residues in agricultural products allows determination of harmonisation with the legally prescribed maximum residue level (MRL), determination of harmonisation of conventional, integrated and ecological production with good agricultural practice, determination of origin or cause of residues determined and risk evaluation for MRL exceeding pesticide residues.
The surveillance sampling was performed by agricultural inspectors and it was carried out in the production areas of Celje, Koper, Kranj, Nova Gorica, Novo mesto, Murska Sobota,

Maribor and Ljubljana. The content of residues of plant protection products in the samples of potato, lettuce and apples was monitored annually while the choice of other agricultural products was harmonised with EU directives each year. In 2005 and 2006 the total number of analysed samples was 296: potato (49), lettuce (33), apples (53), spinach (7), string beans (14), cucumbers (17), pears (12), carrots (15), peas (4), strawberries (19), pepper (16), cauliflower (11), grapes (20) and cereals (26). The samples were taken at the harvest of agricultural products, after the expired pre-harvest interval of the pesticides used or in storehouses. All samples were analysed for the content of selected active substances. In 2005 the residues of 66 and in 2006 those of 86 different active substances were determined in the laboratory using four different methods: 1) multiresidual GC-MS method used for determination of 64 compounds in 2005 and 67 compounds in 2006, 2) method used for determination of dithiocarbamate group: maneb, mancozeb, metiram, propineb, zineb in 2005 and 2006, 3) method used for determination of benzimidazoles: benomyl and carbendazim and thiabendazole in 2005 and 2006, and 4) multiresidual HPLC-MS method used for determination of 17 compounds in 2006.

Določevanje ostankov (reziduov) azoksistrobina v kumarah

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Sistematična ugotavljanja stopnje okužb kumar od kumarne plesni (*Pseudoperonospora cubensis*) ob različnem infekcijskem pritisku in ekoloških razmerah, ki so ugodne za razvoj bolezni, so pokazala, da jo je mogoče zatreti z dobro in pogosto aplikacijo s fungicidi.
V dostopni literaturi so opisane različne metode za določanje ostankov azoksistrobina. Mario Schirra *et al.* so določevali to substanco v grenivkah s plinsko kromatografijo z NPD detektorjem, medtem ko so Lenza-Rizos *et al.* (2005) ugotavljali ostanke iz grozdja vinske trte do smol s plinsko kromatografijo z detektorjem ECD.
V tem prispevku bo prikazano določevanje azoksistrobina v kumarah z GLC-ECD in ekstrakcijo s toluenom in propan-2-olom. Ekstrakt so analizirali z GLC s kapilarno kolono SPB 5 in ECD. Srednja vrednost določitev za vsebnostne stopnje od 0,02 do 1 mg/kg je bila 87,6 %, z relativno standardno deviacijo manjšo kot 10 %.. Metoda kaže linearnost pri vseh vzorcih in linearni korelacijski koeficient, višji kot 0,898. V optimiziranih razmerah GLC-ECD je bil retencijski čas 10,5 min, LOD pa 0,02 mg/kg.
Rezultati analize ostankov azoksistrobina v kumarah na poskusni njivi kažejo, da se ti pojavljajo redno in da so pod dovoljeno mejo (MRL) 1 mg/kg.

Determination of azoxystrobin residue in cucumber

ABSTRACT

Systemic evalution of cucumber downy mildew disease intensity show that under the conditions of severe infection pressure and favorable ecological conditions for disease development, can be protected only by frequent and good quality fungicide application.
The available literature data describe various conditions for determining the azoxystrobin residue. Mario Schirra et al. (2002) determined the level of azoxystrobine residue in grapefruit by gas chromatography with NPD detector, while Lenza - Rizos et al. (2005) dealt with the azoxystrobin residue from grapes to raisins by gas chromatography with ECD detector.

In this paper, GLC-ECD and extraction with tholuen and propa-2-ol, were evaluated to be applied in the analysis of azoxystrobin residues in cucumber. The extract was analysed by GLC with SPB 5 capillary column and ECD. The mean value, recovery for levels 0.02 - 1 mg/kg was 87.6%, with the relative standard deviation less than 10%. The metod showed linearity for all samples and linear correlation coefficient higher than 0.898. Under the optimized GLC-ECD conditions the retention time of azoxystrobin was 10.5 min, and LOD was 0.02 mg/kg.
The results of the residue analysis show that in cucumber on our table the pesticide residues appear regularly, and they were under the MRL (1 mg/kg).

Površinska napetost škropiv (fungicidov, insekticidov) in raztopin rudninskih gnojil v odvisnosti od sestavin in kakovosti vode

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Omočljivost je lastnost pesticidnih učinkovin, da oblikujejo tanko, toda dovolj obstojno plast na površju tretiranih rastlin. Stopnjo omočljivosti opredeljuje površinska napetost učinkovin in dodatkov. Namen te raziskave je bil, določiti in primerjati površinsko napetost fungicidov (Antracola WP-70 in Dithana M-70), insekticidov (Actellic-50 in Confidor 200-SL) ter rudninskih gnojil (Ferticare I, Ferticare II, Ferticare III/ oz. FI, F II in F III/ in/oz. Wuxal Super) ter njihovih mešanic (dvo- in trikomponentnih) v vodi, ki se razlikuje po kakovosti (vodovodna voda in voda iz vodnjakov). Fizikalno-kemične lastnosti mešanic insekticidov in fungicidov ter njihovih mešanic z rudninskimi gnojili so osnova za oceno kompatibilnosti, ne upoštevajoč možnosti, da je kompatibilnost tudi odvisna od kakovosti vode. Primerjalne vrednosti površinske napetosti za mešanice in njene komponente so lahko koristne za oceno fizikalnokemične komptatibilnosti mešanic.
Površinska napetost je bila določana s tenziometrom (Lecomte du Nouy) neposredno po mešanju in po 24 urah (pri 20 ^{0}C) s tremi ponovitvami. Površinska napetost je izražena v mJ/m^2, z natančnostjo 0,1 mJ/m^2.
Površinska napetost vodovodne vode je bila 69 mJ/m^2, tako neposredno po mešanju, kakor po 24 urah, voda iz vodnjakov pa je imela 68 mJ/m^2 takoj po mešanju in 70 mJ/m^2 po 24 urah. Upoštevajoč v celoti vse komponente in mešanice, se je površinska napetost vseh komponent in mešanic zmanjšala glede na čisto vodo na 30,5 do 61 mJ/m^2. Glede na kontrole, ki so vključevale tako vodovodno vodo kakor vodo iz vodnjakov, se je površinska napetost, ne glede na vir vode, znatno zmanjšala v mešanicah, ki so vsebovale kot komponento Actellic-50. Zmanjšanje je bilo okoli 40 mJ/m^2, kar je razumljivo glede na formulacijo (EC) tega pripravka. Zmanjšanje površinske napetosti v drugih variantah je bilo okoli 20 mJ/m^2, kar se zopet lahko pripisuje formulaciji pripravkov. Zmanjšanje omočljivosti se lahko popravi z dodatkom površinsko aktivnih agensov.
Razlike v površinski napetosti so bile ugotovljene glede na kakovost vode. Povečana napetost je bila ugotovljena v vodi iz vodnjakov pri Antracolu WP-70, FIII in Dithanu M-70. Povečana površinska napetost v vodovodni vodi je bila ugotovljena pri Wuxal Super in Dithane M-70 + Confidor + FIII. Zanemarljive razlike pri površinski napetosti so bile ugotovljene tudi pri meritvah neposredno po mešanju in po 20 urah.

ABSTRACT

Surface tension of spray liquids (fungicides, insecticides and mineral fertilizers) depending on the components and water quality

Wettability is a property of pesticidal active liquids to form a thin but satisfactorily persistent layer on the surface of treated plant parts. Wettability level determines the surface tension of active liquids. The objective of this study was to determine and compare surface tensions of fungicides (Antracol WP-70 and Dithane M-70), insecticides (Actellic-50 and Confidor 200-SL), mineral nutrients (Ferticare I, Ferticare II, Ferticare III /FI, FII and FIII, respectively/ and Wuxal Super) and their mixtures (two and three components) in waters differing in quality (tap water and well water). Physicochemical properties of mixtures of insecticides and fungicides, and of their mixtures with mineral nutrients, are the basis for the estimation of compatibility, not disregarding a possibility that compatibility may also be affected by water quality. Comparative values of surface tension for mixtures and their components may be useful in estimating the physicochemical compatibility of mixtures.
Surface tension is determined by means of a tensiometer (Lecomte du Nouy), immediately after mixing and after a resting period of 24 hours (at 20°C). Measurements were replicated three times. Surface tension was expressed in mJ/m^2, with the accuracy of 0.1 mJ/m^2.
The surface tension of tap water was 69 mJ/m^2 both after mixing and after 24 hours. The surface tension of the well water was 68 mJ/m^2 after mixing and 70 mJ/m^2 after 24 hours. Considered on the whole for all components and mixtures, the surface tension was reduced in relation to pure water, ranging from 30.5 to 61 mJ/ m^2. In relation to the controls than included the tap and well waters, surface tension was notably reduced, regardless of water quality, in the mixtures that had Actellic-50 as a component. The reduction was about 40 mJ/m^2, which is understandable considering the formulation of that preparation (EC). The reductions of surface tension in the other variants were around 20 mJ/m^2, which again can be attributed to the formulations of the preparations. Reduced wettability can be effectively corrected by adding certain surface-active agents.
Differences were observed in surface tension due to water quality. Increased tension in the well water was registered for Antracol WP-70, FIII and Dithane M-70. Increased tension in the tap water was registered for Wuxal Super and Dithane M-70 + Confidor + FIII. Negligible differences in surface tension were also observed between the measurements done right after mixing and 20 hours later.

