For over 80 years the scientists around the world have been conducting laboratory experiments to help understand the fate and the behaviour of pesticides in the ecosystem. “Once upon the time” the research based on simple observations, simple measurements and analysis. “Once upon the time” the copper and its salts while today we have hundred pesticide and metabolites with huge profile in safety and plant health protection. Much has been learned over this time. Mathematical models, analytical chemistry, applied biology have advanced maintaining the pesticide science the most advanced science-based regulation allowing the implementation of pest strategies as well the achievement of food safety, human security and health protection goals. However there still remain many things that we don’t know, or are not able to predict but we are confident, and this collection of paper is the evidence, that such unbelievable science – and its community - will remain also in the future pioneer on-demand of the science, of the policy and of the stakeholder populations.

Ettore Capri, Marco Trevisan

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XV SYMPOSIUM IN PESTICIDE CHEMISTRY

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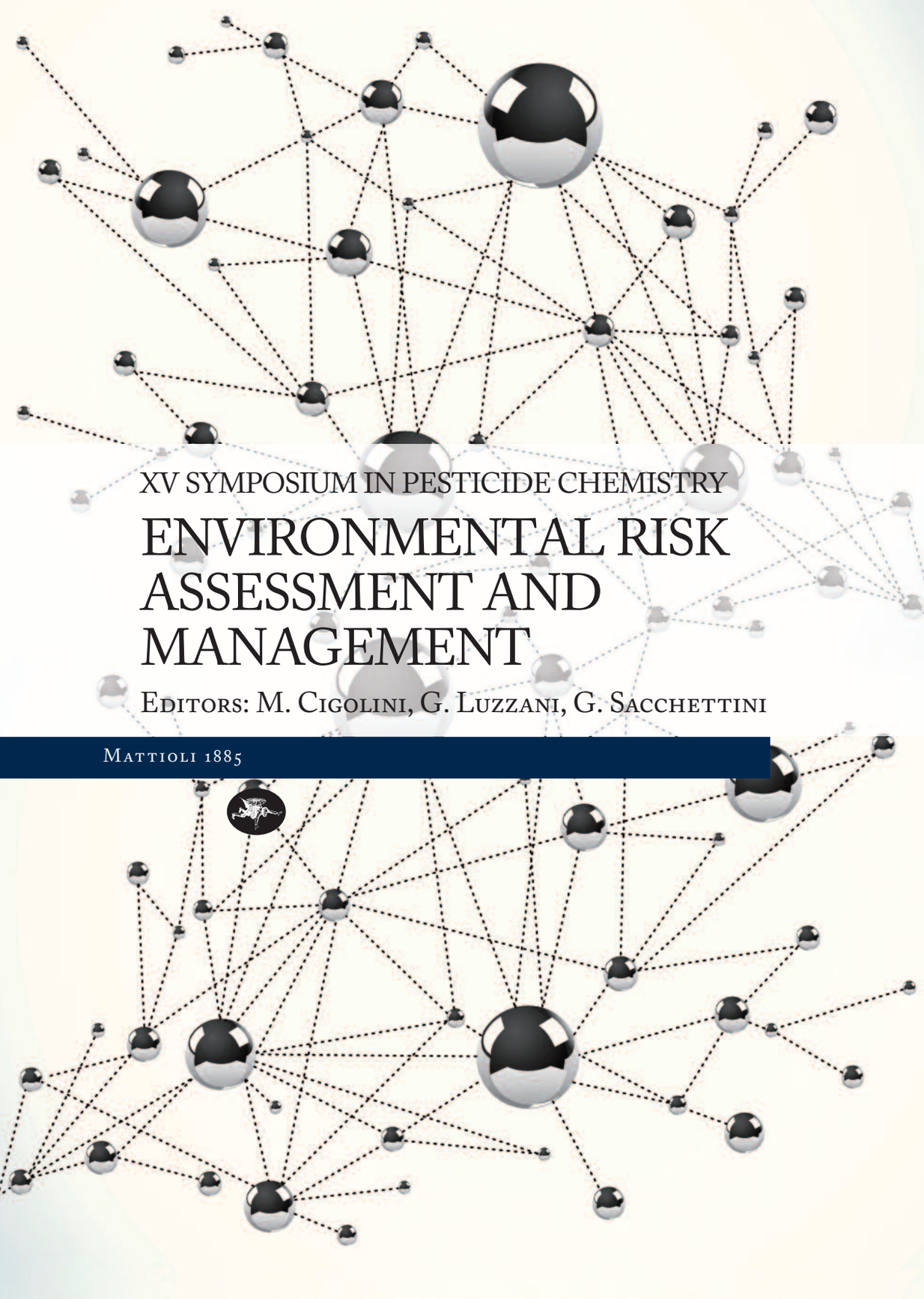

XV SYMPOSIUM IN PESTICIDE CHEMISTRY

ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT

Editors: M. Cigolini, G. Luzzani, G. Sacchettini

Mattioli 1885

EDITORS: MANUELA CIGOLINI, GLORIA LUZZANI, GABRIELE SACCHETTINI

XV SYMPOSIUM IN PESTICIDE CHEMISTRY

ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT

editors
Manuela Cigolini, Gloria Luzzani, Gabriele Sacchettini

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Session VI - Sustainable Use

PRESENTERS

INTRODUCTION

Pesticides are mainly used in agriculture to keep crops healthy and prevent them from being destroyed as a consequence of disease and infestation. Nowadays, it is widely recognized that the main challenge relay on guarantee that their use do not have any harmful and unacceptable effects on human health and on environment. This is particularly enhanced by the new legislative framework developed in the last few years especially in the European Union (i.e. the so called "pesticide package" in 2009) where this aspect is considered fundamental in a wide sense of sustainability.

In this view, appear quite clear that different aspects of the pesticide science are interconnected and need to be addressed in parallel either using an integrated approach (i.e. from laboratory studies to landscape studies, from soil to atmosphere, from ecosystem services to multi functionalities of the farms) either involving a wide range of stakeholders into the debate (i.e. scientists, regulators, farmers, industries, associations and citizens).

Following these needs, it has been organised the SPCXV Symposium in Pesticide Chemistry which main purpose is to develop a scientific platform to stimulate the exchange of the most recent information in the various fields of pesticide science promoting constructive interactions between them and among the main stakeholders involved (especially research, regulatory and industrial communities).

For this reason, the Symposium has been structured around six main complementary and interconnected topics (Laboratory, Field, Landscape, Monitoring, Risk Mitigation and Sustainable Use) with the Use of Models as horizontal drivers for a consistent calculation and validation of the related phenomena.

Each session of the symposium has been organised with oral and poster presentations to share recent discoveries. Furthermore, serval plenary discussions were included to identify future directions for advancing research and regulation of agricultural chemistry and pest management science.

A large number of valuable scientific contributions has been received from our call showing the high interest among scientists on these topics and on the approach proposed. For this reason, it is important to see this Symposium not only as a simple occasion to exchange experiences among colleagues but also as a real opportunity that we need to take together to build and reinforce a network among scientists who share similar views and objectives.

This idea is not new. Indeed, it represented the main stimulus since 1979 when the first edition of the Symposium was promoted by Paolo Fontana and Attilio del Re, professors of the Institute of Agricultural and Environmental Chemistry of the Uni-

versità Cattolica del Sacro Cuore. Since that time, after 36 years, the SPC has grown intensively reaching an international top level which proves the goodness of this approach.
Last but not least, we would like to take the occasion to thank all the people that have actively contributed to the development of such important event with particular emphasis to all the members of the Scientific Committees, the Sponsors as well as all participants willing to share their valuable research experiences.

