

Best Practice in Disease, Pest and Weed Management



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Enhancement of biopreparation activity for plant protection

Shternshis Margarita¹, Gouli Vladimir²

¹Novosibirsk State Agrarian University, Russia

²University of Vermont, USA

The merits of biological preparations for plant protection are well known. Nevertheless, the use of biopreparations for protection of agricultural crops is not as widespread as desirable. Some explanations of this situation include narrow spectrum of host pest, more variable efficacy and field stability than chemicals and some others. Therefore, the aim of this paper to show the possibilities of the enhancement of biopreparations activity for crop protection. To overcome the narrow spectrum of activity of some biopreparations, especially viral ones, mixture with other biological agents is useful. We used the mixture of nucleopolyhedrovirus - based preparation and *Bt*-formulation against complex of Lepidopteran pest insects for cabbage protection. In addition, chitinase was applied in order to activate penetration of biological agents into host targets. Such triple mixture provided complete protection of cabbage against Lepidopteran insects. In some cases, preparations based on microbial metabolites could be a good alternative to synthetic pesticides. Their application allows to avoid some negative environmental factors and to achieve quick effect concerning plant protection. The results of control of several pests with preparation based on natural aversectin complex for vegetable and soft fruit protection in field and greenhouse were described. Possibilities of dual properties of such preparation for insect and disease control were discussed.

New strains of *Streptomyces* as producers of biofungicides and biological stimulators for protection of the shoots and seedlings of Tiang-Shang Fir (*Picea schrenkiana*).

Doolotkeldieva Tinatin¹, Totubaeva Nurzat²

¹Kyrgyz-Turkish International University, 56,Prospect Mira,720044, Bishkek, Kyrgyz Republic

²State Forestry Service of Kyrgyz Republic 228, Toktogyla street,

The Tiang -Shang fir -tree (*Picea schrenkiana*) is the basic forest forming breed of the winter green forest of Kyrgyzstan. The forest restoration process through natural ways is usually very long and weak in all fir natural habitats. Therefore, there was a necessity to create artificial plantings of fir-trees in the nursery forests and further to transplant them to natural habitats. The major factors limiting the germination and the safety of shoots of the fir -tree in the mountain climatic conditions are fungus diseases, caused by phytopathogenic micromycete. The purpose of the present work is enhance the earth germination, safety and growth stimulation of shoots of fir -trees by the use of active metabolites of *Streptomyces*, as the alternative means of the chemical fungicides. In order to select of active *Streptomyces* strains, inhibiting the growth of phytopathogenic fungus the laboratory and field tests have been carried out. The following species of phytopathogenic fungus causing damage to the forestations and nursery forests were used as tests - objects: *Fusarium* and *Alternaria spp.*, *Hypodermella sulsigena* Tub, *Sclerotinia graminearum* Elen. and *Lophodermium* рinastri .

Following our researches for every phytopathogenic has been selected an active strain *Streptomyces* effectively limiting its growth. The optimum concentration of liquidating effect of active metabolites of *Streptomyces* on phytopathogenic fungi was established. Also, the optimum concentration of the growth - stimulating effect of active compounds of *Streptomyces* on the growth of seeds of fir-trees was determined. *S. griseogromogenes* 2ч-8 and *S. rubrogriseus* ТК2-5 have shown a wide spectrum of the antibiotic activity, which effectively suppressed the growth of all species of pathogenic organisms. *S. bambergiensis* К1-3 strain has shown a strong antibiotic action on the growth of *Alternaria spp.*

Biological control of *Fusarium fujikuroi*, the causal agent of bakanae disease by antagonistic bacteria

Mostafa Niknejad Kazempour¹

¹Dept. Plant Pathology, Fac. Agriculture, Guilan University, P.O.Box. 41635-1314, Rasht- IRAN

In this research, effect of some isolates antagonistic bacteria were investigated against *Fusarium fujikuroi* the causal agent of bakanae disease and foot rot of rice, collected from infection farming in Rasht, Lahijan, Foman, Anzaly, Talesh and Astara in the Guilan Province under greenhouse conditions. Two hundred thirty eight bacterial isolates, separated from the rhizosphere and seeds of rice infected by the fungus which mentioned above and antagonistic ability of 13 isolates of these bacteria (8 gram negative and 5 gram positive) were demonstrated by using the dual culture method. According to the results of biochemical and morphological and PCR trials, 8 isolates: F1, F6, F12, F15, F16, F18, F21 and F25 were identified as *Pseudomonas fluorescens*. Five isolates, F14, F19, F21, F32 and F35 were introduced as *Bacillus cereus*. In greenhouse conditions antagonistic isolates were used by seed, plant and soil treatment. Statistical analysis of data indicated that there existed significant differences between seed, plant and soil treatments. The isolate F15 in seed, plant and soil treatment was most effective and disease incidence by 8.5, 8.5 and 12 % respectively. While the isolates F6 was

least effective on *F. fujikuroi*. All of the isolates in seed treatments are more effective compared to other treatments. The results of used the mixed Rovral TS. fungicide with mixed antagonistics isolates showed that there existed significant disease incidence by 6.5, 6.75 and 8 % respectively. In the field conditions foliar spray of isolate F15 mixed with Rovral TS (52.5% WP) were applied. The disease incidence in F15 isolate for seed coating, soil drenching and seed coating + foliar spray were 6.5, 6.75 and 5.5 % respectively, while the control plants showed 28% disease incidence. These results suggest that the *P. fluorescens* and *B.cereus* isolates studied have an excellent potential to be used as biocontrol agents of *F. fujikuroi* in rice at the field conditions.

Keywords : bakanae disease, rice, *Fusarium fujikuroi*, antagonistics bacteria, biological control

INTEGRATED CONTROL STRATEGY OF APPLE SCAB ACCORDING TO WARNING EQUIPMENT

Raudonis, Laimutis¹

¹Lithuanian Institute of Horticulture, LT-54333 Babtai, Kaunas str., Kaunas distr., Lithuania

In the field trials two different apple scab control strategies were compared: i) the current strategy – conventional disease management (CDM) and ii) integrated disease management (IDM), according to scab infection periods. A new scab warning equipment METOS^R-D was used for detection of infection periods and forecast of disease intensity at three levels: light, moderate and severe. According to CDM apple-trees were sprayed 9 times a season. Scab warning equipment gave a possibility to optimize the use of fungicides against scab and to reduce the total spray applications per season in average till 6.3 in very susceptible cultivars and 5 in moderately susceptible ones. This is 30 and 44% less spray applications comparing with CDM. Annual spray program ranged from 5 till 8 spray applications of very susceptible cultivars. CDM and IDM gave high scab control in apple-trees and there was not found any essential difference in scab incidence between two control strategies.

Evaluation of a mycoherbicide for the management of water hyacinth [*Eichhornia crassipes* (Mart.)Solms.]

Naseema A¹, Praveena R¹, Chithra B Nair¹

¹Dept.of plant pathology, College of Agriculture ,Vellyani 695522,Kerala,India

Water hyacinth[*Eichhornia crassipes* (Martius) Solms -Laubach] is a peernicious aquatic weed which caused concern world wide .It can double its biomass in 10 days forming a thin blanket in the water surface.This investigation was carried to develop a mycoherbicide for management of water hyacinth.Work carried at College of agriculture,Vellayani,Kerala,India ,identified *Fusarium pallidoroseum* Cook Sacc., a wilt inducing pathogen isolated from water hyacinth could restrict the multiplication of the weed ,thus causing reduction in its population.Safety of the organism on non traget plants was tested .It had limted host range among the cultivated plants where as it had wide host range among the weeds .The pathogen was mass cultured in 10 solid and 14 liquid substrate and the best substrate was found to be rice bran(10700000 cfu g-¹) followed by coir pith +rice bran and gingelly oil cake.The extract of ground nut oil cake recorded maximum dry weight of *F.pallidoroseum* ,followed by coconut water .An effective formulation (mycoherbicide)was prepared using the fungus. A 40%WP formulation was found to be the best when tested under glass house ,trough and pond conditions. The effect of this formulation on commonly seen aquatic flora and fauna was studied and found to be safe to them.

Criteria-based and value-oriented Agricultural Practice in crop growing companies and its societal benefit

Meier,Uwe¹

¹Federal Biological Research Centre for Agriculture and Forestry. Messeweg 11/12 D 38104 Braunschweig

Trust and credibility are always interlinked with an assessment. In this respect, existing structures, for example in agriculture, are not as such credible or not but can only be assessed with regard to previously determined assessment parameters, like test criteria. Whereas the ecologically oriented, integrated plant cultivation in agriculture has been discussed for many years and corresponding results have already partly been achieved in practice, international discussions held in commercial industry are opening up towards the voluntary assessment and evaluation of social and lately also cultural standards. The aim is an evaluation of the extensive social performance of a company, according to ethical-ecological criteria, basing on the comprehensive set of criteria included in the Guideline Frankfurt-Hohenheim (FHL). Criteria-oriented evaluation of agricultural businesses became increasingly established in practice in the nineties. Practical criteria systems are briefly introduced and compared. Ethical-ecological demands of trade partners on agriculture imply however that the entire trade sector is oriented towards them, because if one trade partner uses his market power, he leaves no options for the weaker partners to take a decision on the production method. The behaviour of the powerful trade partner is therefore not sustainable socially acceptable, according to the FHL. In this respect the FHL opens up a new criteria-based and value-oriented level of discussion, exceeding scientific and economy oriented agricultural sciences by far. A

voluntary implementation of criteria comprising an independent cultural, social and ecological performance evaluation, can polish up the damaged image of agriculture and thus open up new possibilities.

Biosensors for field-based detection of plant pathogens and pesticide residue analysis: The state-of-the-art technology as a key tool in Integrated Plant Disease Management.

SPIRIDON KINTZIOS¹

¹EMBIO/Laboratory of Plant Physiology, FACULTY OF BIOTECHNOLOGY-AGRICULTURAL UNIVERSITY OF ATHENS-IERA ODOS 75, 1141 ATHENS, GREECE

In recent years there has been a rapid increase in the number of diagnostics applications in phytopathology and food chemistry based on biosensors, which can be defined as devices incorporating a biological sensing element connected to a transducer. Biosensor systems for field-based pathogen and pesticide residue detection offer a number of significant advantages, such as high speed, reproducibility, accuracy, selectivity and sensitivity, as well as the ability to monitor at real-time conditions and retrieve as much information as possible during a single assay. The currently more favorable biosensor systems in crop safety monitoring are presented and described in detail. In their overwhelming majority they operate on the basis of indirectly measuring patterns of physical chemical properties of enzymes or antibody molecules. Arrays of cells at high-density can also form the basis of cell-based sensors with extremely high-throughput capability. These abilities are particularly important for determining the level of pesticide residues with an acute toxicity and/or mutagenic effects, as well as for detecting the emergence of pathogens with a yet unidentified virulence.

An emphasis is given on the most successful technologies, including immunoanalytical SPR (Surface Plasmon Resonance), QCM (Quartz-Crystal Microbalance), and cell-based CANARY (Cellular Analysis and Notification of Antigens Risks and Yields), BERA (Bioelectric Recognition Assay) and MIME (Molecular Identification through Membrane Engineering).

Finally, business profiles are reviewed of representative enterprises in the field of vegetable and fruit production, which have adopted or are about to adopt biosensors as an integral BMP tool. In this way, the feasibility of the application of biosensors in a competitive, 21st century agricultural model is demonstrated.

The phytosanitary strategies for plant parasitic nematode control in the Ukraine

Pylypenko Liliya¹, Ustinov Ivan²

¹Institute of Plant Protection UAAS, 33 Vasilkovsky Str., Kyiv - 22, 03022, Ukraine

²The General State Inspection on Quarantine of Plant, 7 Koloskova Str., Kyiv - 138, 03138, Ukraine

The introduction and spread of plant parasitic nematodes depend to a great extent on the phytosanitary legislation employed. The Ukrainian General State Inspection on Quarantine of Plant is issuing a number of new actions to improve such a statutory regulation as the importance of plant parasitic nematodes as a constraint to crop production in the Ukraine has been recently recognised. For the first time a new national list of quarantine and regulated plant parasitic nematodes has been preparing on the base of technical justification and pest risk analysis. The latter revealed the necessity to collect and analyze information on the detection of phytonematodes in export and import commodities. The statistical data obtained from 24 quarantine laboratories showed that during 2004-2005 the plant material, by mean of which the plant parasitic nematodes could be transferred to the Ukraine, were exported from 19 countries. In total 60 nematode species were detected in a broad range of export commodities: 28 species were identified in the potted plants, 13 – in commercial turf, 9 – in sawn coniferous timber, logs and wooden packaging materials, 7 – in seedlings, 6 – in bulbs and 5 – in potato. Order *Araeolaimida* was represented by one species, *Dorylaimida* – 6, *Enoplida* – 4, *Monhysterida* – 1, *Rhabditida* – 24 and *Tylenchida* – 24. A higher number of nematode species (78) were extracted from the import commodities - 8 species were identified in the potted plants, 28 – in soil samples, 34 – in sawn coniferous timber, logs and wooden packaging materials, 9 – in seedlings, 5 – in bulbs and 17 – in potato. Order *Araeolaimida* was represented by one species, *Dorylaimida* – 3, *Enoplida* – 2, *Rhabditida* – 30 and *Tylenchida* – 42. The results will be discussed in relation to the national list of regulated plant parasitic nematodes formation and its impact on the phytosanitary strategies for nematode control in the Ukraine.

Qualitative and quantitative loss of pesticides during waste water treatment

Augustin, Bernd¹, Ittel, Ingrid²

¹DLR R-N-H, Rüdeshheimerstr. 60-68, 55545 Bad Kreuznach

²LUWG, Kaiser-Friedrich-Str. 7, 55118 Mainz

Results of pesticide contamination of surface water in Rhineland-Palatinate between 1997 and 2000 indicated, that waste water treatment plants might be a major source.