Smrtnost *Myzus persicae* Sulz. v odvisnosti od komponent škropiv

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Za prakso mešanja različnih vrst fitofarmacevtskih sredstev (insekticidov, fungicidov) z rudninskimi gnojili je pomembno predhodno preverjanje fizikalno-kemičnih lastnosti in biotičnih učinkov teh mešanic. Nujno potrebno je preučiti specifične lastnosti komponent mešanic (formulacijo, kompatibilnost ali inkompatibilnost), agroekološke razmere, mesto aplikacije in učinek komponent na pridelek in kakovost kmetijskih pridelkov. Prejšnje izkušnje nakazujejo, da fitofarmacevtska sredstva in rudninska gnojila niso vedno

kompatibilna, ali so le delno kompatibilna, zato je treba preveriti njihovo fizikalno-kemično in biotično kompatibilnost. Namen te raziskave je bil oceniti insekticidne učinke pripravka Actellic-50 ob aplikaciji samega in v mešanici dveh ali treh komponent s fungicidom Antracol WP-70 in rudninskim gnojilom Ferticare I (FI), upoštevajoč kakovost vode iz vodovoda ali vodnjakov.
Poskusi so bili opravljeni v laboratorijskih razmerah. Testni organizem je bila zelena breskova uš (*Myzus persicae* Sulz.) na rastlinah paprike. V poskus sta bila vključena III. in IV. stadij ličink, ne manj kot 25 osebkov na replikacijo. Osebke so potopili v čisto raztopino insekticida in njegovih mešanic. Actellic-50 so nastavili v običajno uporabljani in nižjih koncentracijah (0,1, 0,05, 0,025, 0,005 %) Antracol WP-70 v koncentraciji 0,25 % in gnojilo FI v koncentraciji 1 %. Vsi poskusi so bili opravljeni pri 22-25 ^{0}C, pri relativni zračni vlažnosti 41-55 % in pri dnevno/nočnem režimu 16/8 ur ob štirikratni replikaciji. Smrtnost ličink so ugotavljali po 0,5, 1, 2, 2,5, 3, 3,5, 4, 5, 6, 12, 24 in 36 urah po tretiranju. Kriterij za smrtnost so bili mrtvi osebki. Insekticidni učinek so ugotavljal s stopnjo smrtnosti uši.
Običajno uporabljana koncentracija Actellic-50 in dvokomponentna mešanica (Actellic-50 + Antracol WP 70) sta pokazali rahlo povečano smrtnost po 2,5 urah (78-85 %) in 100 % smrtnost po 6 urah po tretiranju, neodvisno od kakovosti vode.
Mešanica Actellic-50 + FI se je obnašala podobno kakor mešanica (Actellic-50 + Antracol WP 70) po 2,5 urah po tretiranju, z doseženo začetno smrtnostjo 77-82 %. Po 24 urah pa je smrtnost dosegla 94-97 %.
Pri aplikaciji trikomponentne mešanice (Actellic-50 + Antracol WP-70 + FI) je bil začetni insekticidni učinek po 2,5 urah le 23-27 % v vodovodni vodi in 43-48 % v vodi iz vodnjakov. To so bila signifikantna zmanjšanja glede na sam insekticid ali na dvokomponentni mešanici. Šest ur po tretiranju je stopnja smrtnosti nihala med 69 in 76 %, ne glede na vir vode, 24 ur po tretiranju je nihala med 80 in 87 %. Na podlagi gornjih podatkov lahko sklepamo, da so spremembe v biotičnih učinkih, ki se kažejo v nižjih ali višjih stopnjah smrtnosti, očitno posledica biotične inkompatibilnosti komponent Actellic-50 in Ferticare I, posebno v trikomponentni mešanici, kjer se inkompatibilnost lahko intenzivira z razlikami v kakovosti vode.

Mortality of *Myzus persicae* depending on the components of spray liquids

ABSTRACT

The practice to mix different kinds of pesticides (insecticides, fungicides) with mineral nutrients calls for a preliminary check of physicochemical properties and biological effects of these mixtures. It is necessary to be thoroughly acquainted with specific properties of mixture components (formulation, compatibility or incompatibility), agroecological conditions of application site and the effect of the components on the yield and quality of agricultural products. Previous experiences indicate that pesticides and mineral nutrients are not always compatible, or that they are partially compatible, therefore, it is necessary to check their physicochemical and biological compatibility. The objective of this study was to assess the insecticidal effect of the preparation Actellic-50 applied alone and in two- and three-component mixtures with the fungicide Antracol WP-70 and the mineral nutrient Ferticare I (FI), taking into account the quality of water used in the mixtures (tap and well water).
Tests were conducted under laboratory conditions. The test organism was the green peach aphid (*Myzus persicae*) cultured on pepper plants. The tests included III and IV stage larvae, not less than 25 individuals per replication. The insects were immersed in active liquids of the insecticide and its mixtures. Actellic-50 was applied in the conventionally used and lower concentrations (0.1, 0.05, 0.025, 0.005%), Antracol WP-70

in the concentration of 0.25%, and the nutrient FI in the concentration of 1%. All tests were performed at the temperatures of 22-25°C, relative air humidity 41-55% and the day/night regime 16/8 hours, replicated four times. Larval mortality rate was estimated 0.5, 1, 2, 2.5, 3, 3.5, 4, 5, 6, 12, 24 and 36 hours after treatment. Dead individuals were the criterion for mortality. Insecticidal effect was determined via the mortality rate of aphids.
The conventionally used concentration of Actellic-50 and the two-component mixture (Actellic-50 + Antracol WP-70) caused a slightly increased mortality rate 2.5 hours after treatment (78-85%) and 100% mortality 6 hours after treatment, irrespective of water quality.
The mixture Actellic-50 + FI performed similarly to the mixture Actellic-50+ Antracol WP-70 2.5 hours after treatment, achieving the initial mortality rate of 77-82%. However, 24 hours after treatment, the mortality rate ranged from 94 to 97%.
The application of the three-component mixture (Actellic-50+ Antracol WP-70+FI) lowered the initial insecticidal effect 2.5 hours after treatment to 23-27% in the case of the tap water and 43-48% in the case of the well water. Those were significant reductions in relation to the performance of insecticide alone and the two-component mixtures. Six hours after treatment, the mortality rate varied from 69 to 76%, regardless of the source of water, 24 hours after treatment it varied from 80 to 87%. It may be stated on the basis of the above that the changes in biological effect demonstrated through the slower and lower mortality rates are obviously due to the biological incompatibility of the component (Actellic-50 and Ferticare I), especially in the three-component mixture where the incompatibility may be intensified by differences in water quality.

Učinkovitost desetih razkužil proti bakteriji *Erwinia amylovora*

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Bakterija *Erwinia amylovora* povzroča bolezen hrušev ožig na jablanah, hruškah in nekaterih okrasnih rastlinah iz družine *Rosaceae* ter posledično obsežno gospodarsko škodo v sadjarstvu in drevesničarstvu. Eden od načinov prenosa bakterije v sadovnjakih je prenos z orodjem. Za zmanjšanje možnosti prenosa bakterij z okuženih na zdrave rastline je priporočljivo razkuževanje orodja med delom na posameznih drevesih. V okviru naloge smo določili *in vitro* učinkovitost desetih razkužil proti bakteriji *E. amylovora*. Bakterijsko suspenzijo smo zmešali z razkužilom, pustili delovati eno minuto pri sobni temperaturi, nato pa določili preživetje bakterije *E. amylovora* s štetjem poraslih kolonij na agarnih ploščah. Na podlagi analize smo razdeli razkužila v tri skupine glede na učinkovitost: učinkovita (0,4% natrijev hipoklorit, Menno florades in Persan), srednje učinkovita (Virkon, Spitaderm, Virucidal extra in Perasafe) in slabo učinkovita (70% etanol, Incidin in Sterillium).

ABSTRACT

Efficiency of ten disinfectants against bacteria *Erwinia amylovora*

Erwinia amylovora is the causative agent of fire blight on apple and pear trees and on many ornamental plants from family *Rosaceae*. It causes substantial economic loses in orchards and nurseries. Infection can be transmitted from infected to healthy plants by

tools, however this could be prevented by the disinfection of the tools. In order to determine the most effective disinfectant *in vitro*, we have tested ten disinfectants for the efficiency against *E. amylovora.* Bacterial suspension was mixed with disinfectants and incubated for one minute at room temperature. Survival was determined by plate count of CFU. Based on survival of *E. amylovora* the disinfectants were classified into three efficiency groups: highly effective (0,4 % sodium hypochlorite, Menno florades, Persan), moderately effective (Virkon, Spitaderm, Virucidal extra, Perasafe), and weakly effective (70% ethanol, Incidin, Sterillium).