Manuela Cigolini
Gloria Luzzani
Gabriele Sacchettini

SESSION I
LABORATORY STUDIES

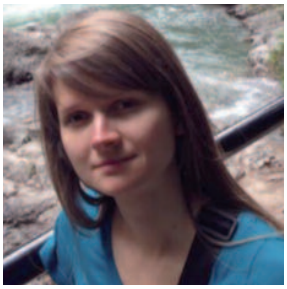
A wide range of mechanisms and processes influence the transformation, movement and availability of pesticides in soil, water and air. This chapter provides an update of research and new work including microbial, hydrolytic and photolytic mechanisms; diffusion, plant uptake, adsorption, desorption (including time dependency), bound residues, leaching and volatilization processes. Work on soil microbial understanding, including effects and modelling work related to laboratory scale investigations are included. Combined mechanism studies such as aerobic mineralization, water/sediment and microcosm systems, the effects of light appear also relevant, as are the studies on metabolites.

Session Chair
- Christopher Leake, Bayer Crop Science (Germany)

Session Co-Chairs
- Sabine Beulke, The Food and Environment Research Agency (United Kingdom)
- Carole Bedos, INRA (France)

Biogenic residue formation from pesticides in soil: extent and relevance for risk assessment

Karolina M. Nowak, Shizong Wang, Anja Miltner, Andreas Schäffer, Matthias Kästner



Presenter Nowak Karolina M.

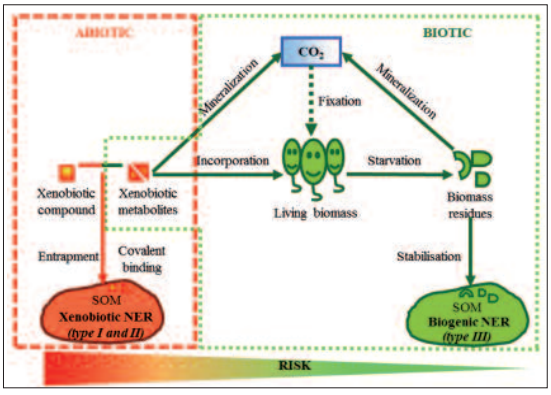
RWTH Aachen University, Institute for Environmental Research - Worringerweg 1
Aachen, Germany
E-mail: karolina.nowak@ufz.de

Objectives

- To determine the turnover mass balance of structurally diverse groups of pesticides
- To investigate the extent of biogenic residue formation
- To assess the contribution of biogenic residue to the overall NER formation
- To evaluate the potential environmental risks related to the NER formation

Highlights

- Microbial degradation with high CO_2 and biomass is mostly accompanied by the formation of biogenic residue (type III)
- Compound elimination with low or no formation of CO_2 indicates xenobiotic NER formation (type I and II)



Biotic and abiotic NER formations from organic contaminantsin soil

- Formation of biogenic residue from the recalcitrant pesticides is expected to be very low, but cannot be completely excluded
- Risk related to NER formation from readily biodegradable pesticides is thus overestimated

Stable isotope labelling techniques as a promising tool in studying the fate of pesticides in soil

Thordis Zegarski, Anja Miltner, Karolina M. Nowak, Matthias Kästner

Presenter Thordis Zegarski

Environmental Biotechnology
Helmholtz-Zentrum für Umweltforschung GmbH - UFZ
Permoserstraße 15
Leipzig, Germany
Thordis.Zegarski@ufz.de

Objectives

- To assess the turnover kinetics of a $^{13}C/^{15}N$-labelled pesticide in a reference soil
- To assess, quantify and identify potential metabolites of the used compounds
- To produce $^{13}C/^{15}N$-labelled NER containing soil material for release/mobilisation experiments

Highlights

- First detailed mass balance of the $^{13}C/^{15}N$ -label in soil from dinitroaniline pesticide class
- Insights into degradation pathways with colabelled pesticides
- Information of the $^{13}C/^{15}N$ -label distribution within fatty and amino acids
- Detailed study on the characterization of the chemical composition of NER
- Higher relevance of xenobiotic NER in soil
- Microorganisms also contributed to the NER formation, but to lower extent

First results with a new test design for the determination of a substance specific Plant Uptake Factor (PUF) for use in regulatory fate modeling

M. Lamshoeft, H. Resseler, G. Reinken, C. Schriever, S. Schubert, J. Webb, S. Webb, B. Zillgens, D. Keenan, W. Doucette, G. Fent, V. Gourlay, K. Malekani, M. Letourneau, J. Martin, P. Rooney, W. vanBeinum, B. Rieder, M. Traub, S. Swales, K. Weinfurtner, K. Derz, K. Kemmerling

Not received

Presenter Herbert Resseler

IVA/ECPA
herbert.resseler@syngenta.com

Objectives

- Test a new experimental design to determine a plant uptake factor (PUF) of chemicals for use in leaching models
- Propose new test protocol to authorities for risk assessment with FOCUS models
- Considering Hingston et al. 2013: EUregPUF Workshop report, York, UK

Highlights

- Overall Result: An experimentally simple, reproducible hydroponic (hp) plant uptake test is proposed
- Org. Set up: Ten laboratories participated in round robin test with wheat plants

	min-max	mean	SD	CV (%)
Translocation shoots (%)	72-93	83.7	7.3	8.7
Radioactive recovery (%)	92.2-109	98.1	4.9	5.0
Biomassfactor	1.3-5.04	2.2	1.1	51.7
Water uptake by plant (%)	4.96-62.86	24.9	19.7	79.2
Evaporation (ml)	1.81-14.88	5.0	4.3	84.9
Plant weight (g)	1.6-7.84	4.7	2.2	46.4
PUF	0.48-0.94	0.72	0.2	23.1

Detailed results of 8 laboratories with equilibration period 2d, uptake measuring period 6d

- Exp. Set up: 5 replicates treated at stage BBCH 12/13 (+controls), germination in perlite, pre-phase in hp, then with 14C-substance: 2d equilibration and 6d measuring
- Stat. Evaluation: ECPA/IVA group PUF. Labs comment protocol for clarifications
- Exp. Result: The mean PUF for 1,2,4-Triazole (log Kow: -0.58) was 0.72 (Tab. 1)
- Correlation: Signif. relationship between transpiration & chemical uptake (R2= 0.93)
- Assessment: Promising test protocol, root integrity by procedure + pre-phase ensured; clarifications: to reduce: evaporation, climate induced variation, to increase water uptake: > 15%
- Next steps: Detailed report to reg. authorities, publication in prep. 20

Are strobilurin fungicides not toxic to non-target organisms: studying the effects of trifloxystrobin and its main soil metabolite on soil microbes using advanced culture-independent approaches

Nicoleta Alina Suciu , Andrea Ferrarini, Edoardo Puglisi, Sotirios Vasileiadis, Chrisostomos Oplos, Flavio Fornasier, Sławomir Sułowicz , Luigi Lucini, Dimitrios G. Karpouzas, Marco Trevisan

Presenter Nicoleta Alina Suciu

Istituto di Chimica Agraria ed Ambientale
Università Cattolica del Sacro Cuore
Via E. Parmense 84, Piacenza
nicoleta.suciu@unicatt.it

Objectives

- Address associated knowledge gaps concerning the potential toxicity of trifloxystrobin (TFX) and CGA 321113 on the soil microbial community
- Assess soil microbial enzymatic activities after TFX application
- Assess TFX dissipation and CGA 321113 formation/degradation in soil

Highlights

- Identification of TFX and of its metabolite CGA 321113 was carried out via high resolution mass spectrometry and then confirmed by tandem mass spectrometry and molecular structure correlation
- Dissipation assessment revealed that DT50 of TFX in soil was less than 5 days and the highest formation rate of the metabolite was in the first 15 days
- TFX was correlated positively with the potential nitrification activity
- No effect of TFX on other measured extracellular enzyme activities were observed
- db-RDA analysis showed a time effect on enzymatic activities at different TFX appli rates