The local working group “pesticides in ground and drinking water” initiated the investigation of waste water treated in six different sewage plants within Rhineland-Palatinate in 2003. 14-days-mixed water samples were tested for 43 different active ingredients (29 herbicides, 12 fungicides and two insecticides). Three sewage water plants located in areas with mainly arable crops were sampled between March and July. The sampling period of the sewage plants situated within areas with mainly specialised crops lasted from March to October.

Pesticide residues found showed a close relationship between different crops and intensity of cultivation.

Protection of surface water requires “best pesticide management” based on feasible measures of pesticides handling and application.

IPM in a developing country: Turkey's experience

Uludag, Ahmet¹, Atlamaz, Abdullah²

¹Izmir Plant Quarantine Department, Ministry of Agriculture, Alsancak, Izmir, Turkiye

²General Directorate of Agricultural Research, Ministry of Agriculture, Yenimahalle, Ankara, Turkey

Agriculture plays vital role in Turkey's economy and social life. Turkey has very diverse crop pattern which causes varying and complex pest problems. In addition, Turkish agriculture is different from that of both under developed countries and developed countries. However, its experience can be used by many countries.

Although biological control of pests started in early 1900's in Turkey, the first IPM research project was initiated in 1970. Then forecasting systems for important diseases and insects was established and varying IPM projects crop or pest based were initiated. But, some IPM projects only consisted of research activities. One of the cornerstones of IPM in Turkey is that IPM projects have been put into action by Ministry of Agriculture in 10 main crops in 1990, which is discussed in this paper. Later the number of crops were increased. These IPM projects included research, training and implementation and covered all pests including weeds. That forecasting systems had been established before was merged to appropriate IPM projects and well developed in some crops such as apple and grapes. IPM guides were prepared, IPM was implemented in limited areas, farmers and extension agents were trained. Projects caused that pesticides were classified in Turkey regarding to their toxicity and impact on environment. However, after 15 years, pesticide use spreads, IPM implementation is not recognized by administrators, vast amount of farmers are not aware of IPM. There are many bottlenecks that are discussed. We consider that lack of consumer education and market related activities is among the most important weak points of projects.

Integrated management of small holder fruit gardens in the Soconusco, Chiapas, Mexico

Marroquín, Francisco¹, Pohlen, Jürgen², Janssens, Marc¹

¹Rheinische Friedrich-Wilhelms-Universität Bonn, INRES, Tropischer Pflanzenbau. Auf dem Hügel 6, D-53121 Bonn

²ECOSUR, El Colegio de la Frontera Sur. Carretera Antiguo Aeropuerto km. 2,5; Apdo. Postal 36. CP 30700 Tapachula, Chiapas; México

Tropical fruits are grown on more than 60.000ha in the Soconusco, Chiapas, and represent by far the most economically important crops (mango, banana, papaya and rambutan). The production areas are divided between exports orientated intensive fruit cropping and traditional self consumption and local sell production by extensive fruit orchards. Since 2005, the possibilities to intercropped annual cash and trap crops into mango and rambutan orchards are investigate. The trials are carried out within two widely spaced orchards in Escuintla, Chiapas. Nine intercropping management variants (traditional, 2 x 4 combinations maize / pumpkins + legumes), are laid out in a split-plot design with six repetitions. In each experimental unit growth and yield parameters of intercropped crops and their interactions with growth and yield parameters of the companion fruit trees were determined. The 1° cycle include maize and maize + pumpkins, and the 2° cycle leguminous crops (*Cajanus cajan*, *Phaseolus acutifolius*, *Vigna unguiculata*). The research areas with mango present 168 x 56 m and with rambutan 100 x 32 m. Weed populations change and biomass decrease by intercropped systems, going one the succession maize / *Cajanus* the best variant. Intercropped crops have a positive function as cash and trap crops, increase small holder income, presented a substantial soil cover producing biomass, do not increase fruit pests, and finally, offered a rehabilitation tool for pollination insects. Mango yield were significant highest in the soil cover combination maize+ pumpkin / *Cajanus* and rambutan yield response in the same manner.

Biochemical methods for control of cereal crops resistance to biotic and abiotic factors

Molodchenkova Olga Olegovna*¹, Adamovskaya Valentina Germanovna*², Ciselskaya Larisa Yosiphovna*³, Levitsky Yuriy Anatolievich*⁴

¹Odessa, St. Generala Petrova 7/4, 33*

²Odessa, St. Simonenko 24*

³Odessa, St. Saharova 42, 249*

⁴Odessa, St. Shershova 15*

One of the factors of achieving a stable productivity of new varieties of cereal crops is their resistance to biotic and abiotic factors of environment. For developing of resistant varieties it is important to know the mechanisms of phytoimmunity formation and to possess effective, express methods for prediction and selection of resistant genotypes of cereal crops. New express estimation methods of Fusarium-resistant and heat-resistant cereal crops genotypes using biochemical parameters (changes in trypsin inhibitors' and lectin's activity in plants which have been grown on medium with presence of pathogen and salicylic acid; in seed which has been warmed at the high temperatures) are developed. Three Ukrainian patents for these methods have been taken out (No. 12639, 1997; Declarative patent No. 43280 A, 2001; Declarative patent No. 69859, 2004). The methods are based on the fact, that changes of trypsin inhibitors' and lectin's activity of infected, treated with salicylic acid and warmed at high temperatures seed depend on the resistance of winter wheat and spring barley genotypes to fusariose and heat. The methods enable a plant breeder to analyse a great quantity of genotypes at early stages of breeding and in the most short term.

Comparison of Entomofauna on Cabbage Plants in Montenegro

Pajovic Igor¹, Petric Dusan²

¹University of Montenegro, Biotechnical Institute, Podgorica, Montenegro

²University of Novi Sad, Faculty of Agriculture, Novi Sad, Serbia

Experimental collection of insects has been done in the localities of Sadine, Grbavci, Balabani, Trešnjica in Zeta Valley; Grbe, Vranjske Njive in Bjelopavli Valley; Pranj in coastal region and Kolašin - Smailagia Polje in the northern region of Montenegro. Collection of insects and entire fieldwork was done during vegetation period in the years 2000 and 2001 on the cabbage plant fields, using malaise traps, Barber soil traps, yellow dishes, light trap as trapping methods and collecting insects manually from the plants.

As a result, we have calculated the Jaccard's similarity coefficient, Shannon's diversity index and Shannon's evenness index. And, finally, we subdivided the total of 49,929 insects into three groups: the group of pests, useful insects and indifferent insects, according to the parameters such as: relations between insects and cabbage plants, relations between insects and insects, relations between the role of insects in agro biotope and ecosystem in general, etc.

Key words: trap, insects, entomofauna, cabbage plants, accard's similarity coefficient, Shannon's diversity index and Shannon's evenness index.

Nano-structured silica -physical active pesticides for urban settings

Ulrichs, Christian¹, Goswami, Arunava², Mewis, Inga¹

¹Humboldt University Berlin, Institute for Horticultural Sciences, Section Urban Horticulture, Lentzeallee 55, 14195 Berlin, Germany

²Biological Sciences Division, Indian Statistical Institute, 203 B.T. Road, Kolkata- 700 108, West Bengal, India

One of the most effective naturally occurring insecticide powders is diatomaceous earth (DE), which contains above 96 % of silica (silicon dioxide SiO₂). In recent days, the possibility to use new improved DE formulations for plant protection in horticulture has been the focus of research. Next to DE we have developed some new insecticides which are based on their nano-scaled structured physically active and show no mammalian toxicity. Such new materials can be used especially in urban settings where synthetic pesticides pose a great risk to the environment and human health. We have evaluated different natural and synthetically derived materials against different insect pests and compared efficacy with synthetic insecticides. Materials have been applied electrostatically as powder or sprayed in solution onto different horticultural crops. The possible use of such materials as replacement for synthetic pesticides will be discussed.

Integrated weed management in Bulgaria under the conditions of sustainable agriculture

Shaban Nidal¹, Baeva Ganka²

¹1756 Sofia University of Forestry Str. Kliment Ohridski 10

²2230 Kostinbrod, Bulgaria tel 359 721 66 061

During the last years of the last century in Bulgaria had been implemented many practices in integrated weed management under conditions of sustainable agriculture. Especially in vegetable growing (tomato, bean, peas, potatoes and others) in many directions—using decreased doses of vegetative herbicides, eliminated using of soil herbicides, mulching methods etc., Bulgarian experience gave good results. Now in mass production of peas, bean and tomato these new techniques are available.

A high multi-drug resistance to chemically unrelated oomycete fungicides in *Phytophthora infestans* and *Phytophthora nicotianae*

Ziogas Basil¹, Markoglou Anastasios¹

¹Agricultural University of Athens, Iera Odos 75, Votanikos, Athens

Mutants of *Phytophthora infestans* with high resistance to the amidocarbamates iprovalicarb and benthiavalicarb, to the cyanoimidazole cyazofamid and to the benzamide zoxamide were isolated after UV-mutagenesis and selection on media containing one of the above fungicides. *In vitro* fungitoxicity tests showed that all resistant strains presented a highly reduced sensitivity to all above fungicides and to other oomycete fungicides such as to the phenylamide metalaxyl, acetamide cymoxanil, morpholine dimethomorph and to chlorothalonil. A lower reduction of sensitivity of mutant strains to strobilurins azoxystrobin, kresoxim-methyl, pyraclostrobin and trifloxystrobin, azolones famoxadone and fenamidone and to antimycin A was observed. A resistance correlation was not apparent for the dithiocarbamate propineb and phenylpyridinamine fluazinam. Mutants of *Phytophthora nicotianae* with high resistance ($R_f > 1.000$) to the amidocarbamate fungicide benthiavalicarb were isolated from a wild-type strain at a low mutation frequency, after UV-mutagenesis and selection on medium containing benthiavalicarb. *In vitro* fungitoxicity tests showed that all resistant strains presented a cross-resistance pattern similar with that described above for the *P. infestans*, with the exception of an increased sensitivity to chlorothalonil and fluazinam. Study of fitness parameters of mutant isolates of both *Phytophthora* species showed that the mutation(s) for resistance to novel oomycete fungicides may or may not affect the saprophytic fitness determining characteristics such as mycelial growth, sporulation, chlamydospores production (*P. nicotianae*), differentiation of sporangia into zoospores (*P. infestans*), sporangial germination and pathogenicity on tomato seedlings. This is believed to be the first report of a high level multidrug resistance in fungal pathogens to chemically unrelated fungicides inhibiting different sites of cellular pathway.

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Fungicide Resistance and Aflatoxin Production: The effect of resistance mutations to triazoles, phenylpyrroles and anilopyrimidine fungicides on aflatoxigenic ability of *Aspergillus parasiticus*

Doukas Eleftherios¹, Markoglou Anastasios¹, Ziogas Basil¹

¹Agricultural University of Athens, Iera Odos 75, Votanikos, Athens

Mutants of *Aspergillus parasiticus* resistant to the triazole, phenylpyrrole or anilopyrimidine fungicides were isolated after UV-mutagenesis and selection on media containing flusilazole, fludioxonil or cyprodinil, respectively. *In vitro* studies on the effect of flusilazole and fludioxonil-resistant mutation(s) on the aflatoxin production resulted in the identification of two resistant phenotypes; aflatoxigenic and non-aflatoxigenic mutant strains. Most aflatoxigenic mutants produced aflatoxins at similar or even higher (up to 5-fold) concentrations than the wild-type parent strain of *A. parasiticus*. Study of fitness parameters of flusilazole and fludioxonil-resistant mutants showed that the mutation(s) for resistance to triazoles or to phenylpyrroles may or may not affect the saprophytic fitness determining characteristics, such as the mycelial growth, sporulation and conidial germination. Contrary to the above, in the case of cyprodinil-resistant isolates the resistance mutation(s) do not affect the fungal aflatoxigenic ability and the fitness determining parameters. Cross-resistance studies with other fungicides showed that the mutation(s) for resistance to fludioxonil or to cyprodinil affect the sensitivity of mutant strains only to the aromatic hydrocarbon and dicarboximide fungicides (AHDs) and to anilopyrimidines, respectively. In the case of aflatoxigenic flusilazole-resistant mutants of *A. parasiticus* a reduction in the sensitivity was observed only to the demethylase inhibiting fungicides (DMIs). However, in non-aflatoxigenic mutant strains the mutation(s) for resistance to the triazoles also reduced the sensitivity of mutants and to chemically unrelated fungicides, such as benzimidazoles, anilopyrimidines, phenylpyridinamines, but not to the QoIs and to the non site-specific fungicides chlorothalonil and maneb. Acknowledgement: This research project was co-funded by European Social Fund and National Resources-EPEAEK II.

Forecasting Systems

Kraatz, Michael¹

¹Sächsische Landesanstalt für Landwirtschaft Referat Pflanzenschutz, Stübellee 2, 01307 Dresden

The Use of Weather –Based Forecasting Systems by the Governmental Crop Protection Service in Saxony
In the German State of Saxony, weather-based forecasting models used in plant protection practice for many important, strongly weather dependent pests are essential tools for decision making in agricultural crops. These computer-aided systems and models use weather data from the Saxon agrometeorological network to predict the dates of first occurrence, simulate pest development and calculate recent infection of epidemic pressure. Such results serve as the main input for warnings issued by the official crop protection service of the State of Saxony, which are transmitted to farmers by fax services and via the Internet.

As a consequence the use of plant protection products (pesticides) can be reduced or optimised.

On the occurrence and monitoring of wheat blossom midges (Diptera: Cecidomyiidae) in Central Germany

Volkmar, Christa¹, Werner, Camilla¹

¹Institute of Agricultural and Nutritional Sciences, Martin-Luther-University Halle-Wittenberg, Ludwig-Wucherer-Str. 2, 06108 Halle (Saale), Germany

Contarinia tritici (Kby.) and *Sitodiplosis mosellana* (Géh.) belong to the most prominent insect pests in winter wheat. However, no practical method exists to predict or monitor the impact of these pests. The last scientific study on wheat blossom midges in Central and Eastern Germany dates from the 1980ies (Lübke, 1982). Consequently this study attempts to provide new data on the occurrence, monitoring and crop damage of wheat blossom midges under the impact of changing agricultural conditions (wheat-to-wheat crop rotation, reduced soil tillage, different crop variants).