Učinkovitost nekaterih razkužil proti bakterijski uvelosti pelargonij (*Xanthomonas campestris* pv. *pelargonii*)

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Bakterijska uvelost, ki jo povzroča bakterija *Xanthomonas campestris* pv. *pelargonii*, je najbolj nevarna bolezen rastlin iz rodov *Pelargonium* in *Geranium*. Najpogostejši način prenosa bakterije je rezanje potaknjencev z okuženih matičnih rastlin. Varstvo proti bolezni je mogoče le s preventivnimi ukrepi, kot je razkuževanje orodja in opreme v rastlinjakih. V laboratorijskem poskusu smo preizkušali učinkovitost razkužil na nožih za rezanje potaknjencev: Virkon (1 in 5%), Na-hipoklorit (10%), Etanol (70 in 96%), Menno Florades (1 in 4%), v 6 časovnih intervalih (1 s, 10 s, 20 s, 40s, 1 min, 3 min). Učinkovitost je odvisna od koncentracije razkužila in časa razkuževanja. Najbolj učinkoviti v vseh obravnavanjih so bili 5 % Virkon, 10 % Na-hipoklorit, 4 % Menno Florades in 96 % Etanol.

ABSTRACT

Testing of efficacy of some disinfectants against *Xanthomonas campestris* pv. *pelargonii*

Bacterial leaf spot of pelargonium, caused by *Xanthomonas campestris* pv. *pelargonii*, is the most dangerous disease of the *Pelargonium* and *Geranium* genera. Infection is mainly performed during preparation of cuttings from infected mother plants. The disease can only be controlled through preventive measures, i.e. disinfection of tools and equipment in greenhouses. In a laboratory experiment we tested the efficacy of some disinfectants: Virkon (1 and 5%), sodium hypochlorite (10%), ethanol (70 and 96%) and Menno Florades (1 and 4%), for cutting knives in different time durations of disinfection (1 s, 10 s, 20 s, 40s, 1 min, 3 min). The efficacy depends upon concentration of disinfectant and time duration of disinfection. The most effective in all time durations were 5 % Virkon, 10 % sodium hypochlorite, 4 % Menno Florades and 96 % ethanol.

Eggplant mottled dwarf virus – nov virus na krompirju v Sloveniji

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V letu 2004 smo na več sortah krompirja opazili nenavadna in huda bolezenska znamenja. Rastline so bile pritlikave, listi močno zviti, gomolji pa maloštevilni in majhni. Iz rastlin z bolezenskimi znamenji smo na testnih rastlinah izolirali virus, ki smo ga z elektronsko mikroskopijo in serološko metodo DAS-ELISA identificirali kot Eggplant mottled dwarf rhabdovirus (EMDV). Virus je bil tokrat prvič najden na krompirju v Sloveniji. Poleg tega, da so okužene rastline praktično brez pridelka, so bolezenska znamenja zelo podobna bolezenskim znamenjem karantenskega virusa (Potato yellow dwarf rhabdovirus – PYDV). V prispevku bomo podrobneje predstavili bolezenska znamenja na rastlinah, okuženih z EMDV, primerjavo z bolezenskimi znamenji, ki jih povzroča PYDV in potencialni vpliv okužbe z EMDV na pridelek krompirja v Sloveniji.

ABSTRACT

Eggplant mottled dwarf virus - a new virus of potato in Slovenia

In 2004 unusual and severe virus-like symptoms were observed on several potato cultivars. Affected plants showed severe dwarfing, leaf curling and reduced leaf size; tubers were very small and few in number. Virus was isolated from symptomatic plants after mechanical inoculation of test plants. It was identified as Eggplant mottled dwarf rhabdovirus (EMDV) using transmission electron microscopy and DAS-ELISA. This was the first finding of EMDV in potato in Slovenia. Symptoms of EMDV infection in potato are similar to symptoms caused by quarantine Potato yellow dwarf rhabdovirus (PYDV). In our presentation we will talk about symptoms caused by EMDV, compare them with symptoms caused by PYDV and discuss potential economical effect of EMDV infection for potato production in Slovenia.

Vrste iz rodu *Phytophthora* na sadnem drevju v Sloveniji

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Vrste iz rodu *Phytophthora* so povzročiteljice številnih bolezni na sadnem drevju: trohnobe korenin in koreninskega vratu (t. i. gnilobe koreninskega vratu), rakastih razjed na deblu in vejah, sušenja vej, tudi sadne gnilobe. V prispevku poročamo o raziskavi diverzitete, ekologije in patogenosti vrst iz rodu *Phytophthora* na sadnem drevju v Sloveniji. Za detekcijo patogenov smo uporabili različne tehnike izolacije tako iz okuženih rastlin kot iz vab, za identifikacijo pa standardne mikroskopsko morfološke tehnike ter analizo molekularnih sekvenc predela ITS ribosomske DNK. Ugotovili smo, da je vrstna sestava rodu *Phytophthora* na sadnem drevju zelo pestra. Identificirali smo pet vrst, med temi štiri, ki so za Slovenijo nove: *P. citricola, P. citrophthora*, *P. taxon Pgchlamydo*, *P. cryptogea* ter vrsto *P. cactorum*, ki je pri nas že dolgo znana in je do sedaj veljala za edino

povzročiteljico gnilobe korenin in koreninskega vratu. V prispevku predstavljamo ekologijo in patogenost novo odkritih vrst in razpravljamo o njihovem pomenu za sadno drevje.

ABSTRACT

***Phytophthora* species infecting fruit trees in Slovenia**

Species of the genus *Phytophthora* are important pathogens of fruit trees. They cause root and collar rot, cankers on trunk and branches, crown dieback and fruit rot. Different *Phytophthora* species can cause similar symptoms. The aim of the present study was to identify prevailing *Phytophthora* species and to study their ecology and pathogenicity. Various isolation and detection techniques were used including baiting. Isolated strains were identified based on morphological characters observed with a light microscope and by sequence analysis of the internal transcribed spacer regions of the ribosomal gene cluster. Five species were identified: *P. cactorum*, *P. citricola, P. citrophthora*, *P. taxon Pgchlamydo* and *P. cryptogea*. *Phytophthora cactorum* is widely distributed and well known as the causative agent of root and collar rot of many fruit plants, while the other four species have not yet been reported from Slovenia. Ecology and pathogenicity of the encountered species is presented and their possible role in decline of fruit trees is discussed.

Nadzor fitoftorne sušice vejic (*Phytophthora ramorum*) v Sloveniji v letih 2005 in 2006

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Fitoftorna sušica vejic (*Phytophthora ramorum* Werres, de Cock & Man in 't Veld) ima širok krog gostiteljev med lesnatimi rastlinami. V Evropi povzroča škodo pri pridelovanju okrasnih rastlin in predstavlja grožnjo za gozdne sestoje. Nadzor fitoftorne sušice vejic poteka v Sloveniji od leta 2003 dalje, ko je bila tudi prvič ugotovljena na okrasnih rastlinah. V letih 2005 in 2006 so pregledniki v okrasnih in gozdnih drevesnicah, vrtnih centrih, parkih, vrtovih in v gozdovih opravili 308 pregledov in odvzeli za laboratorijsko analizo 275 vzorcev gostiteljskih rastlin z bolezenskimi znamenji. V letu 2005 je bilo odvzetih 140 vzorcev. Okužba s *P. ramorum* je bila ugotovljena pri 11 vzorcih v 5 vrtnih centrih. Bolezen se je v enem primeru pojavila na okrasnih brogovitah na Gorenjskem, v mejnem pasu, ki obdaja drevesnico, kar je bil prvi odkrit primer širjenja bolezni na rastline na stalnem rastišču. V letu 2006 je bilo med 135 pregledanimi vzorci pozitivnih 14 vzorcev iz 10 vrtnih centrov. V obeh letih so bile okužene rastline iz rodov *Rhododendron, Viburnum* in *Kalmia.* Okužene rastline v vrtnih centrih so bile sadike v vsebnikih in niso bile pridelane v Sloveniji. Analizirali smo tudi stoječo in tekočo vodo v dveh parkih, kjer so bile najdene okužene rastline, vendar v vodi nismo ugotovili vrste *P. ramorum*. V primerih pozitivnih najdb so fitosanitarni inšpektorji odredili ukrepe za izkoreninjenje bolezni. Rezultati nadzora fitoftorne sušice kažejo, da se bolezen doslej ni razširila na samonikle rastline.