Atmospheric degradation of pesticides: direct photolysis, photo-oxidation and reaction with ozone

Amalia Muñoz, Teresa Vera, Esther Borras, Milagros Ródenas, Tatiana Gómez

Presenter Amalia Muñoz

EUPHORE
Fundación CEAM
C/ Charles R. Darwin 14
Paterna (Valencia), Spain
amalia@ceam.es

Objectives

- To investigate the atmospheric behavior of pesticides through the study of atmospheric degradation processes in the gas phase
- Characterization of compounds generated by the chemical transformation of pesticides in the troposphere

Highlights

- Results obtained from the experiments have been used to derive lifetimes, and provide information on particle and gas phase product formation
- EUPHORE: sophisticated tool for studying pesticides under controlled atmospheric conditions
- Photolysis by natural sunlight is the main degradation pathway for some pesticides, whereas the OH radical reaction is a more important degradation pathway for others
- Rate coefficients important to assess the impact of the pesticide on air quality and on human health together with the product information

Atmospheric degradation of the pirimiphos-methyl. Kinetics and degradation products

Esther Borras, Amalia Muñoz, Teresa Vera, Milagros Ródenas, Tatiana Gómez

Presenter Amalia Muñoz

EUPHORE
Fundación CEAM
C/ Charles R. Darwin 14
Paterna (Valencia), Spain
amalia@ceam.es

Objectives

- Determine the atmospheric lifetime of pirimiphos-methyl in gas phase
- Study of atmospheric degradation products of pirimiphos-methyl
- Characterization of particulate matter and other secondary compounds generated by chemical transformation of pirimiphos-methyl in the troposphere

Highlights

- The gas phase atmospheric degradation of pirimiphos-methyl was investigated at a large outdoor atmospheric simulation chamber
- The kinetic parameters obtained for the gas-phase reactions are used to estimate the tropospheric lifetime
- Photolysis carried out under ambient conditions and natural sunlight irradiations
- First experimental value for the reaction of pirimiphos-methyl with sunlight
- First experimental value for the reaction of pirimiphos-methyl with OH radicals
- EUPHORE provides useful data about atmospheric processes

Complementary chemical and biological approaches to study mesotrione biodegradation pathway by the edaphic Bacillus megaterium strain mes11: first identification and characterization of degrading enzymes

Louis Carles, Pascale Besse-Hoggan, Muriel Joly, Isabelle Batisson

Presenter Pascale Besse-Hoggan

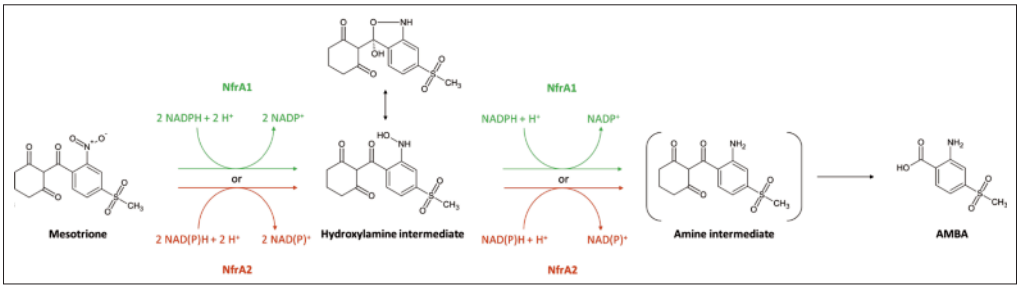
Institut de Chimie de Clermont-Ferrand (ICCF)
CNRS-UMR 6296
Université Blaise Pascal
24 avenue Blaise Pascal
Aubière Cedex– France
pascale.besse@univ-bpclermont.fr

Objectives

- Complete the biodegradation pathways of the herbicide mesotrione
- Identify the genes and enzymes involved in the first step of mesotrione biodegradation
- Characterize the mesotrione-degrading enzymes

Highlights

- High diversity of nitroreductase genes in Bacillus megaterium strain Mes11
- Two Mes11 mesotrione-degrading enzymes were found (named NfrA1 and NfrA2), belonging to the NfsA-FRP nitroreductase subfamily
- Mes11 NR possesses a ping-pong Bi-Bi mechanism; the pH and temperature optima are 6-6.5 and 23-25°C, respectively.



Proposed scheme of mesotrione biodegradation by Bacillus megaterium Mes11.
AMBA = 2-amino-4-methylsulfonylbenzoic acid.

Development of a high density microarray for assessing pesticide biodegradation potential in soils

Stefanos Siozios, Cedric Malandain, Olivier Sibourg, Fabrice Martin-Laurent, Federico Ferrari, Dimitrios Karpouzas, Kostas Bourtzis, George Tsiamis

Presenter George Tsiamis

Department of Environmental and Natural Resources Management
University of Patras
Agrinio - Greece
gtsiamis@upatras.gr

Objectives

- Develop a high-density oligonucleotide microarray
- Detect the presence and/or the expression of key genes involved in the metabolism and detoxification of commonly used pesticide groups
- Target 20 gene families involved in the degradation of five major pesticide groups

Highlights

- A seed amino-acid sequence dataset was build for each target gene family
- Data sources including, env_nt, completed and draft bacterial genomes as well as selected soil-associated metagenomic datasets
- in silico analysis retrieved 24,143 candidatehomolog sequences clustered in 7,630 OTUs
- in silico validation using non-target databases led to the design of 25,377 probes

PesticideChip target sequence retrieval pipeline

Development of pedotransfer functions for the prediction of diuron and glyphosate sorption to soils and ditch sediments

Jeanne Dollinger, Cécile Dagès, Marc Voltz

Presenter Dollinger Jeanne

UMR LISAH (INRA-IRD-SupAgro)
2 place Pierre Viala
Montpellier
jeanne.dollinger@supagro.inra.fr

Not received

Objectives

- Diuron and glyphosate are among the pesticides most often detected in surface waters by water quality surveys in France, aim of our work is:
- Develop of generic pedotransfer functions of diuron and glyphosate sorption to soils and sediments
- Evaluation of the use of these generic pedotransfer functions for the specific case of ditch sediments

Highlights

- Farm-ditch networks play a key role in the fate of pesticides fluxes in agricultural landscapes. They collect water and sediment fluxes loaded with pesticides from surrounding plots, and route them downstream towards receiving aquatic bodies and groundwater in association with infiltration fluxes
- Ditches, however, hold inherent pesticide-retention capacities that confer them substantial water purification power. The buffer effect of ditches mainly results from sorption processes
- Sorption coefficients are thereby most sensitive parameters in models used to predict the fate of pesticides within ditches (FOCUS, 2005). Tools for the estimation of sorption coefficient to ditch sediments would enable an evaluation of the buffer efficiency of ditches under various pedoclimatic contexts
- For diuron, we extended the initial data base of Weber et al. (2004) by 9 additional studies, published after 2004 and reporting sorption of diuron to various soil and sediments. For glyphosate, since neither pedotransfer function nor databases were available, we reviewed the literature and found 23 studies providing glyphosate sorption data.