In 2005/06, a systematic survey of midges occurrence and crop damage in a wheat-to-wheat crop rotation was carried out at research fields in Halle (Saale). Wheat blossom midges were monitored by pheromone traps (GS 48-83). Crop damage was evaluated by line assessment.

Results:

The activity of adult midges reached its peak in 2005 during GS 65-69 and in 2006 on GS 51.

In 2005, the number of catches was significantly higher in the Elvis variant (381 midges per trap) as compared to the Altos variant (202 midges per trap). In 2006, 321 midges per trap were caught in the Tommi variant.

The ratio of midge-effected kernels was established in 2005 on GS 80-83 with 6.3% in Altos and 4.4% in the Elvis variant. In 2006, this ratio reached a top of 20.5% during GS 73-75.

In conclusion, the results of this survey stress the influence of changing agricultural conditions and regional cultivation concepts. They establish the validity of the approach and recommend further studies in wheat fields, which should focus on collecting data for a period of several years.

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The Standardized Treatment Index as an Indicator for Pesticide Use Intensity on Farms in North-East Germany

Bürger, Jana¹, Goltermann, Stefan², Heilmann, Hubert³, Gerowitt, Bärbel¹

¹University of Rostock, Faculty of Agricultural and Environmental Sciences, Institute for Land Use, Crop Health, Satower Straße 48, 18051 Rostock

²State Office for Agriculture, Food Safety and Fishery, Department of Plant Protection, Thierfelder Straße 18, 18059 Rostock

³State Research Centre for Agriculture and Fishery Mecklenburg-Vorpommern, Dorfplatz 1, 18276 Gülzow

The German Standardized Treatment Index counts the number of pesticide sprayings applied to a culture over one season. One treatment of a fungicide, herbicide, insecticide or growth regulator in the full permitted dosage on the whole area accounts for an index of 1. Reduced doses and non-spraying of field parts decrease the index value. For monitoring or studying pesticide intensity, the index can be seen as a more accurate indicator than amount of active ingredients or amount of money spent. In a study in Mecklenburg-Vorpommern (North-East Germany), on-farm-data of pesticide use were collected to calculate values of the Treatment Index over 5 years under practical field conditions. Results are presented for cereal and rape seed crops.

The variability of index values is high between years, but also between farms, or individual fields. Information on cultivation practices such as cultivar choice, seeding time and tillage was collected together with the pesticide data. Thus, analysis was possible how much pesticide use is influenced by cropping practices.

Promotion of antagonistic mymarids of the grape leafhopper by planting dogroses along vineyards

Böll, Susanne¹, Schwappach, Peter², Herrmann, Josef Valentin¹

¹Bavarian State Institute for Viticulture and Horticulture, Herrnstr.8, D-97209 Veitshöchheim

²Bavarian Institute for Viticulture and Horticulture, Herrnstr.8, D-97209 Veitshöchheim

Dog roses planted along vineyards to substitute natural surrounding habitat structures established and promoted populations of the mymarid *Anagrus atomus*, but not any of the other egg parasitoids of the grape leafhopper *Empoasca vitis*. Only young shoots of the dog roses were used as egg laying sites by cicadellid host species and, consequently, by *A. atomus*. In the third study year, planted dog roses were almost continuously used for reproduction over the growing season and intensely as overwintering sites with a mean parasitisation rate of the cicadellid host eggs of 59%. Once the planted dog roses had reached a height > 2 m they housed as many mymarids as wild dog roses in the adjacent hedge. Furthermore, with an increasing biomass of the planted dog roses, the *A. atomus* population in the wild dog roses doubled each year but not in the other shrub species.

USING OF MICROORGANISMS FOR OVERCOMING THE POLLUTION OF SOIL BY PESTICIDES

Freiberg, Irina¹, Yermakova, Maria¹, Stetsenko, Svetlana¹

¹620134, Yekaterinburg, Bilimbaevskaya st., 32a

Using of pesticides at cultivation of pine seedlings in forest nurseries results in formation two phenotypes of teratomorph seedlings - conditionally normal and abnormal. The first are characterized infringement of correlation of stem and needles, the second - by various number of additional shoots. Creation of forest cultures from teratomorph seedlings leads to low surviving of them. It's known, that pesticides and their metabolic products can be kept in soil for many years. Thus, it's impossible to rely only on the natural autopurification of soil from pesticides. The perspective way for removing pesticides from soil is their microbiological decomposition. Now using of pure cultures of microorganisms is enough difficult task. The data about opportunity of microbiological transformation of pesticides that corresponds to opinions about cooperative action of microorganisms are now gathered. This method for the purification of soils from pesticides is preferable because there is the meliorative organic substance not far from forest nurseries and which enriched with microorganisms - a ground-litter. The first experiment created in forest nursery where pesticides were actively applied, has given positive result. Addition of a ground-litter from the mixed stand from a pine and birch, at the dose of 10 kg / m² has provided an output 23 % seedlings by a normal phenotype. The purpose of next experiments was research of an opportunity of reduction of pesticidal activity as a result of adding at the rates 5, 10 and 20 kg / m² of the ground-litter to the soil before the pine sowing. Results of experiments show that the most effective action gives adding of the ground-litter at the rate 20 kg / m² : the quantity of normal seedlings was 32-40 %.

ENDURE, a European Network of Excellence on pesticide reliance reduction

Pierre Ricci¹, Marco Barzman¹

¹INRA, 400 route des Chappes, BP167 06903 Sophia Antipolis Cedex - France

ENDURE - European Network for the **Durable** Exploitation of crop protection strategies - is a Network of Excellence to reshape European research and development on pesticide use in crops for the implementation of sustainable pest control strategies. It brings together sixteen institutions from Research, Education, Extension and Industry in ten European countries, coordinated by INRA (France). It was selected for funding in response to EC call FP6, Food Quality and Safety, in the area "Safer and environmentally friendly production methods and technologies and healthier food stuffs" on the topic "Reducing the use of plant protection products". We will create a coordinated structure that takes advantage of alternative technologies, builds on advances in Agricultural Sciences, Ecology, Behaviour, Genetics, Economics and Social Sciences and connects researchers to other stakeholders in extension, industry, policy-making and civil society. This multi-disciplinary and cross-sector approach is designed to foster the development and implementation of strategies rationalising and reducing pesticide inputs as well as reducing risks. We will advance toward these goals by conducting three types of activities: **integration** of research forces around jointly identified priority areas through shared methods and facilities in connection with other relevant networks and programmes; **jointly executed research**: to stimulate and develop a culture of collaboration in areas that are key to achieving progress in reducing reliance on pesticides; **dissemination** to extend our activities and outputs to farmers, extension agents, students, policy-makers, consumers and society-at-large, as well as to elicit feedback and dialogue ensuring that activities and outputs meet the needs of these stakeholders. Our four-year programme starts in January 2007. The initial 18-month period will serve to review and collate research and will lead to a focused research programme shaped by internal competitive bids.

Invasion pathway of peanut flower by green fluorescence protein *Aspergillus flavus*

Pilumwong Jarunee¹, Senthong Chuckree¹, Ingram Keith², Srichuwong Sombat³, Meechoui Sawit⁴, Julsrigival Suthat⁵

¹Department of Agronomy, Faculty of Agriculture, Chiang Mai University, Chiang Mai, Thailand

²Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL, USA

³Department of Plant Pathology, Faculty of Agriculture, Chiang Mai University, Chiang Mai, Thailand

⁴Lampang Agricultural Research and Training Center, Lampang, Thailand

⁵Department of Agronomy, Faculty of Agriculture, Chiang Mai University, Chiang Mai, Thailand

Colonization of peanut seed by *Aspergillus flavus* and subsequent aflatoxin contamination is a serious worldwide problem. The development of *A. flavus* strain that produce green fluorescence protein (GFP) offers the opportunity to track pathways of infection which have not been clearly identified. Three peanut genotypes (511CC, 419CC, and Tainan 9) were grown in a hydroponic system to determine flower and aerial peg infection by *A. flavus*. Peanut flowers were inoculated with 0.5 ml of GFP *A. flavus* spore suspension. By 24 and 48 hr after inoculation, inoculated flowers were separated into stigma, style, hypanthium and ovary for observation of fungal infection. At 10 days after inoculation, pegs were evaluated for the incidence of fungal colonization. Observation with an UV-illuminated microscope showed conidia of GFP *A. flavus* germinated within 24 hr and extensively colonized stigma and style, especially near the pollen grains. By 48 hr, fungal hyphae grew down the style, eventually reaching the top of the ovary. However, the visible fungal colonization in the ovules was sparse. The highest incidence of peg infection was found in Tainan 9. This experiment provides compelling evidence that seed infection by *A. flavus* may occur directly through floral infection. Initial infections may take place from, i) *A. flavus* spore attached to pollen grain, ii) spore germinated on the stigma surface and penetrated through the stigma follow the pollen tube, and iii) spore germinated on hypanthium and penetrated transversely through the style and ovary wall. Thus, knowledge of the floral infection could be a key to optimizing control of preharvest *A. flavus* infection and subsequent aflatoxin contamination, and then research would be warranted to identify irrigation, row orientation and other factors that would prevent the movement of conidia from the soil surface to the flowers.

FRIS- Best Practice in Viticultural Disease and Pest Management in the Franconian Wine Growing Region

Schwappach, Peter¹, Hönig, Petra¹

¹Bayerische Landesanstalt für Weinbau und Gartenbau, Herrnstr.8, D-97209 Veitshöchheim

Database information systems have become fundamental for economic decisions in agriculture and horticulture. Also in viticulture such an information system can be a helpful instrument. To support the local vine growers the so called FRIS (FRanconian Information Service for plant protection in viticulture) has been established in the Franconian wine growing area, located along the Main river, since 1996.

Focus of FRIS is to support wine growers in finding individual decisions for pest management when thinking about a certain treatment during cultivation of vines. Therefore the system should provide information of high actuality and at the same time adopt different microclimate and soil conditions in Franconia. All persons involved in the viticultural advisory services in Franconia are gathered and cooperate within FRIS. This avoids different or inconsistent recommendations.

Heart of FRIS are five selected vineyards, representing the typical soil and different micro-climate of the Franconian wine growing region, that are monitored regularly, i.e. once a week within the vegetation period. Additionally 16 weather stations register frequently important data like temperature, precipitation, humidity and leaf wetness. Moreover vineyard custodians report weekly about disease and pest development. For more than ten years the same sites have been monitored concerning weather, plant growth and epidemiology of diseases, pests and their antagonists. This systematic and continuous sampling of uniform data led to a longterm datapool. So a very helpful source of information has been established for new management practices, prognosis models and is also useful for newly appearing diseases and pests.

FRIS is accepted very well by local wine growers. Not only wine growers and producers rely on its recommendations. Even agric traders and representatives of agrochemical companies use the information provided by FRIS and thus improve their sales.

The occurrence and impact of biotic harmful agents on Czech grass seed production in recent years

Bohumir Cagas¹

¹Grassland Research Station, Hamerska 698, 75654 Zubri, Czech Republic

The acreage of grasses grown for seed in the Czech Republic shows an upward trend and in the year 2005 it was around 16 000 hectares. Seed production in the same year was 7,500 t, which does not mean a high rate of production. A low average yield (467.6 kg/ha) is a result of a number of objective and subjective factors (a large number of cultivated species with a different yield potential, improper agronomic practices, etc.). Low yields and their fluctuations in individual years are also caused by weeds, diseases and pests. The evaluation carried out over the last 10 years (1996 - 2005) indicated that the most serious herbological problem are still perennial and annual weed grasses (*Elytrigia repens*, *Apera spica-venti*, *Poa trivialis* and *Poa annua*), shattered seeds of cultivated grasses and cereals. Dicotyledonous weeds include species of the genera *Matricaria*, *Tripleurospermum*, *Cirsium* and *Galium*. Their presence was found in more than 15% of the areas under study. Similar results were also provided by natural seed analysis (in addition, important are also species of the genera *Chenopodium*, *Myosotis* and *Viola*). A serious plant pathological problem still remains parasitic silvertop (*Leptopterna dolabrata* x *Fusarium poae*), powdery mildew (*Blumeria graminis*), graminicolous rusts (predominantly *Puccinia* spp.) and leaf diseases (mainly *Pyrenophora* and *Drechslera*) detected in more than 14% of localities. Grass seed production may be endangered by a high occurrence of ergot sclerotia (*Claviceps purpurea*), which are regularly found in the seeds of some species. A new phenomenon of the last years is rodents of the family *Muridae*, fungi of the genus *Fusarium* and especially stem rust (*Puccinia graminis* subsp. *graminicola*). Harmfulness of ryegrass mosaic virus (RGMV) is not, especially in temporary ryegrasses, taken into account. Protection against harmful agents of biotic character is not yet fully resolved in grass seed production.

Estimation of *Aspergillus flavus* population on the root and pod zone of peanut under water deficit condition

Puntase, Janjira¹, Senthong, Chuckree¹, Ingram, Keith T.², Meechoui, Sawit³, Srichuwong, Sambat⁴

¹Department of Agronomy, Faculty of Agriculture, Chiang Mai University, Chiang Mai, 50200, Thailand

²Department of Agricultural and Biological Engineering, University of Florida, Gainesville, FL 32611-0570

³Lampang Agricultural Research and Training Center, Lampang, Thailand

⁴Department of Plant Pathology, Faculty of Agriculture, Chiang Mai University, Chiang Mai, 50200, Thailand

The severity of *Aspergillus flavus* infection of peanut (*Arachis Hypogaea* L.) pods and seeds in the soil differs among peanut genotypes. Fungal infection increased with increasing drought stress. The experiment was conducted in the greenhouse to observe *A. flavus* population on peanut roots and pods in response to water deficit, in the pod zone among four peanut genotypes. A minirhizotron system was used to observe green fluorescence protein (GFP) *A. flavus* population on the surface of roots, pegs and pods at the 5 cm soil depth. All images were analyzed for green fluorescence color of *A. flavus* by QuaCos program. Water deficit increased *A. flavus* population density on peanut root by 37% and pod zone by 22%. Genotype 419CC (drought- and aflatoxin-susceptible) had the greatest *A. flavus* population densities on the root and pod surface under soil culture. It was found that the combination of a minirhizotron, GFP *A. flavus* and QuaCos program was relatively easy to use to estimate *A. flavus* population densities under natural soil condition, and less time-consuming than laboratory screening.