ABSTRACT

Survey of *Phytophthora ramorum* in Slovenia in the years 2005-2005

Phytophthora ramorum Werres, de Cock & Man in 't Veld can infect a wide range of woody hosts. It has negative effects on the production of ornamental plants in Europe and it may pose a threat to forests. The survey of *P. ramorum* in Slovenia has been carried out since 2003. In the years 2005-2006 a total of 308 inspections were made in nurseries, garden centres, parks and forests and 275 samples of susceptible plants with the disease symptoms were taken for diagnosis. In 2005 11 samples out of 140 were positive and infected plants were found in 5 garden centres. There was an outbreak of disease on established, old ornamental Viburnum plants in the nursery buffer area in the Gorenjska region which was the first case of disease spreading in Slovenia. Among 135 plant samples analysed in 2006 14 samples infected with *P. ramorum* were found in 10 garden centres. The infected plants in garden centres were container grown, they belonged to the genera *Rhododendron, Viburnum* or *Kalmia* and they were not produced in Slovenia. Water in ponds and streams was monitored with baiting technique in two parks where infected plants had been found in the past but *P. ramorum* was not detected in water. Phytosanitary measures were taken at all infected sites to eradicate the disease. The results of the survey show that *P. ramorum* is not present on native plants in Slovenia yet.

Vrsta *Cylindrocarpon* sp. s širokimi, trikrat septiranimi makrokonidiji je najbližja sorodnica vrste *Cylindrocarpon macrodidymum*

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Korenine vinske trte kolonizirajo številne vrste iz rodu *Cylindrocarpon* (Fungi, Ascomycetes, Hypocreales, Nectriaceae, anamorf *Neonectria).* Vrsti *Cylindrocarpon liriodendri* (prej *Cyl. destructans*) in *Cyl. macrodidymum* sta povzročiteljici črne noge vinske trte. Nedavno smo iz vinske trte iz vinogradov v Sloveniji izolirali vrsto rodu *Cylindrocarpon* z 10 µm širokimi, ravnimi in večinoma trikrat septiranimi makrokonidiji. Ima klamidospore, nima pa mikrokonidijev. Po morfoloških značilnostih se razlikuje od vrst *Cyl. liriodendri* in *Cyl. macrodidymum*, podobna pa je vrstam *Cyl. austrodestructans* iz Nove Zelandije, *Cyl. theobromicola* iz Papue Nove Gvineje in v manjši meri tudi vrsti *Cyl. destructans* var. *crassum* iz Evrope. Nukleotidno zaporedje ITS regij 1, 2 in 5.8S ribosomske DNK ter dela gena za beta-tubulin smo uporabili za študij filogenetskih povezav. *Cylindrocarpon sp*. iz Slovenije je različna, vendar bližnje sorodna vrsti *Cyl. macrodidymum.* Obe spadata v kompleks *Cyl. destructans* (teleomorph *Neonectria radicicola*), ki vključuje tudi vrste *Cyl. liriodendri* (teleomorf *Neon. liriodendri*), *Cyl. destructans* var. *crassum* in *Cyl. austrodestructans,* medtem ko je vrsta *Cyl. theobromicola* le daljni sorodnik teh vrst. V prispevku predstavljamo nekatere morfološke aspekte in molekularno filogenijo obravnavanih vrst.

IZVLEČEK

A *Cylindrocarpon* species with wide, three septate macroconidia is the phylogenetic sister of *Cylindrocarpon macrodidymum*

Roots of *Vitis* sp. are frequently colonized by various species of *Cylindrocarpon* (Fungi, Ascomycetes, Hypocreales, Nectriaceae, anamorphic *Neonectria*). *Cylindrocarpon liriodendri* (formerly classified as *Cyl. destructans*) and *Cyl. macrodidymum* are known as

agents of a black foot disease of grapevines. Recently, a *Cylindrocarpon* species with up to 10 µm wide, straight and predominantly 3-septate macroconidia and with chlamydospores but without microconidia was isolated from *Vitis* sp. in Slovenian vineyards. It differed morphologically from *Cyl. liriodendri* and *Cyl. macrodidymum* but resembled *Cyl. austrodestructans* from New Zealand, *Cyl. theobromicola* from Papua New Guinea and, to a minor extend, *Cyl. destructans* var. *crassum* from Europe. DNA sequence data of the internal transcribed spacer regions 1 and 2 plus the 5.8S rDNA and the partial beta-tubulin gene were used for phylogenetic inferences. The *Cylindrocarpon* species from Slovenia is distinct from but very closely related to *Cyl. macrodidymum*. Both species are related to members of the *Cyl. destructans* (teleomorph *Neonectria radicicola*) species complex, which also includes *Cyl. liriodendri* (teleomorph *Neon. liriodendri*), *Cyl. destructans* var. *crassum* and *Cyl. austrodestructans* while *Cyl. theobromicola* is only distantly related to these *Cylindrocarpon* species. Some morphological aspects of the discussed *Cylindrocarpon* species and their molecular phylogeny are presented.

Rezultati večletnega proučevanja genskega materiala koruze na odpornost proti glivičnim boleznim ter možnosti njegove uporabe v žlahtnjenju rastlin

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Visok in kakovosten pridelek v kmetijstvu, ki je končni cilj žlahtnjenja rastlin, je v veliki meri odvisen tudi od genetske odpornosti/tolerantnosti požlahtnjenih kultivarjev na bolezni in škodljivce. Uspeh žlahtnjenja pa je najbolj odvisen od ustreznosti izhodnega materiala za žlahtnjenje ter poznavanje le-tega. Zato je sistematično proučevanje žlahtniteljskega materiala eden od ključnih elementov v dolgoročnih žlahtniteljskih programih. Ker je pojav določenega patogena močno odvisen od vremenskih razmer, je za proučevanje genetske odpornosti genotipa najustreznejše umetno okuževanje v naravnih razmerah. Z namenom proučitve odpornosti genskega materiala koruze ter njihovega vključevanja v žlahtnjenje koruze, na Biotehniški fakulteti v Ljubljani, že več let sistematično proučujemo odpornost domačega genskega materiala koruze iz genske banke. V poljskih razmerah z umetnim okuževanjem smo 82 linij in 80 populacij koruze testirali na odpornost na glivo *Fusarium subglutinans* ((Wollenw. & Reinking) P.E. Nelson, Toussoun & Marasas). Najodpornejše linije so med seboj križane z namenom ugotovitve kombinacijske sposobnosti ter vzgoje odpornih hibridov. Na odpornost na glivo *Exserohilum turcicum* ((Pass.) K.J. Leonard & Suggs) je bilo testiranih 108 linij in 128 populacij koruze. Iz potomstva križancev med odpornimi in občutljivimi linijami je bilo v nadaljnjih generacijah s samooplodnjo vzgojenih več odpornih družin z dobrimi ostalimi agronomskimi lastnostmi, ki bodo služile za nadaljnjo selekcijo in križanje.

ABSTRACT

The investigation of the tolerance of maize gene bank material to some fungus and the possibilities of its use in plant breeding

Quantity and quality of yield, also depending on genetic tolerance of genotype, is one of the main aims of plant breeders. But, the success of plant breeding depends on the breeders genetic material. Because of this, the systematic evaluation of germplasm is the

key factor in long term breeding programs. In the case of tolerance to plant diseases and pests, the artificial infection in yield conditions is the best way to evaluate of tolerance. Aiming to evaluate of the tolerance of maize germplasm, collected at Biotechnical Faculty, University of Ljubljana, in the recent years this material was systematic investigated. In field conditions, with artificial infected by fungus *Fusarium subglutinans* ((Wollenw. & Reinking) P.E. Nelson, Toussoun & Marasas) the 82 inbreds and 80 population, were investigated. The most tolerant inbreds were intercrossed to find out inbreds combining ability and to develop tolerant hybrids. Also, the tolerance of the 108 inbreds and 128 populations to fungus *Exserohilum turcicum* ((Pass.) K.J. Leonard & Suggs) were investigated. After the crossing the inbred, tolerant to NCLB, with another inbred, which was not tolerant, but having a good another agronomic traits, in the next generations some tolerant progenies with good agronomic traits, were developed. The investigation are still go on.

Preučevanje delovanja nekaterih fungicidov na glivo, ki povzroča rjavo žametno paradižnikovo pegavost [*Fulvia fulva* (Cooke) Cif.] *in vitro*

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Gliva, ki povzroča rjavo žametno paradižnikovo pegavost [*Fulvia fulva* (Cooke) Cif.] je na območju Slovenije splošno razširjena, zlasti na območjih, kjer pridelujejo paradižnik v zavarovanih prostorih. V nalogi smo preučevali delovanje nekaterih fungicidov na imenovano glivo *in vitro*. Gojili smo jo na trdnem PDA gojišču, ki smo mu dodali fungicide: diklofluanid (Euparen WP), baker (Kocide DF), difenkonazol (Score 250 DF), metiram (Polyram DF), mankozeb (Dithane M-45). Spremljali smo tudi rast micelija glive na gojišču brez fungicida. Inkubacija v komori pri 22°C in v temi je trajala 48 dni. Po izteku inkubacije smo izmerili končni prirast micelija. Vsi fungicidi, ki smo jih uporabili, so delovali na rast micelija glive in na kalitev spor. Najbolj sta rast zavirala difenkonazol in mankozeb, najslabše je rast micelija zaviral metiram.