Effect of pesticide mixtures (formulation, pesticide cocktail) on the biodegradation of individual active ingredients

Mohamed Youness, Tania Alekseeva, Martine Sancelme, Pascale Besse-Hoggan

Presenter Pascale Besse-Hoggan

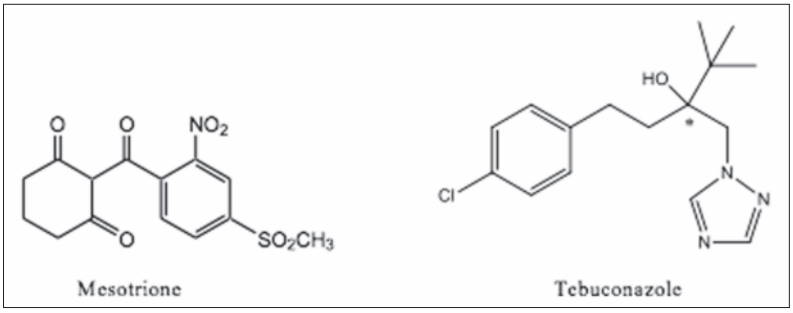
Institut de Chimie de Clermont-Ferrand (ICCF)
CNRS-UMR 6296
Université Blaise Pascal
24 avenue Blaise Pascal
Aubière Cedex– France
pascale.besse@univ-bpclermont.fr

Objectives

- Investigate the impact of pesticide adjuvants (formulation) on bacterial growth and biodegradation activity of the pure ingredient
- Examine the effect of pesticide cocktails on the sorption process
- Compare biodegradation of two pesticides individually and in mixed

Highlights

- Pesticides studied: Mesotrione (Callisto®) = maize herbicide; Tebuconazole (Balmora®) = fungicide used on crops and on woods
- Inhibitory effect of adjuvants on microbial growth increased with the concentration
- Modulated impact of formulated adjuvants / mixture on each active ingredient biodegradation that can be positive by co-metabolism in some cases
- Positive but more often negative effect of mixtures on the different processes (sorption, biodegradation) controlling the fate of each individual pesticide



Effects of random and systematic errors on Freundlich sorption parameters

Jos Boesten

Presenter Jos Boesten

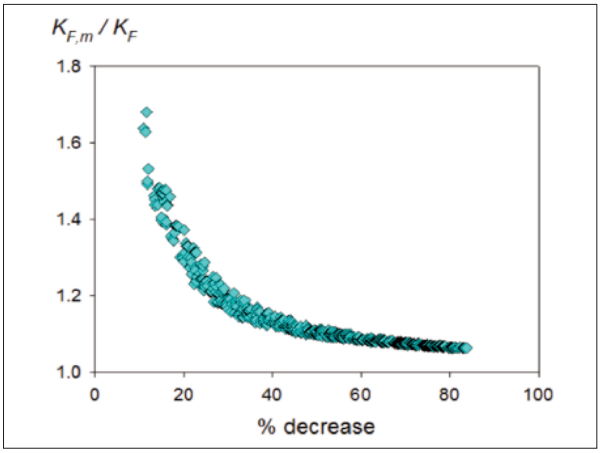
Alterra WUR
PO Box 47
Wageningen – The Netherlands
jos.boesten@wur.nl

Objectives

- Leaching to groundwater very sensitive to Freundlich sorption isotherm parameters (especially N) but little known about experimental errors in these parameters
- Assessment of effects of random and systematic errors on Freundlich parameters

Highlights

- The random and systematic errors in KF and N strongly decrease with increasing percentage decrease in the concentration in the liquid phase



Ratio of the measured divided by the true Freundlich sorption coefficient as a function of the percentage decrease in the concentration in the liquid phase for 5% loss during the study.

- Loss from the system leads to overestimation of both KF and N
- It is recommended to use the highest possible solid-liquid ratio and to include always an assessment of the systematic error of KF in the OECD-106 test report

Environmental fate of the herbicide fluazifop-P-butyl and its degradation products in two loamy agricultural soils – A combined laboratory and field study

Nora Badawi, Annette E. Rosenbom, Preben Olsen, Sebastian R. Sørensen

Presenter Nora Badawi

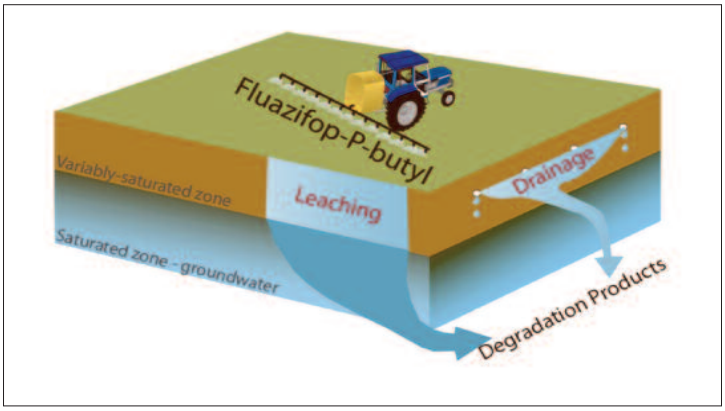
Research Scientist
Dept. Geochemistry, GEUS
Oester Voldgade 10
1350 Copenhagen K, Denmark
nba@geus.dk

Objectives

- To monitor the leaching of degradation products (FP and TFMP) to drainage and groundwater following multiple fluazifop-P-butyl (FPB) applications in two fields
- To study the underlying sorption and degradation processes of FPB, FP, and TFMP in plow layer soils from the two fields using controlled laboratory experiments.

Highlights

- The laboratory experiments with soil from the fields revealed a rapid degradation of FPB to FP and further biodegradation to TFMP occurred at a slower rate
- FP and TFMP were fairly persistent and sorbed to the two soils to a small extent
- Both degradation products leached to drainage and groundwater during precipitation following FPB use
- It is therefore recommended that these degradation products be included in programs monitoring water quality in areas with FPB use



Transfer of S-metolachlor and its metabolites in the vadoze zone: experiments and modelling

Pauline Sidoli, Nicole Baran, Rafael Angulo-Jaramillo, Laurent Lassabatère

Presenter Pauline Sidoli

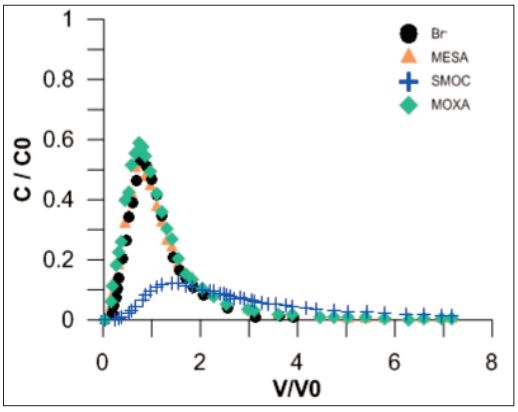
Ecology of natural and man-impacted hydrosystems, LEHNA
UMR 5023 CNRS ENTPE UCBL-Lyon 1
& BRGM French Geological Survey
3 Avenue Claude Guillemin
Orléans, France
p.sidoli@brgm.fr

Objectives

- Towards the understanding of the fate of pesticides from surface into groundwater
- To characterize flow processes and soil / pesticide interactions in the vadoze zone under unsaturated conditions
- To study the specific cases of the herbicide S-metolachlor and its two main metabolites ESA-metolachlor and OXA-metolachlor

Highlights

- Non-saturated column experiments performed for contrasted lithofacies (sand and gravel) from real deposit
- Breakthrough curves modelled with mobile and immobile water model coupled with adsorption coefficient Kd approach and first order law for kinetics
- Flow fractionation with slow solute exchange, mostly for gravel
- Retention of S-metolachlor kinetically limited and irreversible to a certain extent
- In contrast, complete leaching of metabolites meaning higher risk to reach groundwater
- Adsorption processes are dependent on solute and geochemical properties of lithofacies.