Habitat and Resistance Management in renewable energy crop

Thies, Ernst-Peter¹

¹TDowAgroSciences Truderinger Str 15, D-81677 München

Habitat and Resistance Management in renewable energy crops and set-a-side Renewable energy crops like oilseed rape are part of a crop rotation with winter wheat and winterbarley in NW Europe. *Alopecurus myosuroides* can be present in all three crops and some areas already may have developed herbicide resistance against this abundant blackgrass. Non-specific acting herbicides may preserve the efficacy of specific acting herbicides against (ALOMY). Suitable active substances are propyzamide (Kerb 50 W), trifluralin (Treflan) and glyphosate (Dominator NeoTec) to allow long term control as part of herbicides resistance management strategy in a narrow crop rotation. In the near future more and more oilseed rape will be grown as renewable energy crop (bio fuel Directive). In oilseed rape predictable yield expectations will require resistance braker insecticides since some pyrethroids already show the limits to control *Meligethes aeneus* (RGK). On the other hand the EU Review of existing active substances has left only few insecticides. Annex I of Directive 91/414 lists chlorpyrifos ethyl and chlorpyrifos methyl as insecticides. Trials in Germany with Reldan have shown high levels of control of RGK. Sustainable agriculture recommendations use set-a-side land as part of its regeneration

strategy for the soil. However, this requires habitat management to avoid toxic or allergy inducing weeds, neophytes or invasive species to reach unacceptable levels of abundance. Weed species like *ambrosia*, *urtica*, *rumex*, *ranunculus*, *heracleum*, *senecio j.* are controlled post emergence by aminopyralid (Simplex) and triclopyr (Garlon, Starane Ranger) containing herbicides. They have shown to be excellent management tools in non-crop habitats.

THE USE OF ACTIVE STRAINS TRICHODERMA ASPERELLUM, TRICHODERMA HARZIANUM AND STREPTOMYCES LATERITIUS IN BIOLOGICAL MONITORING OF CONIFER SEEDLINGS

Gromovykh Tatyana¹, Sadykova Vera², Grebinnik Alexander³

¹SibSTU, Krasnoyarsk, Mira 82, Russia

²SibSTU, Krasnoyarsk, Mira 82, Russia

³Minino, Miniskij lesxoz

The main cause of forest nurseries diseases and Traditional enphytoties in Central Siberia are phytopathogens micromycetes caused by fungi from genus *Fusarium* and *Alternaria*. methods of protecting conifer seedlings use chemical fungicides. These result in emergence of resistance in plant pathogens, and damage to the environment. Development of safe methods to protect plants is thus important and, in particular, biological monitoring using antagonistic microorganisms. The genus *Trichoderma* have a special place in biological control within agricultural ecosystems, though in practice it is still not an option for reforestation. The other perspective organisms using for biological control are actinomycetes.

The *Streptomyces lateritius* following active strains of *Trichoderma* were obtained from soils in Central Siberia: *T. asperellum* Samuels (strain 1052-1043-97), *T. asperellum* (strain 0-97), *T. koningii* (strain MK). Living preparations of *T. asperellum* 1052;1043;-97 and *T. harzianum* (strain "Universal", as used in industry) were made for testing in forest nurseries. One of the result of screening active strain producent of biopreparations during actinomycetes was the selection of strain 19/97- The influence of the strains 1052;1043;-97 and strain "Universal" on phytopathogens was studied following their introduction in soil of the forest crops *Picea obovata* L., *Picea abies* L., *Pinus sibirica* L. and *Larix sibirica* L. Efficiency of the introduced antagonist was measured using the following parameters: symptom levels in seedlings, strain (*T.*, *T. harzianum*,), fungal numbers and species composition, and asperellum *Streptomyces lateritius* microbes using organic and mineral forms of nitrogen. antagonistic *Trichoderma* strains resulted in a decreased distribution of symptoms, and loss of plant pathogens from the genera *Fusarium* and *Alternaria*. Use of strains was effective only when plant pathogens were in their saprotrophic stage, causing zymotic damping-off. The parasitic stage, during which the plant pathogen can penetrate seedlings, was not affected by introducing *Trichoderma* and *Streptomyces* strains.

Development of new forms of biopreparations on the base of biocontrol *Trichoderma* strains with using plant residuals

Vera Sadykova¹, Tatyana Gromovykh¹, Likhachev Alexander²

¹SibSTU, Krasnoyarsk, Mira 82, Russia

²Moscow State University, Vorobevy gory, Russia

Some of the widely used biocontrol agents in the world belong to the fungi *Trichoderma*. However, standart strains using in agriculture practice is given inconsistent control between different nurseries and seasons and seemed to be ineffective on unfavorable years in reforestation. Screening an effective isolates within the aboriginal strains of *Trichoderma* may open a new perspectives for biological control soil-borne pathogens in forest nurseries.

A collection of 197 isolates among the aboriginal *Trichoderma* fungi was analyzed with respect to their antagonistic activity against the genus *Fusarium*. Strains providing the best control in the artificial light laboratory were then evaluated in small field plot tests. These screening has led to the selection of the 15 aboriginal strains as a potential biocontrol agents.

Heterogeneity of fungi is a serious obstacle for use of strains in biotechnology. Monitoring of the monospore clones of 15 wild isolates have shown high heterogeneity with respect to culture-morphological properties, the sporulation and antibiotic activity as regarding *Fusarium* species. With respect to these indexes, all isolates can be split into four different groups. Vegetative compatibility is in correspondence with these groups. This data was used as a basis for further selection within the given group for the development of biopreparations. For this purpose solid biotechnology systems on subsrates including pine bark, larch bark, and hydrolysis lignin were investigated. Then, the biopreparations were evaluated in forest nurseries on *Picea obovata* L. seedlings. The results shown that the treatments of spruce seeds The maximum of percent of healthy seedlings was in and seedlings could increase the amount of healthy seedlings: biopreparation on larch bark in 4 times; biopreparation on spruce bark after CO₂ extraction in 3,4 times. complex biopreparation (8,5 times compare

with control variant). The study demonstrated that the use of *Trichoderma* strains in combination with substrates suppressed damping-off of coniferous seedlings.

Interaction between weed regulation, faunal diversity and plant growth of apple stands in the central German dry region.

Heyer, W.¹, Christen, O.¹

¹Institut für Agrar- und Ernährungswissenschaften, Professur für Allgemeinen Pflanzenbau und ökologischen Landbau

In the frame of environmental programs, measures to reduce environmental contamination with pesticides are offered. So also the reduction or banning of herbicide use in perennial plant stands. The paper presents the functional responses within the ecosystem in case of application such environmental measures and consequences for plant growth and selected environmental goods (soil, biodiversity).

A sequential testing program to evaluate the efficacy of seed dressing insecticides on the cotton flea beetle as an indicator of cotton early season pests

Abdelgader, Hayder¹

¹ARC-Entomology Section, P. O. Box 126, Wadmedani, Sudan

Protecting cotton plant from the attack of early season insect pests and diseases is of prime importance to ensure a healthy and strong establishment of this strategic crop. The present study is focusing on developing of a sequential testing program to evaluate the insecticidal efficacy and persistence of seed dressers on the cotton flea beetle *Podagrica spp.* The sequential testing program included No Choice Laboratory tests, where seed of cotton dressed by various treatments were sown in pots in the laboratory. Seedlings were then taken at different intervals after sowing and caged with starved adult flea beetles. The damage caused to the seedlings was then measured through counting shot holes at different periods after exposure. In the second step of the testing program No Choice semi field tests were carried out. In these experiments leaves bearing petioles were cut from plants grown on various treatments on field experiments. The leaves were brought to the laboratory and caged with 24 hour – starved adult flea beetles. The damage caused to the test plants was then assessed through counting the shot holes resulted from feeding of the adult beetles. The method included also assessing the damage of flea beetle as well as adult infestation through regular visual counts of field experiments. The results of a number of experiments at the three levels of the testing program will be presented.

FOOTPRINT - Functional Tools for Pesticide Risk Assessment and Management

Stefan Reichenberger¹, Martin Bach¹, Hans-Georg Frede¹

¹Institute of Landscape Ecology and Resources Management, University Giessen, Heinrich-Buff-Ring 26-32, 35392 Giessen

FOOTPRINT is an EU-funded 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: i) identify the dominant contamination pathways and sources of pesticide contamination in the landscape; ii) estimate pesticide concentrations in local groundwater resources and surface water abstraction sources; iii) 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 i) allow pesticide users to assess whether their pesticide practices ensure the protection of local water bodies and, ii) 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.

www.isip.de - online plant protection information in Germany

Manfred Röhrig¹, Reinhard Sander¹

¹ISIP e.V., Rüdeshheimer Str. 60-68, D-55545 Bad Kreuznach, Germany

The information demand from agricultural professionals is increasing steadily. This demand can effectively be met by using modern communication technologies. To achieve this, the governmental extension services in Germany have introduced the Information System for Integrated Plant Production (ISIP).

ISIP, an internet-based informationsystem, give fast and easy access to all data necessary for integrated plant production. Target groups are farmers as well as extension officers. The system focuses on problem-specific decision support modules for cereals, potatoes, oilseed rape and sugar beet. In ISIP, such a module does not only comprise a model for decision support. Due to the fact that a model is only a simplified representation of reality, simulation results are supplemented by monitoring data (if available) and a comment of a regional extension officer. This 'threefold decision support' is one of the unique features of ISIP.

The software framework of ISIP which contains the decision support models is built in an open and readily extensible architecture. To incorporate new simulation approaches, the concept of a 'master component' releases the developer of technical details and provides a comparatively simple integration. This speeds up model development and ensures a fast knowledge transfer.

Introduction of GIS in DSS for plant protection

Kleinhenz, Benno¹, Zeuner, Thorsten¹

¹ZEPP, Rüdeshheimer Str. 68, 55545 Bad Kreuznach, Germany

ZEPP is the central institution in Germany in charge of the development of forecasting and simulation method pest and diseases on plants to optimize control. Up to now more than 20 met. data -based forecasting models have been developed and introduced into agricultural practice. The results of the forecasting models were improved by the introduction of Geographic Information Systems (GIS) in the algorithms.

The position of meteorological stations mostly do not fit optimally as input for forecasting models. The distance between met. stations often is up to 60 km. With complex statistical interpolation methods an adaptation of the met. data is realized. The presentation will show the results of the interpolations and the consequences for the output of SIMPHYT1 and SIMPHYT3 models compared to epidemic development of potato Late Blight assessed in field observations. In a second step daily spatial risk maps are created in which the spread and the temporal process of the first appearance as well as the development of Late Blight is pointed out. To reach this aim the forecasting models were prepared with a spatial index.

CERCBET - A tool for the optimisation of disease management in sugar beet

Joerg, Erich¹, Racca, Paolo¹

¹ZEPP, Rüdeshheimer Str. 68, 55545 Bad Kreuznach, Germany

In German sugar beet growing areas *Cercospora* is the most important pathogen. In each year *C.beticola* epidemics occur with increased severity in warm and humid areas or on irrigated fields.

A model which predicts the development of early *Cercospora* epidemics and helps in the timing of fungicide applications was developed. The model (CERCBET 3) forecasts disease incidence (DI) curves on a plot-specific scale. The procedure of forecasting roughly can be divided into two steps. First step includes the calculation of daily infection rates using temperature and relative humidity as input parameters. The calculated infection rates are summed up over time. The result is an infection pressure index which is representing weather favourableness for disease spread and is correlated with the increase of disease incidences in the early stage of the epidemic. In the second step disease incidences are estimated from infection pressure index. CERCBET 3 was tested in 2001, 2002 and 2003. Results were very promising. In 90%, 83% resp. 80% of the cases CERCBET 3 correctly forecasted the date when an action threshold based on DI values was overridden. However the model needs improvement. It is intended to include the influences of irrigation and cultivar susceptibility into CERCBET 3. In addition a module to reflect fungicide efficacy is under development.

Pyrethroid resistant Pollen Beetles in Sweden

Gustafsson, Goran¹, Djurberg, Alf¹

¹Swedish Board of Agriculture, 581 86 Linköping

In the year 2000 the first cases of pyrethroid resistant pollen beetles (*Meligethes aeneus*) were registered in Sweden. The problem first appeared in the county of Östergötland, approximately 200 km south of Stockholm. In this area, winter and spring oilseed rape have been grown in approximately equal sized areas for several decades. In the 1990s the pyrethroids were the only agents allowed to be used against pollen beetles. Consequently the pollen beetles were exposed for pyrethroid treatments 2-5 times annually for at least ten years. The population of pollen beetles in 2000 and years following were exceptionally large, probably due to reduced efficacy in the late 1990s. The damage to the crop was very severe during these years – in some fields more than 90 % of the siliqua were damaged. Resistant pollen beetles were discovered in other areas as well in the first years after 2000.

Both field trials and lab tests were carried out in the following years to investigate how the resistance developed and to find a way to handle the problem in practice. In the first years, the efficacy of a pyrethroid treatment at normal field rate was 30-70 % after 24 hours. The dose had to be raised about 3 times of the normal dose in order to exceed 90 % efficacy. The efficacy of the pyrethroids against resistant pollen beetles was poor regardless of product, with the exception of Mavrik (taufluvaniate) that surprisingly showed almost normal efficacy. Products from the nicotinoid group were also tested, with promising results.

Today Mavrik is used in alternation with Sumithion (fenitrothion, reregistered in 2001) against (resistant) pollen beetles, with satisfactory efficacy, resulting in much smaller practical problems. Lab studies also indicate that the resistance level has been reduced.