ABSTRACT

Study on effect of some fungicides on [*Fulvia fulva* (Cooke) Cif.] *in vitro*

[*Fulvia fulva* (Cooke) Cif.], tomato leaf blight is a common disease of tomato in Slovenija, especially in areas, where it is grown in greenhouse conditions. In a laboratory experiment we investigated the impact of selected fungicides on the fungus *in vitro*. It was grown on the solid potato-dextrose-agar (PDA) with added fungicides: diclofluanid (Euparen WP), copper (Kocide DF), difenconazole (Score 250 DF), methiram (Polyram DF), mancozeb (Dithane M 45). The mycelial growth was also observed on the medium without a fungicide (a control treatment). Cultures were incubated in a growing chamber in the dark at 22°C. After 48 days the rate of the mycelial growth was determined. All tested fungicides inhibited mycelial growth and germination of conidia. Difenconazol and mancozeb were the most efficient and the least efficient was methiram.

Znotrajvrstna variabilnost fitopatogene glive *Monilinia laxa*

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Med pomembnejše bolezni jabolk sodijo glive iz rodu *Monilinia*, ki jih označujemo s skupnim terminom »glive rjave gnilobe«. Znotraj rodu so znane tri vrste, ki povzročajo gnilobo plodov, sušenje cvetov in poganjkov ter rakavost vejic pri rodovih *Prunus* (koščičarji) in *Malus* ter *Pyrus* (pečkarji), kar se odraža v precejšnji gospodarski škodi. To so *Monilinia laxa* Aderhold & Ruhland, *Monilinia fructigena* Honey in *Monilinia fructicola* (Wint.) Honey. Specializirana forma glive, *M. laxa* f. sp. *mali*, najdena samo na jablani, povzroča sušenje cvetov, odmiranje poganjkov in raka. O tem ali gre zares za specializirano formo ali samo za raso ni v literaturi zanesljivih podatkov. Obstajajo celo namigi, da bi lahko šlo celo za novo vrsto, *Monilinia mali*. *M. fructicola* je v Evropski skupnosti uvrščena med karantenske patogene organizme (Directive du conseil 77/93/CEE, 1976; OEPP, 1996), medtem ko ima *M. fructigena* isti status v ZDA (Code of Federal Regulation, 1996) in Avstraliji (Commonwealth Department of Health, 1984). V Avstraliji ima podoben status tudi *Monilinia laxa* f. sp. *mali*. Za naštete države je zanesljiva identifikacija teh patogenov izredno pomembna, kakor tudi za države, ki izvažajo svoje pridelke v te države. Omenjene vrste gliv iz rodu *Monilinia* so vrsto let ločevali na podlagi morfoloških in rastnih razlik. Nekateri morfološki kriteriji se pri posameznih vrstah med seboj prekrivajo, zato klasične metode niso dovolj zanesljive za rutinsko uporabo. Na PCR temelječe diagnostične metode so bile uporabljene predvsem za ločevanje vrste *M. fructicola* od drugih dveh vrst oziroma za ločevanje vrste *M. laxa* od vrste *M. fructicola*. V nekaterih primerih tudi te identifikacijske metode niso povsem zanesljive, zaradi variabilnosti znotraj vrst. Ena izmed novejših možnosti za ugotavljanje polimorfizma znotraj vrste je molekulska metoda AFLP (dolžinski polimorfizem amplificiranih fragmentov), s katero bomo poskušali odkriti in potrditi razlike med izolati glive *M. laxa* iz koščičarjev in pečkarjev. V delu bo predstavljena optimizacija AFLP metode za omenjeno vrsto glive.

ABSTRACT

Intraspecific variability in phytopathogenic fungus *Monilinia laxa*

Brown rot fungi are found in most temperate regions in which apples, pears and stone fruits are grown. They have often caused considerable losses and damage to fruit crops and to the trees themselves. The group includes three species: *Monilinia laxa* (Aderh. & Ruhl.) Honey, *Monilinia fructigena* (Aderh. & Ruhl.) Honey and *Monilinia fructicola* (Wint.) Honey. They cause brown rot of stone and pome fruits, which result in considerable economic losses. A special form of the fungus, *M. laxa* f. sp. *mali,* is found only in apple, where it causes blossom wilt, spur-kill and canker. It has not yet been clearly confirmed whether this is a special form of the fungus or merely a race. There are some hints that it could even be a new species, *Monilinia mali*. *M. fructicola* is a quarantine pathogen in the EU (Directive du conseil 77/93/CEE, 1976; OEPP, 1996) while *M. fructigena* has the same status in the USA (Code of Federal Regulation, 1996) and Australia (Commonwealth Department of Health, 1984). *Monilinia laxa* f. sp. *mali* has a similar status in Australia. It is thus important to have reliable methods for identifying the pathogen. Distinguishing

these fungus species from the genera *Monilinia* has been done for many years on the basis of morphological and cultural differences. Some of the morphological aspects are identical, so these methods are not reliable for routine work. PCR diagnostic methods have been mainly used for distinguishing between *M. fructicola* and the two other species and between *M. laxa* and *M. fructicola*, respectively. In some cases these methods are not reliable because of intraspecific variability. An alternative possibility for detecting intraspecific variability is AFLP (Amplified Restriction Length Polymorphism). AFLP method optimization for fungus *M. laxa* will be further presented.

Proteomska analiza glive *Verticillium albo-atrum*

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Hmeljeva uvelost, ki jo povzroča talna fitopatogena gliva *Verticillium albo-atrum*, predstavlja resno grožnjo pridelavi hmelja v Sloveniji. Gliva skozi korenine vdre v rastlino in se razmnožuje v prevajalnem tkivu, kar privede do motene ali povsem blokirane oskrbe z vodo. Glede na stopnjo virulentnosti ločimo blag in letalen patotip glive. Medtem ko je blaga oblika v Sloveniji zastopana od leta 1974 in ne povzroča večje gospodarske škode, pa je bila letalna oblika, ki rastline popolnoma uniči, odkrita leta 1997. Ker učinkovitih fitofarmacevtskih pripravkov za zatiranje glive in zdravljenje obolelih rastlin ni, so fitosanitarni in higienski ukrepi, prilagojen kolobar in gojenje odpornih sort edina učinkovita sredstva v boju proti bolezni. Da bi dobili širok vpogled v proces infekcije in identificirali proteine, ki pri tem sodelujejo, smo uporabili proteomski pristop, ki omogoča hkratno analizo celokupnih proteinov na poliakrilamidnem gelu v dveh dimenzijah. Rezultati primerjave celokupnih proteinov iz blage in letalne oblike bodo predstavljeni v nadaljevanju.

ABSTRACT

Proteomic analysis of the fungus *Verticillium albo-atrum*

Verticillium wilt caused by the soilborne phytopathogenic fungus *Verticillium albo-atrum* is a serious threat to hop production in Slovenia. The fungus invades the plant through its roots and colonizes the vascular tissue, which leads to a disrupted or entirely blocked water supply. Mild and lethal pathotypes are distinguished, depending on the level of virulence. The mild form has been present in Slovenia since 1974 and causes no considerable economic loss, while the lethal form was first discovered in 1997. Due to the lack of effective phytopharmaceutical agents, the only effective means of fighting the disease are phytosanitary and hygienic measures, crop rotation and planting resistant varieties. In order to get a wide insight into the infectious process and to identify proteins related to infection, we employed a proteomic approach, which allows simultanous analysis of total proteins on two-dimensional polyacrylamide gel. The results of comparison of total proteins between the mild and lethal forms will be presented.

Povezava med aplikacijo herbicidov in mineralnih gnojil pri sončnicah

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Varstvo pred pleveli ima pomembno vlogo pri gojenju sončnic. Rastline sončnic, stare od 4 do 6 tednov so namreč zelo občutljive na tekmovalnost plevelov. Kmetje herbicide navadno uporabljajo pred setvijo ali pred vznikom, za uporabo po vzniku pa na Madžarskem praktično nimajo registriranih herbicidov, ki bi jih lahko uporabljali pri gojenju sončnic. Talni herbicidi lahko neposredno vplivajo na vznik in fiziološke procese gojenih rastlin in plevelov. Te kemične snovi lahko spremenijo procese premeščanja hranil in tako posredno vplivajo na mineralno prehrano rastlin.
Cilj naše raziskave je bil preučiti vpliv različnih herbicidov za uporabo pred vznikom, na učinkovitost gnojenja z mineralnimi gnojili pri dveh hibridih sončnic v lončnem poskusu. Raziskava je potekala v rastlinjaku v štirih ponovitvah. Preučevali smo spremembe vsebnosti dušika, fosforja, kalija in kalcija na dveh hibridih sončnic, Itanol in Rigasol PR. Herbicidi, ki smo jih uporabili v najvišji predlagani koncentraciji, so bili Afalon Dispersion (linuron), Galigan 240 EC (oxyfluorfen), Pledge 50 WP (flumioxazin), Proponit 720 EC (propisochlor) in Stomp 330 (pendimethalin). Rastline so rasle štiri tedne. Nato smo stehtali maso svežih in posušenih rastlin in izmerili koncentracijo posameznih elementov, N-, P-, K- in Ca.
Ugotovili smo, da so mineralna gnojila povečala biomaso in vsebnost hranil v poganjkih v vsakem obravnavanju. Uporaba herbicidov je vplivala na zmanjšanje mase svežih in posušenih sončnic starih štiri tedne, a različno pri obeh hibridih. Hibrid Rigasol PR je bil bolj toleranten na herbicide kot hibrid Itanol. Herbicid Stomp 330 je najmočneje zaviral dvig hranil v sončnicah, medtem ko je herbicid Afalon Dispersal povečal koncentracijo N-, P-, K- in Ca- v poganjkih.