Breakthrough curves of tracer (Br-), S-metolachlor (SMOC), ESA-metolachlor (MESA) and OXA-metolachlore (MOXA) for the gravel expressed as the relative solute aqueous concentrations (C/C0) in function of the pore volume number (V/V0)

Experimental determination of foliar wash-off factors for modelling purposes

Eva-Maria Hein, Gerald Reinken

Presenter Eva-Maria Hein

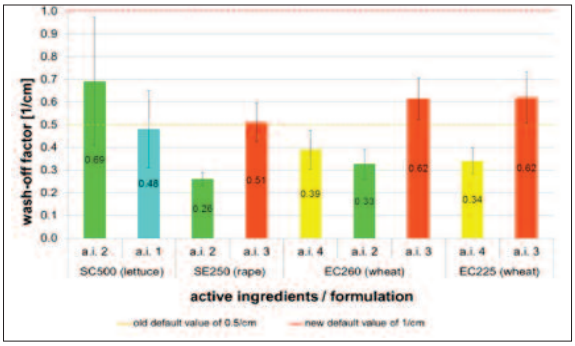
Bayer CropScience AG
Alfred-Nobel-Str. 50
Monheim – Germany
eva-maria.hein@bayer.com

Objectives

- Set-up of a robust test design for the experimental determination of wash-off factors based on the generic framework developed in an ECPA workshop
- Investigation of dependencies between experimental parameters and measured wash-off factors

Highlights

- Establishment of a robust test design for experimental determination of wash-off factors for modelling purposes
- The first experiments address possible dependencies of wash-off factors from the
  → … type of formulation
  → … investigated crop
  → … mixing partners



Experimentally determined wash-off factors for different formulations and mixing partners

Heterogeneous reactivity and photodegradation of pesticides adsorbed on atmospheric particles under simulated laboratory conditions

Joanna Socorro, Amandine Durand, Brice Temime-Roussel, Sylvain Ravier, Sasho Gligorovski, Henri Wortham, Etienne Quivet

Presenter Joanna Socorro

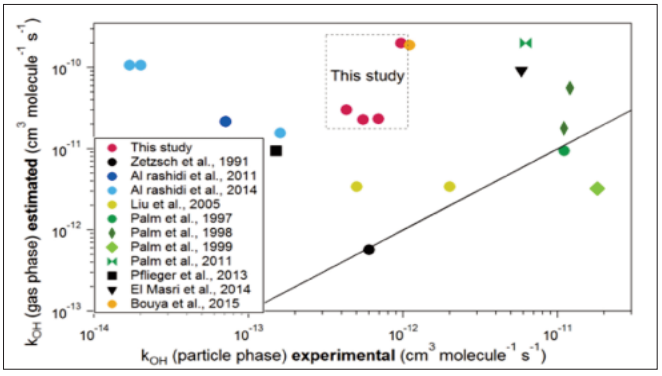
Aix-Marseille Université, CNRS, LCE
3, Place Victor Hugo
Marseille - France
joanna.socorro@etu.univ-amu.fr

Objectives

- Study of the heterogeneous reactivity of eight pesticides commonly used adsorbed on particles towards atmospheric oxidant such as ozone and hydroxyl radicals (·OH)
- Determination of the atmospheric fate and lifetimes of pesticides under study
- Investigation of the degradation products with ozone in both gas and particle phases

Highlights

- Atmospheric lifetimes towards ozone and ·OH range between one week and more than one month
- For OH reactivity, experimental lifetimes in the particle phase are drastically lower than estimated lifetimes in the gas-phase
- Degradation products were detected in both gas and particle phases and were identified as hazardous compounds
- The 8 studied pesticides can be considered as Persistent Organic Pollutants (POPs) with respect to ozone and ·OH



Estimated kinetic rate constants by modeling towards ·OH reactivity plotted against the experimental rate constants in particle phase.

Impacts of co-formulants on pesticide sorption and leaching through soil

Majid Ali Khan, Colin D. Brown

Presenter Majid Ali Khan

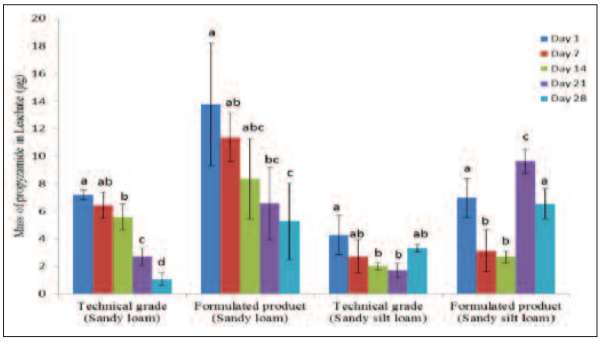
Environment Department,
University of York
YO10 5DD
UK
mak507@york.ac.uk

Objectives

- Investigate the effects of pesticide formulation on leaching of four compounds through two soils
- Investigate the effects of formulation on sorption of propyzamide in two soils
- Investigate how the effect of formulation on leaching varies for compounds with different solubility

Highlights

- There was a significant effect of formulation on leaching of pesticides from soil columns which was independent of time and soil type.
- There was a significant effect of formulation on sorption of propyzamide in sandy loam soil when characterised by a centrifugation method. There was a large increase in the strength of sorption over time for both soils and for both technical and formulated material
- The effect of formulation on leaching was greatest for compounds with higher solubility



Mass of propyzamide leached through sandy loam and sandy silt loam soils treated with technical grade and commercial formulation of propyzamide (Kerb Flo). Letters on the bars show significant differences within the treatments

Increasing realism of laboratory soil degradation studies

Dieter Schäfer, Hans-Peter Stupp

Presenter Hans-Peter Stupp

Environmental Safety
Alfred-Nobel Strasse 50
4Monheim Germany
hans-peter.stupp@bayer.com

Not received

Objectives

- Degradation in soil is one of the most important processes regarding the behavior of substances in plant protection products within the environment
- In the authorization process soil degradation studies are required under controlled conditions in the laboratory (OECD Guideline for the Testing of Chemicals No. 307, 2002) and, in case of longer half-lives, also under field conditions
- Comparison with field study results clearly indicate that with current practice the degradation behaviour of substances in laboratory studies is more realistic since the degradation rates are closer to those found under field conditions than in the past
- Comparisons of previous and current soil degradation studies will be given together with the field data and the relevance of old degradation studies for estimating the environmental behaviour of substances will be critically discussed

Highlights

- In the course of the current re-registration process (Annex I Renewal) some of these studies have had to be repeated, e.g. to comply with new metabolite identification triggers
- In many cases it has been observed that degradation rate in the repeated studies was faster than in the legacy studies, even though they were conducted under the same guideline and using if possible the same or similar soils. The reason for this is not clear, but we propose that the effect is linked to current practices of more careful handling of the test soils
- Freshly sampled soils are used and stress on the microbial community is minimized by avoiding high temperatures, lack of air, drying or mechanical disturbance during transport, preparation and storage

  This ensures that the natural micro-biological activity of the test soils is preserved in the laboratory studies as far as possible, and studies are performed under optimal microbial conditions

Lindane reactions in the atmosphere: a study in the EUPHORE simulation chambers

Teresa Vera, Amalia Muñoz, Milagros Ródenas, Esther Borrás, Tatiana Gómez

Presenter Teresa Vera

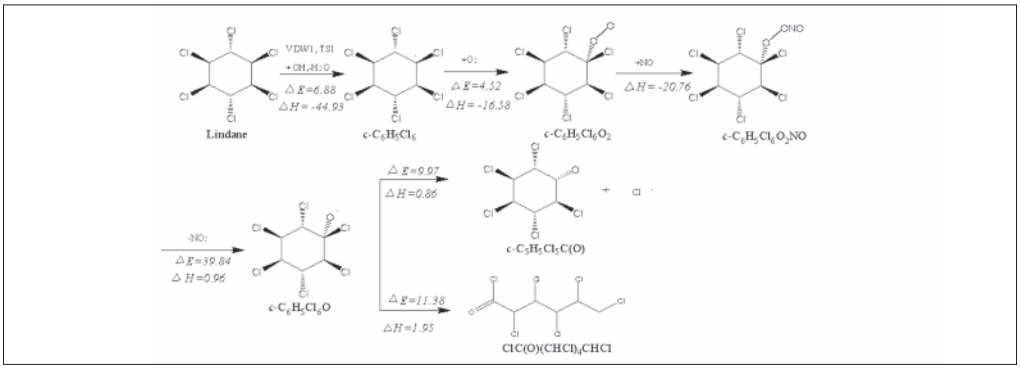
EUPHORE
Fundacion CEAM
C/ Charles Darwin 14
Paterna (Valencia)– Spain
Teresa@ceam.es