Observation regarding the efficacious fauna of carabidae (Coleoptera-Carabidae) from apple plantation belonging in the northeastern Romania

Talmaciu M., Diaconu A., Talmaciu N.¹

¹Street Aleea Sadoveanu M., no 3, Iasi

Among the most important families from the Coleoptera (Insecta) order, there are the carabidae (Carabidae), which group nearly 25.000 species of insects, distributed throughout the globe. The species carabids of this family have a trophic regime, largely carnivorous (*Cicindela germanica* L., *Calosoma auro-punctatum* Herbst., *Pterostichus cupreus* L., *Calathus fuscipes* Goetze., etc.), and also the species are vegetarian (*Harpalus aeneus* Fab., *Harpalus distinguendus* Duft., *Harpalus tardus* Panz., *Amara spp.*, etc.) and carnivorous or vegetarian species (few species) (*Anisodactylus signatus* Panz., *Ophonus azureus* Fab., *Pseudophonus rufipes* De Geer., etc.). The studies were conducted in the vegetative season of 2006, 10 hectares of intensive orchard were submitted to an ecological exploitation. The material was collected by plantation belonging to S.C.D.P. Falticeni, from May till October, by means of the „Barber” soil traps. For this, we subsequently selected the carabidae species (Coleoptera-Carabidae), every 10-14 days, when the bugs was keeping and Formalin solution (4-5%) was replaced. The carabidae species were also the most frequently collected, as it follows: *Pseudophonus rufipes* Dej., *Carabus violaceus* L., *Harpalus aeneus* F., *Pterostichus cupreus* L., *Abax carinatus* Duft., *Amara familiaris* Duft. **TOPIC: Practical examples** - Integrated management of horticultural and field crops and forestry

Elaboration of system for assessment of agricultural land bio-diversity in Siberia

Babenko Andrey¹

¹Tomsk State University, Lenina str.,36 Tomsk 634050 Russia

System crisis in Russian agriculture has negatively affected the state of bio-diversity. In Siberia this is caused by the following: increased forest cutting and poaching, soil erosion, water basins silting, loss of soil fertility, degradation of pasture fields. The way out of this situation is seen in conducting agricultural activities on the basis of ecological principles. In addition to the improvement of the ecological situation in Russia this will make it possible to get maximum economic effect with low investments, which is extremely important in the present environmental crisis. In the last few years we have tried to develop a system for agricultural land bio-diversity assessment. This system gives an opportunity to obtain integrated description of biota reactions on anthropogenic influence. Elaboration of such a system consists of several stages. At first it is necessary to collect the data concerning initial state of agro-landscape bio-diversity and perennial data about environmental state. Selection of indicator species and the most suitable places for monitoring are of great importance as well. Sustainability of some communities of soil invertebrates has been selected as a crucial indicator for assessment of bio-diversity disturbance. We selected wetlands and low mountains territories of South-West Siberia as key places for our investigation. Analysis of the pilot study shows that the common problems in the field of management and conservation of agricultural bio-diversity in Siberia are the following: disturbance of natural communities of

plants and animals and also self-migration of foreign species; spread of animal and plant diseases; pollution of water bodies; destruction of animal food resources. Nevertheless, last investigations show, that degradation of agricultural lands and reduction of biodiversity in Siberia have not reached critical levels, and with a sound system of economic activities it is possible to restore environmental conditions and soils productivity to an acceptable level.

The forecaster ZWIPERO for downy mildew of onion: applying a disease warning system in diverse culture systems of vegetable crops

Leinhos, Gabriele¹, Klante, Brigitte¹, Laun, Norbert¹

¹Dienstleistungszentrum Ländlicher Raum (DLR) Rheinpfalz, Abt. Gartenbau, Breitenweg 71, 67435 Neustadt / Weinstrasse

Downy mildew of onion, caused by *Peronospora destructor* is the most disastrous disease on leaves of onion in all onion growing regions of humid climate. Therefore, forecasting systems based on weather data were developed and adjusted to the regional conditions in several countries (Canada, Netherlands, France, Italy, Germany). They are proven tools to increase fungicide efficacy by terminated fungicide sprays according to predicted infection risk. They also lead to a reduced number of fungicide sprays and contribute to national pesticide reduction programs. Generally, the forecasting systems are adapted for spring sown onions. Spring sown onions are either seeded or grown of sets. They also vary widely in variety (early and later ripening) as well as in the irrigation intensity applied and the canopy density chosen. Depending on the climatic conditions, onions are also grown as over wintering crop and as all year grown salad or bunching onions. In Germany all crop systems are found, some with very high regional importance. Therefore, the forecaster ZWIPERO has been adjusted for these different culture systems of onion and is available for all growing regions in Germany. Key words: prediction system, forecast, downy mildew, vegetable, onion

Dynamics of the parasitoid complex of the summer fruit tortrix moth *Adoxophyes orana* (F.v.R.) (Lep., Tortricidae) in the first year of conversion of apple trees to an ecological production in the northeastern Romania

DIACONU Alecu(1), CLOSCA Cornelia(1), TALMACIU Mihai(2), VASILIU Gabriel(3), PAREPA Madalin(1), DIACONU Mariana(4), MITROIU Mircea(5), MANOLACHE Agurita(3)¹

¹(1) Institute of Biological Research, 20A - Bd. Carol I, 700505, Iasi, Romania; (2) University of Agronomy Sciences and Veterinary Medicine of Iasi, 3 - M. Sadoveanu Alley, 700490, Iasi, Romania; (3) Fruit Growing Research Station, 10 - Str. Pl. Ghinita, 725200 Falticeni (SV), Romania; (4) "Gh. Asachi" Technical University of Iasi, 71A - Bd. D. Mangeron, Iasi, 700050, Iasi, Romania; (5) "Al I. Cuza" University of Iasi, 11 - Bd. Carol I, 700506, Iasi, Romania

Summer fruit tortrix moth *Adoxophyes orana* (F.v.R.) (Lep., Tortricidae) is one of the key pests in the apple tree orchards where high numbers of synthetic insecticide treatments are applied in order to control the specific pests. Starting with the vegetative season of 2006, 10 hectares of intensive orchard planted in 2001 were submitted to an ecological exploitation, the synthetic insecticides being eliminated from the plant protection scheme.

In the present paper we present comparative aspects regarding the role of the parasitoid complex of the summer fruit tortrix moth in the limitation of host populations.

The hymenopterans *Colpoclypeus florus* (Eulophidae) and *Teleutea striata* (Ichneumonidae) were the most important parasitoid species controlling the pest populations in the ecological plot, with a global parasitism percentage in the second generation of over 90%.

SkleroPro - a decision support system for control of *Sclerotinia* stem rot in winter oilseed rape

Koch, S.¹, Dunker, S.¹, Kleinhenz, B.², Röhrig, M.³, Tiedemann, A. v.¹

¹Institute of Plant Pathology and Plant Protection, Georg-August University Göttingen, Grisebachstraße 6, 37077 Göttingen, Germany;

²Center Institution for Decision Support Systems in Crop Protection (ZEPP), Rüdeshheimer Straße 60-68, 55545 Bad Kreuznach, Germany;

³Information System Integrated Plant Protection (ISIP), Rüdeshheimer Straße 60-68, 55545 Bad Kreuznach, Germany

Chemical control of *Sclerotinia* stem rot (SSR) in winter oilseed rape (OSR) through fungicide spray during bloom has become a routine treatment in the agricultural practice in Germany and other European countries. An analysis of historical field data from 1994 to 2004 revealed a proportion of 66% of treatments being economically not justified as damage due to the disease was lower than the costs of spray. Therefore, a

forecasting model was developed to provide decision support for the fungicide spray against SSR at bloom. Disease incidence (DI) significantly correlated with infection hours (Inh) occurring post growth stage (GS) 58 (late bud stage) (DI; $r^2 = 0.42$; $P < 0.001$). A parallel crop growth model determines the critical developmental stages of OSR between GS 58 (late bud stage) and GS 68 (late bloom). The novel forecasting system, SkleroPro, consists of a two-tiered approach, the first providing a regional assessment of the disease risk, and a second tier giving a field-site specific, economy-based recommendation, based on costs of spray, expected yield and rapeseed produce price. From an analysis with historical field data a significant impact of crop rotation was found, while crop density, nitrogen level and soil management did not have significant effects on DI. In a field evaluation of SkleroPro the percentage of economically correct decisions varied from 70 to 81% depending on the year. Compared to routine sprays at bloom savings of fungicides accounted to 39 and 81% equivalent to gain in net returns of 23 and 45 € per hectare, respectively. This study demonstrates that the level of SSR in OSR can sufficiently be determined by recording the conditions for stem infection during late bud/flowering, whilst simulation of apothecial development and ascospore dispersal are not required for an accurate and reliable disease forecast. SkleroPro is the first crop-loss related forecasting model for a Sclerotinia disease and has been made accessible to the growers on a broad scale via the internet since 2006.

Comet assay: A novel biotechnique to detect and compare DNA damage in resistant and susceptible insect pests

Hasan, Md. Mahbub¹

¹Department of Zoology, Rajshahi University, Rajshahi 6205, Bangladesh

The physical agents and a variety of chemical compounds can damage Deoxyribonucleic Acid (DNA) in living cells. A variety of methods have been developed for detecting damage to DNA strands. A more recent method, referred to as the single-cell gel electrophoresis (SCGE) or comet assay, can detect DNA strand breaks and alkali labile sites by measuring the migration of DNA from immobilized nuclear DNA. The comet assay is a quick, simple, sensitive, reliable and fairly inexpensive method for measuring DNA damage. The present study deals the nature of DNA damage in phosphine-resistant (PHR) and susceptible (PHS) strains of adults *Rhyzopertha dominica* (F.) after exposed to radiation assessed using the comet assay. The lesser grain borer *R. dominica* is one of the most serious pests of stored grain. Phosphine fumigation is widely relied upon as the primary means of controlling insect pests of stored cereal grains. Analysis of DNA damage, following 40 and 160 Gy gamma radiation, was carried out using cells obtained from both strains. Gamma-irradiated adults of both strains showed typical DNA fragmentation, compared with cells from non-irradiated ones which showed more intact DNA. Investigations using the comet assay showed that tail length, moment, olive-tail moment, % tail DNA and % DNA damage were all greater in the PHS strain compared with the PHR strain and the control insects. Results also showed that DNA damage remained at a constant level for up to 24 h after irradiation. The results have been discussed in relation to the observed strain differences in radiation sensitivity and resistance to phosphine. In addition, the degree of radiosensitivity of different stages of insect was determined based on the nature of DNA damage using the comet assay. The results of the comet assay also showed a dose-dependent induction of DNA damage in different stages of insect.

Common bunt causal agent molecular biological quantification in wheat varieties

Kochanova Michaela¹, Marek Martin¹, Prokinova Evzenie¹, Rysanek Pavel¹

¹Czech University of Agriculture in Prague, Department of Plant Protection, Kamycka 129, 16521 Prague 6 Suchdol

Tilletia caries (DC.) Tul., syn. *T. tritici* (Bjerk.) Wint (common bunt causal agent) and hyphae penetrate plant tissue in growing phase and infection process is latent until plant full maturity. In that time it transformates grains into sori filled in *Tilletia* teliospores. *Tilletia* product strongly smelly trimethylamin, that causes unavailability of contaminated crop for food and keeping products. Bunt presence degrade harvest quality index and faces to total disposal of crop, it means loss of all costs expended on na crop creation, fertilization, treatment and harvest or crop disposal.

Basic precautions against bunts include use of resistant variety. Already there are resistant varieties in the world collection and the others are breeding constantly because pathogen constantly overcome plant resistance. Optimal inoculation methods and plant infection by bunts are tested. All methods need visual classification of bunt presence in full maturity and comparing of number of infected plants to non-infected plants. None of scientific teams used molecular diagnostics or other modern methods for resistance testing time reduction. Nevertheless in this case all tests including plant growing need expensive several-months cultivation. Molecular biologic methods give problem solution. They are rapid and precise and they are routinely used for the fast and easy detection of pathogens in plant tissues or biologic materials in the world.

Bunt mycelium quantification in seedling tissue and its comparison with infectious intensity in full maturity can give useful information about wheat variety resistance against bunt.

The Effect of AMF Inoculation on Growth and Disease Resistance of Field Cotton, Field Pepper and Potted Marigold

LONG Xuan-qi¹, CUI Wei-dong¹, YANG Rong¹

¹No. 403, Nanchang Rd., Urumqi, Xinjiang, 830091, P. R. China

Two kinds of arbuscular mycorrhizal inoculants of *Glomus mosseae* and *Glomus etunicatum* were inoculated to field cotton. The result indicates that both introduced a significant decrease in aspects of *Verticillium* Wilt rate and disease index, where the treatment *G. etunicatum* reduced by the lowest of 47.8% and 56.6% respectively. Both treatments gave significant increases in predictive lint yield by 48.0% and 13.6% respectively. Meanwhile mycorrhiza colonization in both treatments and the control shows a positive correlation with lint yield. The same two kinds of arbuscular mycorrhizal inoculants were inoculated to field pepper. The results indicate that both introduced a significant promoting effect on economic yield. The treatment *G. etunicatum* increased yield significantly by 116.4% and decreased disease rate of pepper *phytophthora* blight by 41%. Two kinds of arbuscular mycorrhizal inoculum of *Glomus mosseae* and *Glomus versiforme* were inoculated to pot marigold of *Tagetes erecta*. In the first 40 days, the results indicate that the inoculation of AMF in both treatments introduced a significant promoting effect on plant vegetative growth in the aspects of shoot length, stem diameter and leaf number, as well as a significant delaying effect on plant reproductive growth in the aspect of bud number. In the following 20 days, there are also significant promoting effects of both treatments in stem diameter and of *G. versiforme* in shoot length on plant vegetative growth, as well as of both treatments in bud number on plant reproductive growth, but there is no influence on flower diameter.

Soil inoculation with *Burkholderia phytofirmans* strain PsJN induces resistance of *Vitis vinifera* L. inflorescences to grey mould disease caused by *Botrytis cinerea* Pers.