ABSTRACT

Relationship between herbicide application and mineral nutrition of sunflower

Weed control has a determining role in sunflower growing, because 4-6 weeks old plants are very sensitive to weed competition. Pre-sowing or pre-emergence technology are usually applied, we have hardly any licensed post-emergence herbicides in sunflower culture. Soil herbicides can influence directly the emergence and physiological processes of cultivated plants and weeds. These chemicals can also change processes of nutrient transformation, so can indirectly effect on mineral nutrition of plants.
The aim of our experiment was to study the effect of different pre-emergence herbicides on mineral nutrition of two sunflower hybrids in a pot experiment. Experiment was set up in greenhouse in four replications. We examined changes of nitrogen, phosphorus, potassium and calcium content of Itanol and Rigasol PR sunflower hybrids. The applied herbicides were Afalon Dispersion (linuron), Galigan 240 EC (oxyfluorfen), Pledge 50 WP (flumioxazin), Proponit 720 EC (propisochlor) and Stomp 330 (pendimethalin) with the highest field suggested doses. Plants were grown for four weeks. Thereafter fresh- and dry weights, as well as N-, P-, K- and Ca concentration of shoot samples were measured.

We established that fertilizers increased biomass and nutrient content of shoots in every treatment. Herbicides decreased fresh- and dry weight of four weeks age sunflower shoots in different extent, moreover influenced mineral nutrition of two hybrids unequally. Rigasol PR tolerated herbicides better, than Itanol. Stomp 330 hindered the nutrient uptake of sunflower to the greatest degree, while Afalon Dispersion enhanced N-, P-, K-concentration of shoots.

Zgodnja tekmovalnost med oljno ogrščico in njivskim slakom (*Convolvulus arvensis*) v aditivnih poskusih

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Pleveli lahko zelo uspešno tekmujejo z gojenimi rastlinami ter s tem povzročajo precejšnjo izgubo v kakovosti in količini pridelka. Večina raziskav o takšni tekmovalnosti temelji na aditivnih poskusih. V aditivnem poskusu dve rastlinski vrsti rasteta skupaj, gostota glavnega posevka ostaja nespremenjena, medtem ko se le-ta pri plevelih spreminja. V rastlinjaku smo preučevali vpliv različne gostote njivskega slaka na zgodnji razvoj oljne ogrščice. V vsaki posodi so bile štiri rastline oljne ogrščice, medtem ko je bila gostota njivskega slaka od 0 in 10 rastlin/posodo. Šestdeseti dan po nastavitvi poskusa smo izmerili prirast biomase (sveža masa in masa posušenih poganjkov) ter porabo hranil (dušika, fosforja in kalija) pri oljni ogrščici in njivskem slaku. Zaključili smo, da je bil v začetku rasti razvoj oljne ogrščice hitrejši od razvoja njivskega slaka in nismo opazili nobene znatne medvrstne tekmovalnosti. Znotrajvrstna tekmovalnost med sadikami njivskega slaka je naraščala, če se je povečevala gostota plevelov.

ABSTRACT

Early competition between oilseed rape and *Convolvulus arvensis* in additive experiments

Weeds can successfully compete with the cultivated plants, causing considerable reduction in crop quality and quantity. The majority of agricultural competition studies are based on the additive experiments. In the additive experiments two species are grown together, the density of the crop is maintained constant, while that of the weeds species is varied. We have investigated the effect of different weed densitiy of *Convolvulus arvensis* on the early development of oilseed rape under glasshouse conditions. There were four oilseed rape in a pot and the *C. arvensis* densitiy varied between 0 and 10 plants/pot. Sixty days after the beginning of the experiment the biomass production (fresh and dry weight of the shoots) and nutrient uptake (nitrogen, phosphorus, potassium) each of oilseed rape and *C. arvensis* were determined. It was concluded, that the development of the rape plants was faster, as compared to that of the *C. arvensis* seedlings at the beginning of the vegetation period, therefore no considerable interspecific competition between the rape an weed plants was observed. Intraspecific competition between the *C. arvensis* seedlings was stronger, as the weed density increased.

Vpliv abiotičnih dejavnikov na razvoj oljkovega kaparja (*Saissetia oleae* [Olivier])

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Oljkov kapar (*Saissetia oleae* [Olivier]) se je zadnja leta v Slovenski Istri prerazmnožil tako, da povzroča gospodarsko škodo. Njegova bionomija pri nas ni bila znana, zato smo se odločili, da raziščemo razvoj kaparja v povezavi z nekaterimi abiotskimi dejavniki (temperaturo zraka, količino padavin, relativno zračno vlago, sončnim obsevanjem ter kemičnimi sredstvi). Poskus smo izvajali leta 2003 v oljčniku, zasajenem leta 1989 na lokaciji Ankaran. Metoda dela temelji na: vzorčenju oljčnih vejic škropljenih in neškropljenih dreves sorte Leccino (junija in julija uporabljen Basudin 600 na osnovi diazinona, avgusta in septembra pa Perfekthion na osnovi dimetoata), opazovanju razmer na terenu in laboratorijskem pregledovanju vzorcev pod stereolupo, ter ugotavljanju števila osebkov in razvojnih faz kaparja. V preučevanem letu so bile zelo povišane povprečne mesečne temperature zraka, podaljšano je bilo trajanje sončnega obsevanja, v primerjavi z dolgoletnim povprečjem tudi manjša količina padavin. Kapar je bil v začetku aprila v stadiju L2, L3 in odraslih samic. Ovipozicija se je začela 21. aprila; 1. junija so se začele izlegati ličinke L1. Njihova smrtnost na kontroli je bila, zaradi zanje neugodnih vremenskih razmer, skoraj 90 %. Ličinke L2 in L3 so poleti vstopile v diapavzo. Prag škodljivosti je bil presežen 15. junija (6,7 žive ličinke na list) in 29. junija (7,1 živa ličinka na list). Uporabljena insekticida sta učinkovala dobro. Kapar je v letu 2003 razvil 1 rod.

ABSTRACT

Influence of abiotic factors on olive black scale (*Saissetia oleae* [Olivier]) development

In the last years, the olive black scale (*Saissetia oleae* [Olivier]) in Slovenian Istra propagated to such a degree to cause economic damage. Its biology was not known in our country; therefore, we decided to study its development related to some abiotic factors (air temperature, amount of precipitation, relative air humidity, solar irradiation, and pesticides). In 2003, olive trees planted near Ankaran in 1989 were tested. Working methods were based on: sampling of oleaginous branches from sprayed and non-sprayed Leccino trees (in June and July using Basudin 600 based on diazinon, in August and September using Perfekthion based on dimetoat), surveying conditions at the site, and sample checking under stereo-microscope in a laboratory; so as calculating the subjects and finding out their developing stages. At that very year the average month air temperatures were highly raised, solar irradiation prolonged, and the amount of precipitation reduced, compared to many years' average. In the beginning of April, the scales were in 1st larval stage, 2nd larval stage, and imagoes. Oviposition began on April 21; eggs hatched on June 1. Because of unfavourable weather conditions, the mortality rate of 1st larval stage on control trees was nearly 90 %. 2nd larval stage and 3rd larval stage entered into diapause in summer. Damage threshold was exceeded on June 15 (6.7 alive larvae per leaf) and June 29 (7.1 alive larvae per leaf). Insecticides' efficacy was nearly 100 %. In 2003, the black scale developed 1 generation.

Prostorska razporeditev in časovni izbruhi breskove muhe (*Ceratitis capitata* W., Diptera, Tephritidae) v Republiki Hrvaški

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Breskova muha (*Ceratitis capitata* W.) je škodljivka s čedalje večjim gospodarskim pomenom na Hrvaškem. Od njenega prvega pojava pred več kot petdesetimi leti, se je ta škodljivka razširila po celem območju Dalmacije in Istre. V Dalmaciji so to kraji od Konavelj do Šibenika, vključno s sosednjimi otoki, kjer ta škodljivka povzroča pomembne škode na številnih gojenih in samoniklih sortah. Najbolj ogrožene sadne vrste so: smokve – *Ficus carica,* breskev - *Prunus persicae*, sliva oz. češplja – *Prunus domestica*, marelica – *Prunus armeniaca*, mandarinovec – *Citrus reticulata* in kaki – *Dyopirus lotus*. V Istri so škode, čeprav je škodljivka zastopana, manj pomembne. Izbruh, trajanje leta in obseg plenjenja so lahko zelo različni med letom v raznih krajih. Razen podnebnih razmer so ti znatno odvisni od števila gostiteljskih rastlin, na katerih se škodljivka lahko razmnožuje. Zato so prvi zbruhi v skrajni južni Dalmaciji že proti koncu julija, posebno v Župi dubrovački, v Dubrovniku ob morju in na območju Stona. V dolini Neretve, kjer se je breskova muha pojavila pred četrt stoletja, se v večjem obsegu pojavlja v septembru in oktobru, manj pa v novembru. Na območju Splita se začne muha pojavljati v začetku septembra, toda njen let lahko traja do konca decembra. Za ugotavljanje pojava, intenzivnosti napada in trajanje leta so bili izvdeni programi monitoringa skozi štiri leta z vabami Chromotrap-M z dodanim paraferomonom in vabami tipa Modified Liquidbaitor Trap s paraferomonom cerealure in insekticidom DDVP.