Objectives

- Experimental determination of lindane's reaction rate against OH radicals
- Estimation of an upper limit for the photolysis rate of lindane
- Proposal of a mechanism for the OH reaction with lindane in ambient air

Highlights

- The gas-phase atmospheric behavior of lindane was studied at EUPHORE
- Atmospheric rate coefficients are estimated under almost realistic conditions
- Removal of lindane from atmosphere is controlled by reaction with OH radicals
- The major initial C-containing oxidation product is pentachlorocyclohexanone
- 1,3-dichloroacetone was used as a model for theoretical calculations
- 1,3-dichloroacetone has rapid atmospheric degradation



Proposed mechanism for the reaction of lindane with OH radicals. Reaction heats (ΔH) and energy barriers (ΔE) of the addition pathways are in kcal/mol units.

Long-term experiments to investigate irreversibility in sorption of pesticides to soil

Laura Suddaby, Sabine Beulke, Wendy van Beinum, Robin Oliver, Sui Kuet, Colin Brown

Presenter Laura Suddaby

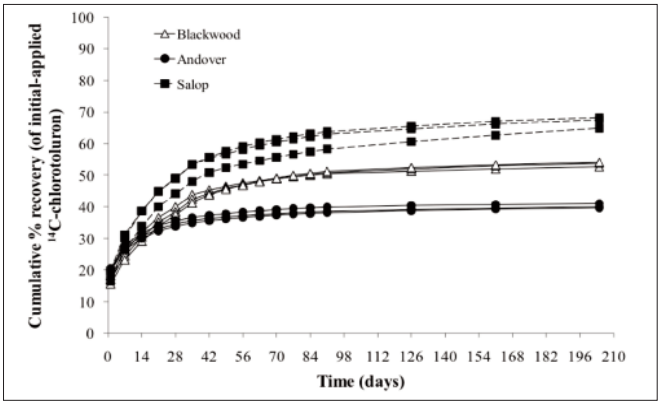
TSGE Consulting
St James Business Park
Grimbald Crag Court
Knaresborough - UK
laura.suddaby@tsgeurope.com

Objectives

- Investigate whether isotope exchange techniques are an effective measure of physical irreversibility in pesticide sorption to soils over time
- Investigate whether the irreversibly bound fraction of pesticide (if present) changes over time and whether it is influenced by pesticide and soil type

Highlights

- Long-term study of bound residues provides complex experimental challenges
- Isotope exchange may be constrained by extremely long time scales involved
- Forced isotope exchange accelerates release of sorbed pesticide from soil matrix



Cumulative percentage recovery of initial 14C-chlorotoluron applied using the forced isotope exchange method. Samples initially 14C, 56-days sorption and isotope exchange for 14-days (3 replicates per soil).

- Pesticide was still being desorbed from soil matrix after more than six months
- Physically entrapped residues are not instanteously reversible
- Microbial degradation is likely to lead to greater irreversibility

Modelling herbicide loss on urban hard surfaces

Ting Tang, Piet Seuntjens, Ann van Griensven, Jan Bronders

Presenter Ting Tang

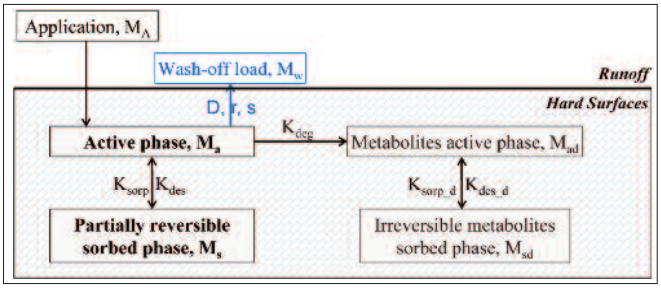
Flemish Institute for Technological Research Boeretang 200, Mol – Belgium
Dept. Hydrology and Hydraulic Engineering Vrije Universiteit Brussel
Pleinlaan 2, Brussels - Belgium
Email: ting.tang@vito.be

Objectives

- To develop a conceptual model to simulate herbicide processes on hard surfaces and herbicide losses into urban waters
- To evaluate the model with existing experimental dataset
- To promote our understanding of herbicide behaviors on hard surfaces

Highlights

- The conceptual model describes the sorption-desorption, degradation and wash-off of herbicides and the major metabolites on hard surfaces
- The bi-phasic sorption-desorption and degradation processes are conceptually similar to the Single First-Order Reversible Binding (SFORB) model
- Wash-off of herbicides is considered as a diffusion process, with runoff-dependent diffusivity and solubility-limited maximum load
- The model is parameterized and evaluated, using published experimental data for various herbicides and surfaces



The proposed conceptual model includes two herbicide pools on hard surfaces. Application, degradation and wash-off occur only in the active pool, Ma.

Pesticide emissions into the air: understanding, quantification, prediction – A literature review

Clarisse Guiral, Enrique Barriuso, Claudine Basset-Mens, Carole Bedos, Pierre Cellier, Vincent Colomb, Jean-Paul Douzals, Thomas Eglin, Bernadette Ruelle

Presenter Clarisse Guiral

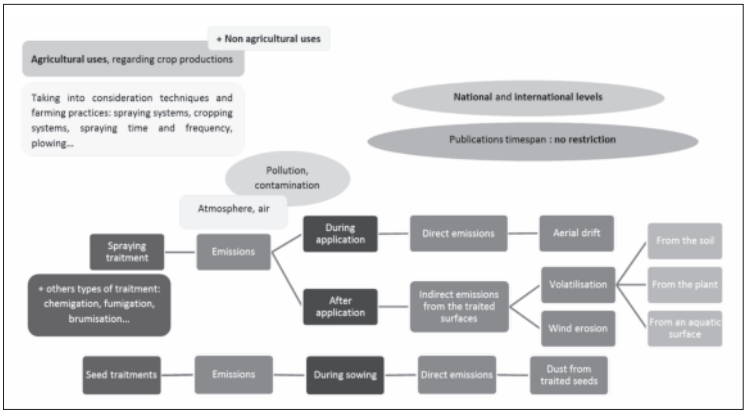
INRA UMR 1402 Ecosys
Route de la ferme
Thiverval-Grignon - France
clarisse.guiral@grignon.inra.fr

Objectives

- To update the state of the art of pesticide emissions into the air
- To inventory existing pesticide emission factors
- To evaluate their relevance into the French context
- To identify ways to improve existing factors and develop relevant ones

Highlights

- Published approaches are classified according to a gradient of complexity yielding emission factors
- An overview of the few existing emission factors is drawn. Those already used in emission inventories or Life Cycle Assessment (LCA) tools are also pointed out



Bibliographical synthesis framework

- Several calculation tools, including the correlation with some physicochemical properties up to mechanistic modelling, are also informed
- Further analysis will focus on data sets useful to test the accuracy of emission factors

Prediction of the fate of pesticides in the environment from their molecular properties

Laure Mamy, Dominique Patureau, Enrique Barriuso, Carole Bedos, Fabienne Bessac, Xavier Louchart, Fabrice Martin-Laurent, Cécile Miège, Pierre Benoit