Compant, Stéphane¹; Paquis, Sandra¹; Baillieul, Fabienne¹; Nowak, Jerzy²; Clément, Christophe¹ and Ait Barka, Essaid¹

¹Laboratoire de Stress, Défenses et Reproduction des Plantes, Unité de Recherche Vignes et Vins de Champagne, UPRES EA 2069, UFR Sciences, Université de Reims Champagne-Ardenne, 51687 Reims Cédex 2, France; ²Department of Horticulture, Virginia Polytechnic Institute and State University, 0327-301 Saunders Hall, Blacksburg, VA 24060, USA

Soil inoculation of *Vitis vinifera* L. cv. 'Chardonnay' rooted cuttings by a plant growth promoting bacterium, *Burkholderia phytofirmans* strain PsJN, induced gene defense expression in preflowering buds and flower resistance against *Botrytis cinerea* Pers. causing grey mould disease. Expressions of the genes encoding PR proteins (*VvChit4c*, *VvGluc*, *VvPR6*, *VvPR10*, *VvPR27*) were significantly enhanced after bacterization compared to the non-bacterized control treatment at both root and inflorescence tissues. In addition, root bacterization leads to 60% flower protection against grey mould disease caused by *Botrytis cinerea* Pers. We conclude that the observed grey mould disease reduction in the *Burkholderia phytofirmans* strain PsJN treatment was due to the bacterial induction of systemic resistance. This study demonstrates for the first time that systemic induction of gene expression in plants by beneficial bacteria can enhance resistance of inflorescence tissues to phytopathogens.

A potentised leaf extract of *Melanthus comosus* has higher activity than six commercial products used against plant fungal pathogens

J N Eloff¹, I Anghel¹, L McGaw¹

¹Phytomedicine Programme, University Pretoria, Private Bag X04, Onderstepoort, 0110, South Africa
M. comosus occurring only in southern Africa is used traditionally to treat bacterial infections although its roots contain toxic heart glycosides. A company was interested in developing an antibacterial product for the veterinary market. The antibacterial activity of extracts was not high enough to pursue any further. It however had excellent antifungal activity against animal pathogens, but the potential toxicity would have complicated the development of a product. We then evaluated the activity against plant fungal pathogens. Extracts had excellent activities against 10 plant fungal pathogens investigated (*Rhizoctonia solani*, *Fusarium oxysporum*, *Penicillium janthinelum*, *Penicillium expansum*, *Colletotrichum gloeosporiales*, *Trichoderma harzianum*, *Pythium ultimum*, *Phytophthora nicotiana*, *Aspergillus niger*, and *Aspergillus parasiticus*). The extract contained one major antifungal compound and this compound was isolated and characterized. By selective extraction and solvent fractionation an extract with an average MIC of 0.066 mg/ml against all ten fungal pathogens was obtained. Ignoring MIC values of 0.16 mg/ml against *Penicillium expansum* and *Aspergillus niger*, the average MIC for the other fungi was 0.04 mg/ml. The acetone extract stored at room temperature for a month did not lose activity. The dried extract was slightly soluble in water and ethanol, reasonably soluble in ethyl acetate and highly soluble in acetone. The potentised extract had a higher antifungal activity than six commercially used fungicides against some important plant fungal pathogens. In a limited field

trial it gave a much better result than a commercial fungicide even though it was used at a quarter of the dose of the commercial fungicide. The results have been patented and a product is under development.

Managing fungal diseases of tomato and wheat by potential biocontrol agents in salinated soils of Uzbekistan

Egamberdieva Dilfuza¹, Kucharova Zulfiya¹

¹Tashkent State University of Agriculture, University str.1, 700140 Tashkent, Uzbekistan

Sustainable crop production is the basic approach for agriculture in the 21st century. It aims at obtaining ecologically safe food and fodder with a minimal disturbance of the environment. Cotton was the major crop produced in Uzbekistan for decades. Its production required an extensive use of chemical fertilizers and pesticides and was accompanied by strong irrigation of fields. This led to the drying up of the Aral Sea and resulted in strongly increased concentrations of chemical pesticides and natural salts. The heavy use of fertilizers and pesticides is the cause of increasing soil salination and soil contamination from agricultural chemicals. Because plants are under saline or water unbalance stress, they become more vulnerable to diseases caused by pathogenic fungi. Up to 30 % of crop plants are lost before harvesting in Uzbekistan mainly due to fungal diseases caused by pathogenic fungi. Chemical control of plant disease creates a number of problems when country already facing environmental pollution. In the present work we screened and developed salt tolerant biological control organisms against tomato foot and root rot and wheat root disease in salinated extreme conditions of Uzbekistan. The bacterial inoculants increased germination of wheat and tomato seeds, stimulated plant growth and also reduced diseased plants of tomato caused by *Fusarium oxysporum* and wheat caused by *Fusarium culmorum* in salinated extreme conditions. After application of biological control organisms *Bacillus subtilis* NCAM the sick wheat and tomato plants was reduced to about 25-28 %. Considering the fact that most crops in Uzbekistan are cultivated on agricultural lands is salinated the salt tolerant and temperature resistant these biological control organisms can easily stand the local salt stress and will help improve cropping methods, plant health and productivity. Through this sustainable practice soil quality is also expected to improve.

Breeding for Verticillium wilt resistance in cotton under salinated soil conditions of Uzbekistan

Avtonomov Viktor¹, Avtonomov Vadim², Gafurova Laziza², Egamberdiyeva Dilfuza²

¹Institute for Cotton Breeding and Seed Production, Tashkent, Uzbekistan.

²Tashkent State University of Agriculture, Centre of Biological Control, Tashkent, Uzbekistan

Uzbekistan is one of the biggest cotton producer country in the world and *Verticillium wilt* bring great damage its productivity where yield loosing consist 10-15 %. Since 1979 heredity and variability for wilt tolerance studied at hybrids F₁ – F₂ depend which form were taken as a paternal form, and in 1996, elite plant from the hybrid combination F₁₁ (C-1973x02654) created, which one became ancestor of new variety – Namangan-34 which is having fiber quality IV type. (02757^x) - *G. hirsutum ssp mexicanum mayer* is age-old wild form, and not bearing fruits under the natural day length condition. (02654^x) - *G. hirsutum ssp punctatum mayer* is a semi – barbarous form and under the Tashkent regional condition bearing fruits, having best indication complex in comparison *G. hirsutum ssp mexicanum*. There were taken as maternal forms, the varieties such as C-4727, 159-F, C-1973 and 133 which were completely defeated 100% by *Verticillium wilt*. The results suggest that using the crossing wild and semi – barbarous forms of *G. hirsutum L.* should be taken high wilt tolerable plants. Splitting ability in F₂ of this sign show it's polygenes nature. In F₃ families keep the same heredity character like in F₂ hybrids. Involving to hybridization wild and semi-barbarous forms of *G. hirsutum L.* could be selected several plants since F₂ which are not affected to verticillious wilt. Nevertheless, to find out the necessary to the breeder the signs' combinations we only succeeded in F₁₁. We conclude that semi – barbarous form *G. hirsutum ssp. punctatum* – 02654 is inherited own tolerability to hybrids from F₁. From F₂, selection of separate plants could be expected with tolerability identical to *G. hirsutum ssp. punctatum*. For selection of elite plant which is served as a “Namangan – 34” variety's progenitor we were need 11 generations, on these all the works based for individual selection.

Perspectives of Biological Control in cotton protection in Uzbekistan

Avtonomov Vadim¹, Egamberdiyeva Dilfuza¹, Gafurova Laziza¹, Kimsanbaev Khujamurod¹

¹Tashkent State University of Agriculture, University str.1, 700140 Tashkent, Uzbekistan

Public health and safety concerns about the environmental impact of chemical pesticides have led to consideration of biological control as a natural approach to maintaining crop health. Biological control methods can be used as part of an overall integrated pest management program to reduce the legal, environmental, and public safety hazards of chemicals. The cotton filed in Uzbekistan occupied 1391,4 thousand/hectares. However

annually more than 100 kinds of harmful organisms cause disease and reduce cotton yield and production. The common pests of cotton are: Yellowstriped Armyworm (*Spodoptera ornithogalli*), Cotton aphid (*Aphis gossypii* Glover), tobacco thrips (*Thrips tabaci*), the Twospotted Spider Mite (*Tetranychus urticae*), also there are more damaging pests such whitefly (*Bemisia tabaci*), bugs (*Miridae*) and mining flies (*Liriomyza sativae*) has appreciably increased. The chemical agents such pesticides and herbicides were used for wheat, cotton, vegetable and fruit production for 656, 6 thousand hectares in 2001. Its application decrease in 2002 for 542,5 th/ha, in 2003 for 424,9 th/ha and in 2004 for 367,6 th / ha agricultural fields. In Center of Biological Control of Uzbekistan were developed a technologies in cultivation womb of a material aphid lion (*Chrysopa carnea*), bracon (*Bracon hebetor*), trichogramme and (*Encarsia panteopea*), (*Edowym petlera*), a predatory bug (*Macrolofus*), *Coccifagus lycimnia* and *Apididi* and others. The manufacturing technologies of the most effective endemically natural entomophage of harmful *Eurygaster integriceps*, *Thrips tabaci*, and *Oscinella frit* L, were developed.

The effect of the EU review of active substances on plant protection in Poland

Matyjaszczyk Ewa¹

¹E.Matyjaszczyk@ior.poznan.pl

The effect of the EU review of active substances on plant protection in Poland The paper presents the results of the EU review of active substances on the availability of plant protection products for Polish farmers. The following issues are analysed in the paper: number of plant protection products placed on the Polish market; changes in number of plant protection products after EU accession in different groups of plant protection products (fungicides, herbicides, insecticides and others); expected changes resulting from the withdrawal of active substances due to the lack of support in the fourth round of review. The article mentions the problem of minor crops and the fact that plant protection products in Poland are usually re – registered for less approved uses than before.

Optimised application of plant protection products for control of Colorado Potato Beetle (*Leptinotarsa decemlineata* Say) in organic farming

Stefan Kühne¹, Torben Reelfs², Frank Ellmer², Benno Kleinhenz³

¹Biologische Bundesanstalt für Land- und Forstwirtschaft, Institut für integrierten Pflanzenschutz, Kleinmachnow

²Humboldt Universität zu Berlin, Landwirtschaftlich Gärtnerische Fakultät, Fachgebiet Acker- und Pflanzenbau

³Zentralstelle der Länder für EDV-gestützte Entscheidungshilfen und Programme im Pflanzenschutz (ZEPP), Bad Kreuznach

The Colorado Potato Beetle is one of the most important pests of potatoes. The effect of various plant protection products with neem oil (NeemAzal-T/S), pyrethrum/rape oil (Spruzit Neu) and *Bacillus thuringiensis*-B.t.t.(Novodor FC) against this pest has been compared in a field experiment from 2004 until 2006. The combined application of Neem oil and B.t.t. have reduced the number of Colorado Potato Beetle larvae as well as the losses of plant material by feed of the beetle larvae significantly. In three years of field experiments the application of pyrethrum/rape oil has shown no significant effect to reduce the number of Colorado Potato Beetles.

Analyses of pesticide use in reference farms with regard to needed minimum

Günther Astrid¹, Pallutt Bernhard², Freier Bernd³, Büttner Carmen⁴

¹a.guenther@bba.de

²b.pallutt@bba.de

³b.freier@bba.de

⁴carmen.buettner@agrar.hu-berlin.de

With the passage of the “Action Plan for Reduction of Pesticide Use” in 2004, the treatment frequency index (TFI) was introduced in Germany as an instrument to measure the intensity of use of plant protection products. One advantage of the TFI is that it makes it possible to compare different units, such as kilograms, litres and grams. Furthermore, it makes it possible to determine whether any actual reductions in pesticide use have been achieved.

We therefore conducted a retrospective analysis of pesticide use in various crops, especially winter wheat and winter rape, at five German reference farms with different climate and soil characteristics from 1998 to 2005. TFI's were calculated for each farm, year, and main crop. Potential correlations between the intensity of

pesticide use and relevant agricultural factors like time of sowing, preceding crops and the type of tillage were also investigated.

Our findings show that the intensity of pesticide use in winter rape and winter wheat increased in 2 of 5 farms studied. The variation between the years was less pronounced in herbicides and more pronounced in insecticides than in other plant protection products.

The highest treatment frequency indices were measured in sugar beet herbicides (farm 5: 3.7; farm 2: 2.6), winter wheat fungicides (farm 1: 2.2; farm 5: 2.9), and winter rape insecticides (farm 1: 2.3; farm 3: 2.9). TFI's below a mean 1.0 were achieved in growth regulators and fungicides except winter rape.

In winter wheat, there was a correlation between the date of sowing and the intensity of fungicide use in 2 of 5 farms, and between the date of sowing and the intensity of herbicide use in 2 of the farms. Furthermore, the intensity of growth regulator use correlated with the date of sowing in one farm, and with variety properties in another farm.

Variability of aliphatic glucosinolates in Arabidopsis and their influence on insect resistance

Franziska Rohr¹, Christian Ulrichs¹, Inga Mewis¹

¹Humboldt-Universität zu Berlin, Institut für Gartenbauwissenschaften, Urbaner Gartenbau, Lentzeallee 55/57, Berlin-Dahlem

The glucosinolate(GS)-myrosinase system comprises a defense especially against generalist herbivores. GS are usually found in members of the order Brassicales which includes the Brassicaceae. Based on their side chain structure GS are grouped into aliphatic, aromatic, and indolyl GS. Indolyl GS are widely distributed in *A. thaliana* ecotypes and the Brassicaceae family, but the presence of aliphatic GS is very variable and under strong genetic control. There are only few studies paying attention to the impact of certain GS on insect resistance. Due to this, we have investigated the plant resistance of *A. thaliana* ecotypes with variable aliphatic GS profiles against two lepidopteran insect pests with different specialization. For the experiments we chose 19 ecotypes, which were divided into three groups after HPLC analysis: containing 1) methylsulfinyl, 2) 3-hydroxypropyl, and 3) allyl GS. The different *A. thaliana* ecotype groups were different suitable for consumption by the generalist *Spodoptera exigua* Hübner and the specialist *Pieris brassicae* L.. Percentage weight gain of larvae on *A. thaliana* plants containing 3-hydroxypropyl GS and allyl GS was significantly higher for both insects than on methylsulfinyl GS containing ecotypes. But the tendency was stronger for *P. brassicae* than for *S. exigua*. Simple correlation of insect feeding to GS contents revealed that ecotypes containing 3-hydroxypropyl GS were less resistant than ecotypes with methylsulfinyl GS at similar concentrations. Weight gain of *S. exigua* was statistically significant negatively related to constitutive GS level only in methylsulfinyl GS containing ecotypes. Also a negative relation to constitutive GS levels but less strong was found for *P. brassicae* in methylsulfinyl GS containing ecotypes. Furthermore, ecotypes with 3-hydroxypropyl GS as substrate were less resistant to insects compared to ecotypes with methylsulfinyl GS when comparing similar hydrolysis product concentrations. But this was independent from the type of hydrolysis product produced, isothiocyanates vs. nitriles.