ABSTRACT

Spatial distribution and temporal outbreaks of medfly (*Ceratitis capitata* W., Diptera, Tephritidae) in Republic of Croatia

Medfly (*Ceratitis capitata* W.) is the pest of increasing economic importance in Croatia. Since the first appearance more than fifty years ago, this pest has been spread in almost the whole region of Dalmatia and in Istria. In Dalmatia it is area from Konavle to Šibenik neighbourhood including islands, where this pest causes important damages on fruits of numerous cultivated and wilde sorts. The most imperilled fruit sorts are: fig tree – *Ficus carica,* peach - *Prunus persicae*, plum – *Prunus domestica*, apricot – *Prunus armeniaca*, mandarine tree – *Citrus reticulata* and kaki – *Dyopirus lotus*. In Istria, although pest presence, the damages are of lower importance. Outbreak, fly duration and medfly capture ammount may be very different on particular areas through the years. Beside climatic conditions, it considerably depends on number of host plants on which this pest might be reproduced. Therefore, first outbreak takes place in the very south of Dalmatia already by the end of July, namely Župa dubrovačka, Dubrovnik seaside and area of Ston. In the Neretva valley, where medfly was introduced about twenty years ago, it's increased appearance is noted in September and October, less in November. In Split area medfly appears by the begining of September, but the flight may be continued even till the end of December. In the appearance, attack intensity and fly duration monitorring programme during four years, traps type Chromotrap-M with parapheromone trimedlure

added and traps type Modified Liquidbaitor Trap with parapheromone ceralure and insecticide DDVP added were used.

Status kaparjev (Coccoidea) iz družine Coccidae na vinski trti na Hrvaškem v letu 2006, s poudarkom na posebnosti drugega rodu vrst *Parthenolecanium corni (*Bouche*)* in *Parhenolecanium persicae* (Fabricius)

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Med monitoringom kaparjev (Coccoidea) na vinski trti v letu 2006 smo ugotovili množične izbruhe *Parthenolecanium corni* (Bouche), *Parthenolecanium persicae* (Fabricius), *Pulvinaria vitis* (Linnaeus) in *Neopulvinaria innumerabilis* Rathvon). *Neopulvinaria innumerabilis* je nova vrsta kaparjev na Hrvaškem.
P. corni in P. vitis sta zastopani v številnih vinogradih v celinskem delu Hrvaške. *P. corni* je zelo polifagna vrsta in njene izbruhe ugotavljajo v 10-11 letnih presledkih od 1880. *P. vitis* se šteje kot vrsta brez gospodarskega pomena. V nasprotju s tem pa je množični pojav v letu 2006 pokazal, da ima lahko prav precejšen gospodarski pomen. *P. corni, P. vitis* in *N. innumerabilis* lahko prenašajo viruse, kar povečuje njihov pomen. Množični izbruhi *P. persicae* so bili ugotovljeni v številnih vinogradih v Istri. *N. innumerabilis* so našli v Škodelinu, na meji s Slovenijo.
V nasprotji z mnenji v hrvaški strokovni literaturi, da imata *P. corni* in *P. persicae* na Hrvaškem le eno generacijo na leto, je bilo očitno da sta bili v letu 2006 dve generaciji. To je bilo razvidno iz našega zbranega materiala kaparjev v obdobju od maja do oktobra.

ABSTRACT

Status of scale insects (Coccoidea), family *Coccidae* on grapes in 2006. in Croatia with emphasis on rarity of second generation of *Parthenolecanium corni* (Bouche) and *Parthenolecanium persicae* (Fabricius)

During monitoring of Coccoidea on grapes in 2006. we noticed mass outbreaks of *Parthenolecanium corni* (Bouche), *Parthenolecanium persicae* (Fabricius), *Pulvinaria vitis* ((Linnaeus) and *Neopulvinaria innumerabilis* (Rathvon). *Neopulvinaria innumerabilis* is a new insect species in Croatia.
P. corni and *P. vitis* were present in many vineyards in continental part of Croatia. *P. corni* is very polyphagus species and massive outbreaks have been reported in 10-11 year intervals since 1880. *P. vitis* is considered as species of not economic importance. On the contrary, it's massive outbreak in 2006. showed that it can have pretty big economic importance. *P. corni, P. vitis* and *N. innumerabilis* can transmit viruses what increase their importance. Mass outbreak of *P. persicae* was in Istria in many vineyards. *N. innumerabilis* was found in vineyard in Škudelin, on the border with Slovenia.
On the opposite of Croatian literature which tells that *P.corni* and *P. persicae* have only 1 generation per year in our country, it was obvious that they had 2 generation in 2006. That was visible from our collected material (scales) in the period from May to October.

Ceroplastes japonicus (Green) (Hemiptera: Coccoidea: Coccidae) - nov škodljivec na Hrvaškem in njegova razširjenost

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Ceroplastes japonicus (Green) je nova žuželčja vrsta na Hrvaškem. Prvič je bila ugotovljena leta 2006 v Novigradu v Istri na *Laurus nobilis.* Pozneje so jo našli v številnih krajih v Istri (Bašanija, Buje, Kaštel, Škudelin, Poreč, Brtonigla, Savudrija in Opatija) na več različnih gostiteljih. Med monitoringom v letu 2006 je bil torej ugotovljen množičen izbruh le v Istri in vzdolž jadranske obale (od otoka Paga do Dubrovnika, vključno z otokoma Brač in Šolta). Ta vrsta pa je znana na Hrvaškem že dolgo časa.
Na postru bo prikazan kratek opis vrste, sedanja razprostranjenost *C. japonicus in C. rusci* na Hrvaškem in njuni gostitelji.

ABSTRACT

Ceroplastes japonicus (Green) (Hemiptera: Coccoidea: Coccidae) as new pest in Croatia and its distribution

Ceroplastes japonicus (Green) is a new insect species in Croatia. It was first time recorded in 2006. in Novigrad in Istria on *Laurus nobilis*. Later was found on many places in Istria (Bašanija, Buje, Kaštel, Škudelin, Poreč, Brtonigla, Savudrija and Opatija) and on many different hosts. We noticed mass appear of *C. japonicus* in 2006. During monitoring in 2006. this species was found only in Istria even along the Adriatic coast (from island Pag to Dubrovnik, including island Brač and Šolta) we recorded mass outbreak of species *Ceroplastes rusci* which is present in Croatia for a long time.
The poster will present short description of species, current distribution of *C .japonicus* and *C.risci* in Croatia and range of its hosts.

Netipični škodljivci na vrtninah v Istri

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Spremembe v načinu pridelave vrtnin na Hrvaškem, tj. uvajanje intenzivnega gojenja vrtnin v monokulturi, imajo za posledico velike spremembe v sestavi favne na proizvodnih

površinah. Spreminja se dinamika populacije posameznih vrst, pri čemer so se nekatere manj znane vrste začele pojavljati v velikem in škodljivem obsegu, zato so težave z njihovim zatiranjem. Ker gre za vrste, katerih bionomija je v ekoloških razmerah Hrvaške manj znana, je treba izpeljati njihovo identifikacijo in ugotoviti pogoje za njihov razvoj. Tako bi lahko pravočasno predvideli njihovo pojavljanje, našli racionalno rešitev za zatiranje in s tem, kolikor je mogoče zmanjšali škodljivost njihovega napada. Južna plodovrtka (*Helicoverpa armigera* Hübner) je bila najdena v letih 2003 in 2004 na zahodu Istre. Na vrtnarskih površinah se je pojavila množično. S spremljanjem ličink na paradižniku in papriki sta bila ugotovljena mesto napada in obseg poškodb. Poškodbe na paradižniku in papriki so bili ugotovljene v okolici Poreča in Rovinja leta 2003, medtem ko so bile poškodbe na paradižniku opažene v dolini reke Mirne v letih 2003 in 2004. Pridelek se je zaradi poškodb na plodovih paradižnika v letu 2003 v Poreču zmanjšal od 33 do 37 %. V dolini reke Mirne je bil pridelek v letu 2003 manjši za 42 %, v letu 2004 pa za 13 %. Ličinke na paradižniku so bile velike od 15 do 40 mm, ličinke na papriki pa do 30 mm. V letu 2004 je bil ugotovljen tudi množični pojav stenice *Beosus maritimus* na rastlinskih ostankih kapusnic. Čeprav ta stenica ne povzroča poškodb na kapusnicah, ker se prehranjuje z neživo organsko snovjo, je povzročila preplah med prebivalci Vrsarja. Na glavni cesti med Vrsarjem in Limskim kanalom je bilo cestišče zaradi odmrlih žuželk spolzko, širil pa se je tudi neprijeten vonj.