Presenter Laure Mamy

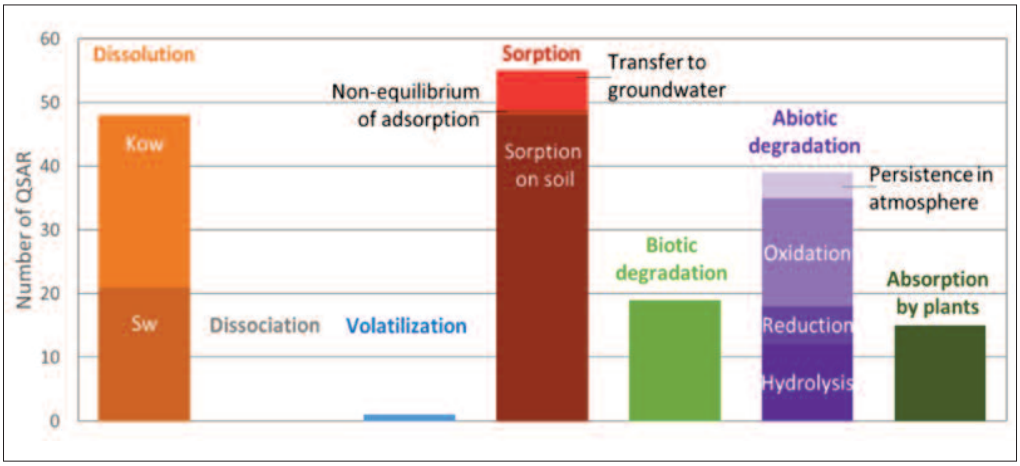
INRA - UMR 1402 ECOSYS
Thiverval-Grignon, France
laure.mamy@versailles.inra.fr

Objectives

- To do the first comprehensive review of QSAR (quantitative structure-activity relationship) allowing the prediction of organic compounds fate in the environment.
- To analyze the QSAR according to the frequency of the use of one molecular descriptor and to the generic character of the descriptor.

Highlights

- 790 QSAR involving 686 different molecular descriptors are reported to assess 90 environmental parameters related to 7 main processes: dissolution, dissociation, volatilization, sorption, biotic and abiotic degradation, and absorption by plants.

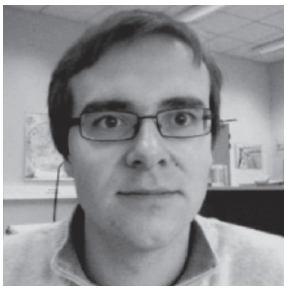


Number of QSAR found for the seven main processes governing the fate of pesticides in the environment (Mamy et al., 2015).

- Only 177 QSAR (22%) were developed for pesticides. There was almost no QSAR to predict their dissociation, volatilization, adsorption on sediments, photolysis, atmospheric photodegradation and oxidation, and degradation on vegetation.
- Five descriptors were found to be dominant and the most generic ones in the 790 equations: EHOMO, ELUMO, polarizability, dipole moment, and molecular weight.

Reduction of post-application volatilisation by the use of surfactants from glass surfaces

Michael Houbraken, David Senaeve, Davina Fevery, Pieter Spanoghe



Presenter Michael Houbraken

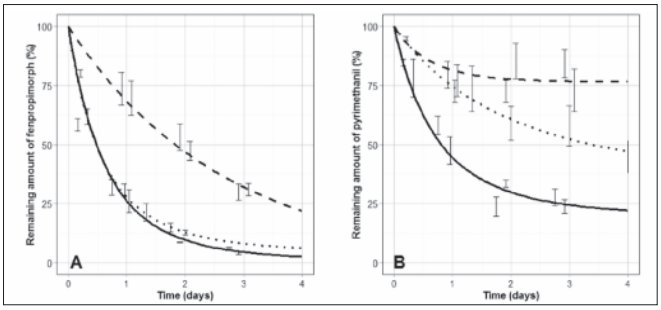
Department of Crop Protection Chemistry
Faculty of Bioscience Engineering
Ghent University
Coupure Links 653
Ghent - Belgium
michael.houbraken@ugent.be

Objectives

- Describe the dissipation of fenpropimorph, pyrimethanil, chlorpyrifos and lindane under laboratory conditions
- Illustrate the effect of formulation components on the volatilisation of pesticides
- Compare with current practices to illustrate potential improvements to reduce volatilisation
- Illustrate the effect of adjuvant concentration and increased wind speed on volatilisation reduction

Highlights

- Volatilisation of pesticides ranges for 70% to 91% in four days
- Methylated seed oil reduces the volatilisation of all pesticides



Remaining residue (%) of fenpropimorph (A) and pyrimethanil (B) in a commercial formulation (dotted line), formulated with methylated seed oil (dased line) and without adjuvants (solid line)

- Ethoxylated alcohol, polymeric and anionic surfactants only reduce the dissipation of certain pesticides
- Commercial formulation of pyrimethanil reduces volatilisation by 40%
- Commercial formulation of fenpropimorph has no effect on the volatilisation

Seepage patterns of diuron in ditches bed over a sequence of flood events

Cécile Dages, Anatja Samouelian, Veronika Storck, Sandrine Negro S., Olivier Huttel, Marc Voltz

Presenter Marc Voltz

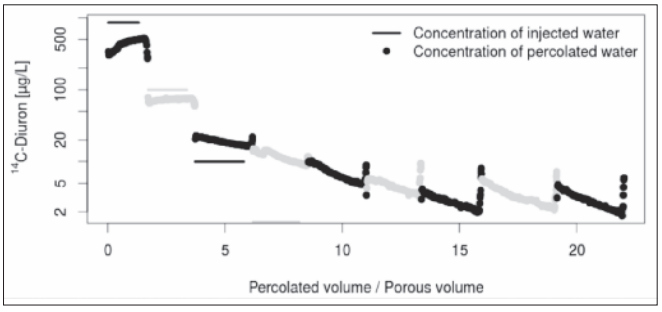
INRA UMR LISAH
2 Place Viala
Montpellier– France
voltz@supagro.inra.fr

Objectives

- This study aimed at understanding the dynamic of pesticide percolation in infiltrating farmed ditches bed during a sequence of flood events with contaminated water, and to determine to which extent pesticide percolation from the ditches is correlated to surface flow water

Highlights

- We analyzed the percolation dynamic of Diuron in a ditch bed in a column experiment mimicking successive infiltration events occurring during a flood season
- Diuron percolation across the ditch bed represented 50% of the infiltrated Diuron due to preferential flow processes
- The ditch bed shows a high buffering capacity thanks to its large sorption properties.
- Compared to the contamination levels of surface water, those of percolation water were reduced but lasted longer due to late Diuron desorption



14C-Diuron breakthrough curves for 9 successive percolation events. Injected concentrations were changed between events for mimicking observed contamination in ditches flow during a flooding season. provide a brief description MAX 2 ROWS)

Soil Bacterial Community under the influence of Chlorpyrifos, Isoproturon and Tebuconazole at a lab-scale level

Sofia Nikolaki, Stefanos Siozios, Fabrice Martin-Laurent, Federico Ferrari, Dimitrios Karpouzas, Cedric Malandain, George Tsiamis

Presenter Sofia Nikolaki

Department of Environmental and Natural Resources Management
University of Patras
Agrinio - Greece
sonianikolaki@yahoo.gr

Objectives

- Determine the effects of pesticides on soil microbiota
- Selected pesticides were: a) Isoproturon, b) Chlorpyrifos and c) Tebuconazole
- Four dose levels, x0, x1, x2, and x10 the recommended dose

Highlights

- Soil bacterial communities were characterized by Illumina amplicon sequencing
- Bacterial community composition and diversity was studied by targeting the V3-V4 hyper-variable regions
- Statistical analysis of sequencing data was performed with the QIIME pipeline as well as custom scripts