Studies on the effect of composting on the organism causing potato wart disease in potato

Steinmüller, Silke¹, Müller, Petra², Büttner, Carmen¹

¹Humboldt-Universität zu Berlin, LGZ, Institut für Gartenbauwissenschaften, FG Phytomedizin, Lentzeallee 55/57, D-14195 Berlin

²Biologische Bundesanstalt für Land- und Forstwirtschaft, Abteilung für nationale und internationale Angelegenheiten der Pflanzengesundheit, Stahnsdorfer Damm 81, D 14532 Kleinmachnow

Wastes from potato processing may be contaminated with the causal agent of potato wart disease (*Synchytrium endobioticum*, *SE*). For this reason, waste must be sanitized before applying it to agricultural fields. The German Biowaste Ordinance sets out composting as an appropriate measure to sanitize waste.

The present study is aimed at finding out whether *SE* can be totally eradicated by composting.

Quartz sand contaminated with resting spores of potato wart disease pathotype 1 was introduced through special carriers into the substrate to be composted. The substrate was a mixture of pulp and garden compost at a ratio of 2:1. Composting was conducted in two 60-l composters. The first run lasted 2 weeks respectively 2 months. Temperatures were held below 50°C. Further composting runs lasted 12 and 21 days. Temperatures reached 65°C during that time.

To evaluate the experiment, resting spores of the causal agent were recovered from the composted substrate using a sieve washer and then examined under microscope for filled (vital) or empty (dead) resting spores. This was paralleled by a bioassay on potato tubers (tube test). After two weeks respectively two months composting, vital resting spores were isolated from the substrate, while the bioassay did only sporadic result warts on the test plants. However, results of the bioassay are of reduced reliability because it is very difficult to standardize the

test. Only a few control plants in untreated contaminated quartz sand showed warts. Evaluation of composting for 12 and 21 days held above 65°C is still under way.

Biocontrol Activity and Molecular Characterization of of Some *Tilletiopsis* spp. against Grape Powdery Mildew

Wafaa, M. Haggag¹, Mahmoud. M. Saker², Mahmoud A. Ibrahim³

¹Plant Pathology Dept., National Research Center, Dokki, Cairo, Egypt

²Plant Molecular genetics Group, Nobel Project, National Research Center, Dokki, Cairo, Egypt

³Molecular Biology Dept., National Research Center, Dokki, Cairo, Egypt

The efficacy of yeast-like fungus *Tilletiopsis pallescens* Gokhale, *T. minor* Nyland and *T. washingtonensis* Nyland against powdery mildew caused by *Uncinula necator* was investigated on grape (*Vitis vinifera*). Germination of *U. necator* and disease incidence were reduced on leaf disks after inoculation and treatment with either blastospores or culture filtrate. Conidiospores germination and development were affected after treatment with *T. pallescens* culture filtrate, as determined by Scanning Electron Microscope (SEM) examination. In general, isolates of different *Tilletiopsis* spp. had high levels of protease, exochitinase, exoglucanase and β -1,3-glucanase activities in broth cultures. Maximum production of hydrolysis enzymes by *Tilletiopsis* spp. in broth culture occurred up to 21 days. There were significant differences among the species, and highest overall enzymes activity was present in *T. pallescens* and the lowest in *T. washingtonensis*. Electrophoretic analysis on native polyacrylamide gel showed over production of high levels of protease and low level of β -1,3-glucanase. SDS-PAGE of total proteins also showed different protein pattern of the isolates. The developed RAPD banding patterns of the different isolates revealed incidence of polymorphism among the isolates, although there were some common amplification bands. Single or combined *Tilletiopsis* spp. were tested in naturally infected field conditions at Behera Governorate. A wettable powder product was formulated of *Tilletiopsis* sprayed twice a monthly on grapevines of King Ruby, Superior and Thompson Seedless cvs. during the period from March 1st to June 1st, reduced powdery mildew on leaf, flowers and clusters. *Tilletiopsis* spp. significantly reduced powdery mildew disease incidence and improved yield under natural infested conditions. Combined foliar application of these *Tilletiopsis* spp. provided protection at an important level against powdery mildew on leaves, flowers and clusters than in treatment with single one. *Tilletiopsis* spp. were also more efficient in dropping the *U. necator* growth in phyllosphere.

Estimation of corn yield loss as affected by single or binary competition with common cocklebur and jimsonweed using early season weed density empirical models

H. Karimmojeni¹, H.Rahimiyan Mashhadi², H.M. Alizadeh³, M.Nassiri Mahallati⁴, Zoheir Yaghoobi Ashrafi⁵

¹-P.hd Student of Weed Science Agronomy Dep., College of Agriculture, Tehran University, Karaj (Iran)

²Faculty member of Agronomy Dep., College of Agriculture, Tehran University, Karaj (Iran)

³Faculty members of Agronomy Dep., College of Agriculture, Tehran University, Karaj (Iran)

⁴Faculty member of Agronomy Dep., College of Agriculture, Mashhad University, (Iran)

⁵M.Sc Student of Weed Science Agronomy Dep., College of Agriculture, Tehran University, Karaj (Iran)

Field experiments were conducted to determine the influence of single and multispecies competition of common cocklebur and jimsonweed on corn yield and competitive abilities of common cocklebur and jimson weed. Common cocklebur (*Xanthium strumarium*) and jimsonweed (*Datura stramonium* L.) were established at selected densities within 15 cm on either side of the corn row. Common cocklebur and jimsonweed seeds were sown concurrently with corn. Corn yield loss in the condition of single and multispecies weed competition was estimated from empirical equations based on the Cousens(1985) hyperbolic crop yield model. The results showed that common cocklebur was more competitive than jimsonweed across all situation. In the mixed weed population plots including jimsonweed, cocklebur and corn, when common cocklebur was assigned a competitive index of 1 on a scale from 0 to 1, the competitive ability of jimson weed was 0.25 of common cocklebur, while in the single weed population plots, one common cocklebur plant had 1.40 fold higher ability to seed corn as jimsonweed. The results of this study, as the first experiment which include the competition effects of jimsonweed and common cocklebur on corn, suggest that different weeds competition coefficients must be estimated from mixed weed population experiments.

Key words: multispecies interference, single weed specie interference, weed density, yield loss, competitive index, corn, common cocklebur, jimsonweed.

Documentation of Pesticide Applications in Arable Farming

Steinmann, Horst-Henning¹, Battermann, Henning², Theuvsen, Ludwig²

¹University of Goettingen, Centre of Agriculture and the Environment, Am Vogelsang 6, D-37075 Goettingen, Germany

²University of Goettingen, Department of Agricultural Economics, Platz der Goettinger Sieben 5, D-37073 Goettingen, Germany

In Germany recording of pesticide applications came into farmers practice with the last official revision of guidelines for good agricultural practice (GAP). These guidelines demand for detailed documentation of pesticide measures. The recent plant protection act does not quote a mandatory documentation but there is a demand for consideration of GAP. In fact, EU legislations 178/2002, 852/2004 and 183/2005 require documentation of the complete agricultural process chain including plant protection. Additionally, in many cases documentation of pesticide use and application data is already required by traders, millers, process labels and contract partners. Thus, farmers are enforced by several ways to fulfil proper documentation. Although, critics of pesticide use argue that documentation is insufficient and misuse may take place. Data is lacking to evaluate current state of agricultural practice in this area.

Determination of water extractable deltamethrin metabolites in different kinds of tea and non-extractable residues in tea

Klimusch, Anna¹

¹Humboldt University at Berlin, Faculty of Agriculture and Horticulture, Invalidenstr. 42, 10115 Berlin, Germany

With a metabolism study of ¹⁴C-Deltamethrin in tea plants we examined its major pathways in the tea plant under greenhouse conditions. The main aspect was the building of conjugated and bound residues with the tea matrix. From the applied plant materials were produced different kinds of tea. These teas and their infusions were analyzed of the deltamethrin residues and metabolites.

These data supplied the information about dependence of the release of deltamethrin-metabolites from the fermentation degree of the tea.

Another special aspect of this study was the determination of the bound or non-extractable residues. After the chemical cleavage of the plant cell wall, we were able to measure the radioactivity in each hydrolyzed fraction.

Effect tankmix herbicide with fertilizer in weed management wheat

Zoheir.Y.Ashrafi¹, Hassam .M.Alizadeh², Hamid .R.Mashhadi², Sedigheh sadeghi¹

¹M.sc , student , TEHRAN university

²professor of TEHRAN university

Tank mixed of herbicides with Fertilizer is among the strategies applied to our come these problems. For this reason on experient was carried out in the research farm of , University of Tehran,in 2005-2006 . Experimental design was factorial arrangement of herbicide treatment 1- clodinafop 0.7 L/ha + tribenouron-methyl 20 gr/ha 2- Diclofop methyl 2.5L/ha + tribenouron-methyl 20 gr/ha 3- Sulfosulfuron 27gr/ha 4- Iodisulfuron + mesusulfuron + safener(prepackaged formulation 250gr/ha) and fertilizer 1- Urea 5% w/n at 10 kg/ha 2- Zinc sulphate 0.3% w/n 3 kg/ha 3- Urea + Zinc sulphate 4- Control (Not application of fertilizer)based on Complete randomized blocks with 3 replications . weedy and weed free checks were also included .There were significant effect of treatment on wheat biomass with clodinafop + tribenouron-meth +urea + zinc sulphate yielding the highest biomass (7710kg/ha). There were no significant difference among treatment with wheat grain yield , howere , the highest and lowest yield were obtained with clodinafop + tribenouron-meth +urea + zinc sulphate (7940kg/ha) and Iodisulfuron + mesusulfuron (6030kg/ha) , respectively. Harverst index was significantly higher than other treatments in weedy check and clodinafop + tribenouron-met applied alone. Seed thousand weight (STW) was significantly affected by treatments and the highest stw of 47 g was achieved with Iodisulfuron + mesusulfuron . plant number per m² ,plant height , spike number and protein content were not affected by treatments. Leaf area index (LAI) was significantly higher in clodinafop + tribenouron-meth + zinc sulphate and Iodisulfuron + mesusulfuron+ urea + zinc sulphate with Diclofop methyl + tribenouron-methyl exhibiting the lowest LAI .All herbicide (± fertilizer) treatment provided effective control of weeds with no significant difference among them in terns of both bread-leaved and grass weed control clodinafop + tribenouron-meth +urea + zinc sulphate controlled grass weed 88% . bread-leaved weed control was 94% with Iodisulfuron + mesusulfuron+ urea and clodinafop + tribenouron-meth + zinc sulphate (91%) .

Weed Community shifts as Influenced by Long-term Saffron (*Crocus sativus*) and Black Zira (*Bunium persicum*) Intercropping

M, B, Msgaran¹, H, R, Mashhadi¹, E, Zand², H, M, Alizadeh¹

¹Department of Agronomy, University of Tehran, Karadj, Iran

²Department of Weed Research, Plant and Pest Disease Research Institute, Tehran, Iran

The development of integrated weed management strategies requires knowledge of mechanisms that influence compositional changes in weed flora. A 7-years study was initiated in 1999 and the response of above ground weed flora to the intercropping of saffron (*Crocus sativus* L.) and black zira (*Bunium persicum* (Boiss.) B. Fedtsch) was investigated. Mixtures were consisted of 0/100, 25/75, 50/50, 75/25 and 100/0 saffron/black zira ratios, each planted at 3 densities of 30, 50 and 70 plant m⁻². A split plot design based on randomized complete blocks with 4 replications was used. Densities were assigned to as main plots with ratios constituted the subplots. Data were collected during 1999-2003 and 2006. Mixture ratios caused drastic species compositional changes in weed flora for which univariate and multivariate explored five major associations: 1- weeds that preferred higher ratio of saffron in mixture e.g. grasses, field bindweed (*Convolvulus arvensis* L.), pigweeds (*Amaranthus* spp.); 2- weeds that preferred higher ratio of black zira in mixture e.g. Persian speedwell (*Veronica persica*), flixweed (*Descurainia sophia* (L.) Webb.), knotweed (*Polygonum aviculare* L.) and eartsmoke (*Fumaria vaillantii* Lois.); 3- weeds that were more abundant in 50/50 mixtures e.g. some species of Caryophyllaceae; 4- weeds that showed no specific pattern e.g lambs quarter (*Chenopodium album* L.).

Key words: Weed Community, Intercropping, Black Zira, Saffron

The study on allelopathy effects of *H. spanthium* on seed germination and seedling growth of different cultivar of wheat

Sedigheh Sadeghi¹, Hassam .M.Alizadeh², Zoheir.Y.Ashrafi¹

¹M.sc , student , TEHRAN university

²professor of TEHRAN university

One possible way is by using instantaneous ability of plants including selection for plants with high competitive ability and those of which produce growth inhibitors. An appropriate alternative to weaken the dependency of weed management programs to herbicides is application of allelopathy. Allelopathy is defined as the biochemical interaction of plants, including beneficial or detrimental effects, which are carried out by producing chemical compounds and exudation of these materials into the environment. The allelopathic activity one species of weed (*H. spanthium*) against 4 cultivars of wheat was investigated. The aqueous extract of this weed were diluted to 75, 50 and 25 strenght. The effect of this extract on germination and seedling growth of 4 wheat cultivars were studied. The data showed that the allelopathic activity of aqueous extract of weed had differ significantly against wheat cultivars. The weed had different effects on the percentage of seed germination, coleoptiles and root length and dry weight of 4 cultivars of wheat.