ABSTRACT

Non-typical pests on vegetables in Istria

Changes in vegetable production systems in Croatia, respectively introducing intensive monoculture growth has a consequence of big change on fauna in production areas. Population dynamics of each species is changing, and some less known species are starting to show up through strong pest like populations which are creating a problem for treatments. As it refers to species which bionomy Croatia ecological areas are less known, it is necessary to identify them and determine circumstances for their development in order to predict their show up and in rational ways prevent them from creating damage to the least possible measure. The species *Helicoverpa armigera* Hübner, cotton bollworm was determined in 2003 and 2004 on west Istria on vegetable plots in a massive population. By monitoring the larvaes on tomato and sweet pepper we estimated the place and share of damaged fruits. Damaged fruits of tomato and sweet pepper were noticed in the surroundings of Poreč and Rovinj in 2003, while damages on tomatoes were noticed in river Mirna valley in 2003 and 2004. The mean loss of yield due to damage on the tomato fruits in 2003 in Poreč was between 33% and 37%. In river Mirna valley, this loss was 42% (2003) and 13% (2004). The most of larvaes on tomatoes were 15 to 40 mm long, while on sweet pepper they were 30 mm long. Also in 2004 we determined the appearance of *Beosus maritimus* (two-spotted ground bug) on cabbage leftovers. Also this bug usually causes no damage on cabbage because it is feeding on dead organic matter; therefore its appearance caused panic among inhabitants in Vrsar. On the road Vrsar-Limski canal hordes of bugs were crossing the road and creating a slippery ands smelly mass.

Agronomski in gospodarski vidiki občutljivosti oljk na oljčno muho (*Bactrocera oleae*)

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Oljka je ob vinski trti najpomembnejša trajna kultura v hrvaški Istri. Ocenjuje se, da je bilo v letu 2006 na tem območju 750.000 oljčnih dreves, kar predstavlja 18,75 % oljčnih nasadov v Republiki Hrvaški. Oljčna muha (*Bactrocera oleae* GMEL.), ki sodi med najvažnejše škodljivce na oljki, povzroča poškodbe na plodovih v odvisnosti od sezone in kultivarja. Posledice poškodb, ki jih povzročajo ličinke oljčne muhe na plodovih namiznih kultivarjev, se kažejo v tem, da te olive niso primerne za predelavo. Medtem ko ima olje iz oljčnih kultivarjev slabšo kakovost. Slabša kvaliteta plodov in olja pa se odraža tudi v gospodarski škodi, ki jo utrpi proizvajalec. V letu 2006 smo v nekaterih oljčnih nasadih v Istri vzorčili 100 naključno izbranih plodov in spremljali stopnjo napadenosti plodov z ličinkami oljčne muhe. Plodove smo pobirali med 26. oktobrom in 10 novembrom na šestih lokacijah (Rovinj, Vodnjan, Kaštelir, Poreč in dve v Livadi). V opazovanje je bilo vključenih 10 kultivarjev (Rosigniola, Buža, Ascolana, Leccino, Carbonazza, Pendolino, Frantoio, Bjelica, Črnica in Picholine), od katerih je bilo polovica tretiranih z insekticidom, druga polovica pa ne. V netretiranih nasadih je imel največji odstotek napadenih plodov cv. Buža v Rovinju (91 %), medtem ko so bili najmanj napadeni plodovi cv. Pendolino v Kašteliru in plodovi cv. Črnica v Livadah (1 %). Na tretiranih olivah je imel največji odstotek napadenih plodov cv. Leccino v Poreču (21 %), medtem ko so cv. Pendolino v Poreča in Leccino v Livadah imali le 1% napadenih plodov.

ABSTRACT

Agricultural and economic aspects of sensitivity of olive tree to olive fruit fly (*Bactrocera oleae*)

Olive's beside vine grapes are the most important long term agricultural culture in Istra, Croatia. In 2006. it was estimated that 750.000 olive trees, a share of 18,78% in total number in Croatia. The olive tree fly *Bactrocera oleae* Gmel. is one of the most important pest on olive's in general, which is depending from year to year makes minor or larger damages on olives. The damaged olives for table use (fresh olive's) are not suitable for consummation, while in olive's for oil production, the olives contained with olive's larvae are lower in quality and affect the oil quality. In 2006. we researched the contamination of olives with olive tree fly on randomly picked 100 olives. Olives were taken in mature state of technological ripeness, from 26. October till 10. November on six localities (Rovinj, Vodnjan, Kaštelir, Poreč, and two locations near Livade). We examined ten cultivars (Rosigniola, Buža, Ascolana, Leccino, Carbonazza, Pendolino, Frantoio, Bjelica, Črnica and Picholine). We used two types of protection against olive oil fly, with and without chemicals. On untreated olives the most damage was spotted on cv. Buža from Rovinj, while the least damage was on cv. Pendolino from Kaštelir and cv. Črnica from Livade (with 1% of damaged olives). On treated olives the highest percentage of damage had cv. Leccino from Poreč (21% damaged olives) while cv. Pendolino from Poreč and Leccino from Livade had only 1% of damage.

Predpisi s področja certificiranja naprav za nanašanje fitofarmacevtskih sredstev

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Certificiranje in testiranje naprav za nanašanje fitofarmacevtskih sredstev je temeljno načelo poslovnega sodelovanja na reguliranem področju države, ki je urejeno z zakonom in posebnimi tehničnimi pravilniki. Postopek certificiranja opravlja tretja stranka in s tem zagotavlja, da natančno določen izdelek ustreza določenemu zakonskemu predpisu.

ABSTRACT

Regulations on certification of machines used for the application of phytopharmaceutical products

The certification of machines used for the application of phytopharmaceutical products is a basic principle in the business cooperation in the regulated area of the state which is managed by laws and special technical regulations. Certification is carried out by the third party which thereby asserts that a defined product is in compliance with the requirements of the legal document.

Reguliranje novih škodljivih organizmov rastlin

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V Sloveniji je od 1. maja 2004 v veljavi sistem varstva pred organizmi, ki so škodljivi rastlinam in rastlinskim proizvodom, in njihovega obvladovanja. Sistem je identičen za vse države članice Evropske unije (EU). Temeljne predpisane zahteve daje Direktiva Sveta 2000/29/ES, ki ima značaj zakona, in več podzakonskih uredb, smernic in odločb. Direktiva Sveta 2000/29/ES temelji na načelih Mednarodne konvencije o varstvu rastlin (IPPC) in WTO-SPS (sanitarno-fitosanitarnega) sporazuma. Organizme, ki so znani kot zelo škodljivi rastlinam, razvršča v priloge. Prilogi I in II vsebujeta škodljive organizme, ki so prepovedani v EU, bodisi sami kot taki bodisi če so na določenih rastlinah ali rastlinskih proizvodih. Vse uradne ukrepe izvajamo za škodljive organizme, uvrščene v priloge, ali pa kot nujne ukrepe za eradikacijo. Navkljub ukrepom za preprečevanje vnosa in širjenja organizmov, škodljivih za rastline in rastlinske proizvode, v EU redno najdemo bodisi nove škodljive organizme, ki še niso na seznamih iz prilog, bodisi organizme s seznamov na območjih, kjer prej njihov pojav ni bil znan. EU je razvila postopke obveščanja, ocene tveganja in upravljanja novih škodljivih organizmov, ki bodo predstavljeni v prispevku, vključno z ustrezmi primeri za Slovenijo.

ABSTRACT

Regulation of new organisms harmful to plants

Since 1 May 2004 Slovenia has been putting in place a system for protecting against and controlling the spread of organisms harmful to plants and plant products, which is identical for all member states of the European Union (EU). Basic legislative provisions are given by Council Directive 2000/29/EC which has a level of the law and with several sub-law regulations, directives and decisions. Directive 2000/29/EC is based on the principles accepted internationally in the International Plant Protection Convention (IPPC) and the WTO SPS (sanitary and phytosanitary measures) agreement. Directive 2000/29/EC lists organisms, recognized as very harmful to plants, in the annexes. Annexes I and II list the harmful organisms banned in the EU, either altogether or when they are on certain plants or plant products. All official measures relate to listed organisms or organisms under emergency eradication measures. Despite protective measures against the introduction into the EU of organisms harmful to plants or plant products and against their spread within the EU, either new harmful organisms, which are not listed, are found regularly or listed organisms are found at territories, where were previously not known to occur. The EU developed procedures for notification, risk assessment and management of new harmful organisms, which will be presented, including the most relevant examples for Slovenia.

KAZALO AVTORJEV