Key words: allelopathy, *H. spanthium*, seed ,

The germination response of primed bristlegrass (*Setaria viridis*) seeds to drought, salt and temperature stress conditions

Sedigheh Sadeghi¹, Zoheir Yaghoobi Ashrafi¹, H.M.Alizadeh²

¹Ms.c student, tehran university

²Professor of TEHRAN university

One possible way is by using instantaneous ability of plants including selection for plants with high competitive ability and those of which produce growth inhibitors. An appropriate alternative to weaken the dependency of weed management programs to herbicides is application of allelopathy. Allelopathy is defined as the biochemical interaction of plants, including beneficial or detrimental effects, which are carried out by producing chemical compounds and exudation of these materials into the environment. The allelopathic activity one species of weed (*H. spanthium*) against 4 cultivars of wheat was investigated. The aqueous extract of this weed were diluted to 75, 50 and 25 strenght.. The effect of this extract on germination and seedling growth of 4 wheat cultivars were studied. The data showed that the allelopathic activity of aqueous extract of weed had differ significantly against wheat cultivars. The weed had different effects on the percentage of seed germination, coleoptiles root length and dry weight of 4 cultivars of wheat.

Effect of chemical control on weed seed bank size and composition in corn-barley rotation system

mostafa oveisi¹, ibrahim reismohammadi¹, hasan mohammadalizadeh¹, mohammad ali baghestani²

¹department of agronomy, the university of tehran,Iran

²plant pest protectio institue,tehran,Iran

Changes in weed seed bank due to crop production practices are an important determinant of subsequent weed problems. To study the effect of chemical control on agricultural rotation systems, a study was conducted during 2004 and 2005. Corn-barley was the selected rotation with and without applying of herbicide. Method of sampling was systematic (zigzag) and the time of the sampling stages were in two dates on before sowing and after harvesting of barley. To compare the diversity between farms, Shannon-Weiner diversity index was calculated. Based on results, weed seed bank densities in chemical managed farms (CMFs) was generally higher than those farms without chemical control (NMFs). At first sampling, average weed seed bank populations in CMFs, were 49 and 31 seeds/ kg of soil, and for NMFs were 136 and 177 seeds/kg soil in 2004 and 2005, respectively. The weed seed bank density in second sampling date (post harvesting of barley) for CMFs were 33 and 30.5 seeds/kg soil, and for NMFs were 210 and 254 seeds/kg soil in 2004 and 2005, respectively. seed bank density decreased over sampling times (growing season) for CMFs in 2004 as contrasted to those of none chemical controlled. In 2005, The variation trend of the seed bank densities for managed farms, was constant between the two stages of sampling. But the trend of variation in NMFs was similar to previous year. Shannon-Weiner diversity index in CMFs was higher than those of not controlled. Probably, herbicide spraying had caused to prevent the seed production cycle of weeds and reduced the rain of weed seed into soil. Result of this study demonstrated the importance of weed control practices in reducing weed seed bank size.

Keyword: seed bank, rotation system, chemical control, diversity.

SOME ARABLE CROPS INTEGRATED PEST AND NUTRITION MANAGEMENT IN THE STEPPE ZONE OF UKRAINE

Mykola Kharytonov¹, Yeugen Dudka², Vladimir Patyka³

¹State Agrarian University, Voroshilov st.25, 49600,Dnipropetrovsk, Ukraine

² Grain Institute of NASU, Dzerzhinskogo 14, Dnipropetrovsk, 49600, Ukraine

³Microbiology Institute of NASU, Kiev, Ukraine

Pest problems of crops are numerous in the steppe zone. The phytopathogen fungies dissemination and composition content have been monitored in the winter wheat plantings settled in the northern Steppe of Ukraine from 1997-1999. Observations showed that 8.1-40.3 % of two upper leaves surface was damaged with Septoria Spot, up to 13 % - Downy Mildew, and 7%-orange leaf rust. The leaves Septoria Spot Agents composition content investigation showed that disease was caused with third fungies. Two of them were identified as Septoria tritici and S.nodorum including their stages Mycosphaerella graminicola and Leptosphaeria nodorum. The plants root rots affection level was 1.5-19.8% 3-4 times growth of root rots affection was fixed after heading stage. Two fungous Bipolaris sorokiniana and Fusarium spp. were determined for all winter wheat stages in damaged roots and lower part of stalk. As a rule, Fusarium spp. was main kind of Fusarium fungies. During several years the fungicides seeds treatment impact on winter wheat affection with root rots has been estimated in the field experiments in the Dnipropetrovsk province. Some diseases and disorders of tomato and potato include root rots, late blight, stolbur, blossom - end rot, sunscald, internal browning are there too. Insect problems include Colorado Potato Beetle, wire worm, aphids, earth crab, etc. Late blight occurrence on tomatoes in 1997 shows local pest and pesticide management problems. Root rots are the second factor which limits tomato yield. New bacterial fertilizers and biological control strategies include products which are able to improve symbiotic and associative nitrogen fixation in the root zone, and soil phosphorus mobilization.

Lignosulfonates based compositions as a disease control strategy for plant protection in Belarus

Hamolka, Lioubou¹, Hryshchuk, Nadzeya², Krut'ko, Nikolai¹, Shulga, Natalja¹

¹The institute of general and inorganic chemistry of the National Academy of Sciences of Belarus, 9 Surganava Street, Minsk BY-220072, Republic of Belarus

²Belarus State Economic University, 26, Partizanski Av, Minsk, 220070, Republic of Belarus

Two yield-limiting diseases of long-fibred flax (*Linum usitatissimum*) in Belarus are anthracnose (*Colletotrichum lini*) and chlorosis (abiotic) with correlation coefficient of 0.7-0.8. Diseases are widespread on 90% of flax cultivation area and related to photosynthesis inhibition of flax leaves. Economical loss owing to disease detriment reaches 30-40% of possible flax yield value and yet more on light soils.

The existing disease management practices, based primarily on integrated usage of chemicals, are expensive and do not give effective protection. The lignosulfonates (phytogenic natural polymers derived from the wood pulping process) are more effective compounds because of their high biological activity, absence of

phytotoxicity and cheapness. This study aims to develop new antifungal chelates compositions of lignosulphonates for flax foliar application having high agronomic and economical efficiency.

We developed the technique of chemical modification of lignosulphonates for the purpose of increasing of sorptive capacity with respect to biometals. New products have a stronger affinity for metal ions and form highly stable polymer complexes. Their macromolecular structure is typical for phytoactive polymers and contains metals ions (zinc) as side groups.

New antifungal lignosulfonates compositions show powerful efficiency in increasing of stability of plants to stress impact at flax foliar application because of accumulation and translocation of zinc by plant tissues. Lignosulphonates reduced the disease incidence of anthracnose – up to 2-2.5 times, of calcium chlorosis – in 2.2-8.8 times; they influenced on plants growth (specifically on capsules number and length of plants), productivity (increasing of the yield of straw and seeds, and also quantity and quality of fiber). Significant advantage of these compositions is their macromolecular nature, providing good adsorption at applying on plants and high adhesion strength.

Our results indicate that current disease management practices may be enhanced by including foliar spray of new biopesticides.

Effect of kresoximmethyl on coffee berry disease in Kenya.

Gilbert M. Kairu¹

¹Coffee Research Station, P.O. Box 4-00232, Ruiru, KENYA.

Kresoxim-methyl is a synthetic derivative of naturally occurring strobilurins found in wild mushrooms (Ypema & Gold, 1999). A formulation (BAS 500F or Cabrio) of kresoxim methyl was introduced in Kenya, by BASF Corporation for laboratory screening and subsequent field evaluation against Coffee Berry Disease (CBD) caused by *Colletotrichum kahawae*. The disease is of major economic importance in coffee farming. It attacks green berries during the expansion stage, resulting in massive berry-fall and mummification. About 80% crop-loss has been recorded after a severe CBD epidemic in the past.

The findings have important implications in coffee farming, related to: increased efficacy of chemical management of CBD; reduction of fungicide carting costs and widening the scope for pesticide reduction in the environment.

The effect of day and night tillage on weed emergence

Mousavi nik Atefeh¹, Rahimian Hamid¹, Jodakhanloo Ali¹

¹Department of agronomy- Tehran University- Karaj-Iran

Photoblasticity of weeds seeds is a trait that can be explored to propose new control methods. Conducting tillage at night, thus preventing the photo induction of weed seed germination can be used as a means to reduce weed emergence.

This study was conducted to assess the effects of day and night tillage at different dates during the growth season on weed emergence experimental design was randomized complete block with four replications. Tillage treatments consisted of day tillage-day disk, day tillage- night disk, night tillage- night disk and night tillage- day disk. Time of tillage was (6 February, 6 March, 6 April). Four fixed quadrates were established in each plot where weed seedlings were counted at different times after field tillage. The night tillage reduced emergence of all weed species except fox tail. The emergence of common lambsquarter (*Chenopodium album*), redroot pigweed (*Amaranthus retroflexus*), tutssole(*Chrozophora tinctoria*), black nightshade (*Solanum nigrum*) and birdseye speedwell (*Veronica persica*) in night tillage treatment was 54%, 63%, 43%, 40 and 50% lower than that of day tillage, respectively. Tillage treatment had no significant effect on foxtail (*Setaria species*) emergence. Tillage treatment on February sixth significant increased weed emergence compared to other two date of tillage. This could be a result of higher soil moisture content during February compare to March and April.

Weed control .Photoblasticity. Germination .Day and night tillage

Ecology of fungi associated with oak powdery mildew, *Erysiphe alphitoides*

Eleni Topalidou¹, Michael W. Shaw¹

¹School of Biological Sciences, University of Reading, Lyle Tower, Whiteknights, RG6 6AS, Reading - UK
Powdery mildew (*Erysiphe alphitoides*) on oak (*Quercus robur*) was extremely commonly intimately associated with a variety of other fungi. Some of these were isolated on artificial media and were organised in morphological groups, since their definite identification was not possible. Three of the isolated symbionts (under the group names: Group I, Group IV and Group V) were tested in glasshouse experiments. The symbionts were inoculated onto young oak leaves. No effects were visible on the leaves. Symbionts were applied to oak leaves, which had been previously inoculated with powdery mildew, singly and in combinations of two. The treated oak

leaves were covered with permeable-transparent bags in order to reduce immigration of external micro-organisms. Assessments of powdery mildew disease severity were made twice per week. When the leaf area was about 80%-100% covered with powdery mildew, leaves were detached and a final assessment was made macroscopically and microscopically. Symbionts were related with powdery mildew in different ways. Group IV inhibited powdery mildew; group V increased powdery mildew severity; and the powdery mildew severity of the leaves treated with group I was similar to the severity of the powdery mildew control leaves. In addition, different inhibition levels were observed according the leaf age. The relationship between the population densities of powdery mildew and its symbionts is being investigated. Molecular techniques are being used in order to identify the applied micro-organisms.

Molecular ecology of systemic *Botrytis cinerea*

Rajaguru, Anuja¹, Shaw Micheal²

¹School of Biological Sciences, University of Reading, Whiteknights, Reading, RG6 , 6AS UK

²School of Biological Sciences, University of Reading, Whiteknights, Reading, RG6, 6AS UK

Botrytis cinerea is the causal organism of grey mold disease. Three isolates of *B. cinerea* were transformed with the Green Fluorescent Protein gene by *Agrobacterium* mediated transformation. Hybrid *Primula* seedlings (six leaf stage) and flowers were inoculated with the transformed pathogen. GFP expressing *B. cinerea* was isolated from symptomless, none inoculated, leaf and stems of leaf inoculated plants and from ovaries of both leaf and flower inoculated plants. Visualisation was difficult because the host autofluoresced brightly. Isolates of *B. cinerea* were collected from three locations at least 90 miles apart in the UK. At each location isolates were obtained from non-symptomatic fruits of *Rubus fruticosus* and *Fragaria x ananassa* and from non-symptomatic roots or leaves of *Taraxacum* agg. and *Primula vulgaris*. Isolates were genotyped at nine microsatellite loci. Populations from different hosts are genetically distinct and there are probably differences between regions.

Genetic variability in the populations of the hyperparasitic fungus *S. filum* from *Puccinia* sp. rust on grasses.

Kajamuhan Anparasy¹, Shaw Micheal¹

¹School of Biological Sciences, Lyle Tower, University of Reading, Whiteknights, Reading, RG6 6AS, UK

The rust hyperparasite *Sphaerellopsis filum* occurs naturally on many rust genera worldwide. Variation has been reported from rusts on various broadleaf hosts, especially *Melampsora*. To study the genetic variability of *S. filum*, 94 isolates were collected from *Puccinia* sp. on ten different grass species: *Holcus lanatus*, *Holcus mollis*, *Festuca arundinacea*, *Arrhenatherum elatius*, *Poa trivialis*, *Cynosurus cristatus*, *Bromus erectus*, *Anthoxanthum odoratum*, *Agrostis gigantea*, and *Dactylis glomerata*. Isolates from *H. lanatus*, *A. elatius* and *P. trivialis* came from large populations separated by about 5 km; other isolates were collected from a botanic collection of grasses growing in close proximity. Internal Transcribed Spacer (ITS) region was amplified with the primers ITS 4 and ITS 5 and sequenced. Based on bootstrap analysis using 1000 replicates in PAUP, it was shown that there are three distinct groups of *S. filum* in the isolates examined. Two large clades and one smaller one with 100% support for the groupings were distinguished. One of the large clades contained *S. filum* isolates from *P. poarum* on *Poa trivialis*. Two isolates from *P. coronata* on *A. gigantea* fell into a clearly separate clade. All other isolates were very similar, despite coming from a range of rust species and host grasses.