Sorption of acidic pesticides and biocides to biochars

Gabriel Sigmund, Huichao Sun, Thilo Hofmann, Melanie Kah

Presenter Melanie Kah

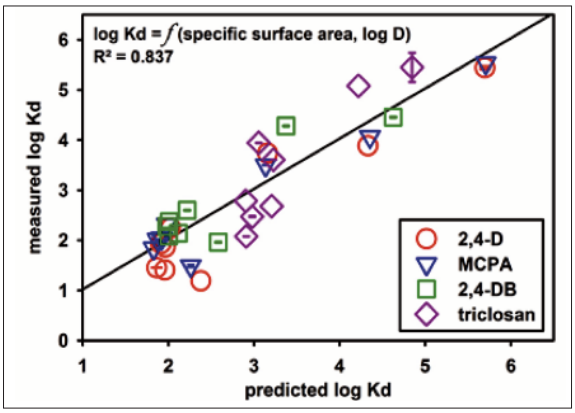
Department of Environmental Geosciences
University of Vienna
Althanstrasse 14, UZA 2
Vienna – Austria
melanie.kah@univie.ac.at

Objectives

- Consider 15 sorbents with different degree of carbonization (i.e., carbon nanotubes, activated carbon, and biochars produced from wood, manure, and sewage sludge)
- Investigate the influence that the sorbent properties have on the sorption of acids
- Compare and discuss the sorption behavior of neutral and anionic species
- Identify key parameters that can be used to predict sorption

Highlights

- Sorption was significantly influenced by factors that are not usually considered for neutral sorbates (e.g., ash content, pH)



Measured log Kd for biochar, carbon nanotubes and activated carbon plotted against predicted log Kd. (Error bars represent standard error for triplicates)

- Dissociation affected the sorption of all the acidic sorbates
- Sorption of the anionic species substantially contributed to the overall sorption
- Sorption could generally be very well predicted by a single equation that included log D (pH dependent hydrophobicity coefficient of the sorbate) and the specific surface area of the sorbent

Summary of the draft aged sorption guidance

Wendy van Beinum, Sabine Beulke

Presenter Wendy van Beinum

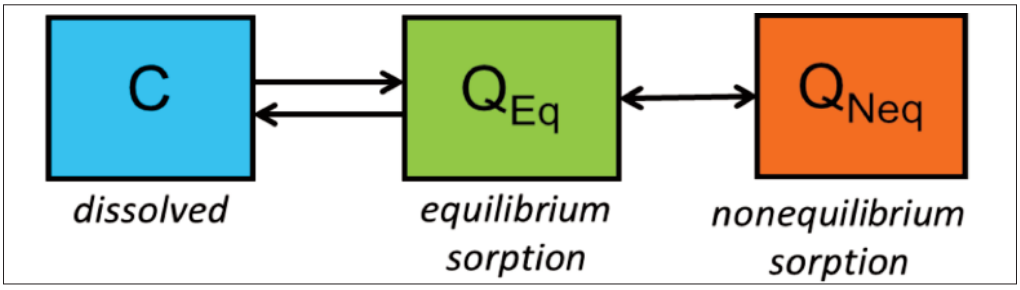
Fera Science Ltd.
Sand Hutton YO41 1LZ
York – United Kingdom
www.fera.co.uk/ccss
wendy.vanbeinum@enviresearch.com

Objectives

- Proposed guidance on how aged sorption studies for pesticides should be conducted, analysed and used in regulatory assessments

Highlights

- Overview of the procedures and criteria proposed in the draft guidance
- Reasoning behind the recommendations made in the draft guidance and outstanding questions that need to be addressed



Schematic representation of the aged sorption model: Equilibrium sorption is described by the Freundlich equation. Nonequilibrium sorption is time-dependent and described by a rate constant kdes and fraction fNE

The EFSA statement on the guidance proposal on aged sorption

Aaldrik Tiktak, Ettore Capri, Ole Stig Jacobsen, Roy Kasteel, Michael. Klein, Ton van der Linden, Alessandro Piccolo, Michael Stemmer

Presenter Aaldrik Tiktak

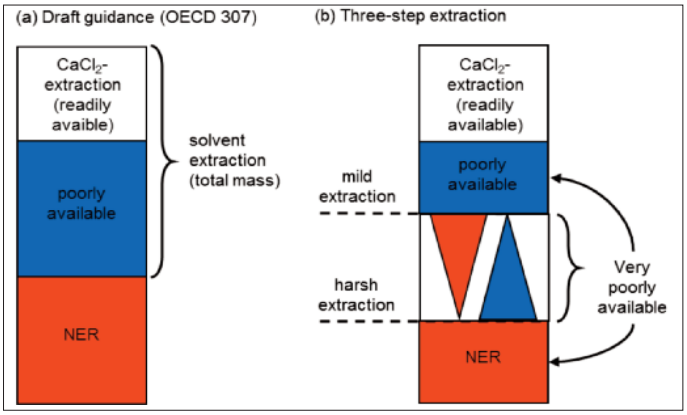
PBL Netherlands Environmental Assessment Agency
PO BOX 303
AH Bilthoven
The Netherlands
Aaldrik.tiktak@pbl.nl

Objectives

This presentation will present the EFSA PPR Statement on the FERA guidance proposal on aged sorption.

Highlights

The experimental and modelling approaches in the proposed guidance are reasonable compromises between the required effort and what is desirable from a theoretical point of view. The Panel has, however, concerns about the interpretation of the experiments and how results of the experiments should be used in the leaching assessment. The Panel investigated options for improvement, but could not complete its evaluation on these two topics, because underlying data to test these options were not made available to the Panel.



The two-step extraction procedure proposed in the draft guidance (left) is a reasonable compromise between the experimental effort and what is desirable from a theoretical point of view. The definition of the poorly available fraction is, however, ambiguous and relies on the experimental protocol (right). The applicant should therefore justify if the extraction is harsh enough.

To t-test or not to t-test, that is the question

Johannes Ranke, René Lehmann

Presenter Johannes Ranke

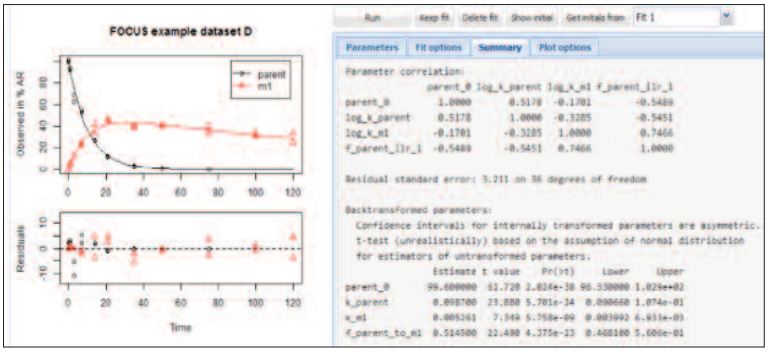
Scientific consultant
Kronacher Str. 8
Grenzach-Wyhlen - Germany
johannes.ranke@jrwb.de

Objectives

- Derive reliable endpoints from experimental degradation studies
- Avoid the exclusion of valid datasets
- Avoid the use of arbitrary default values
- Improve guidance on parameter uncertainty in FOCUS degradation kinetics

Highlights

- The common rate constant t-test wrongly assumes normal distribution of estimators
- The mkin package features several improvements over the current state of the art
- Plausible confidence intervals for rate constants based on lognormal distribution
- The commonly used t-test results at the same time, with a warning
- A suite of regression tests to allow for frequent release of new versions



Part of the gmkin user interface showing the parameter uncertainty assessment of mkin 0.9-38

- A completely Open Source user interface (gmkin)
- Unrivalled performance due to compilation of models and parallel execution

Towards an understanding of the sensitivity of pesticide degradation to losses of soil microbial diversity

Jessica Princivalle, Kevin Thomas, Samantha Marshall, , Irene Bramke, Liz Jane Shaw

Presenter Jessica Princivalle

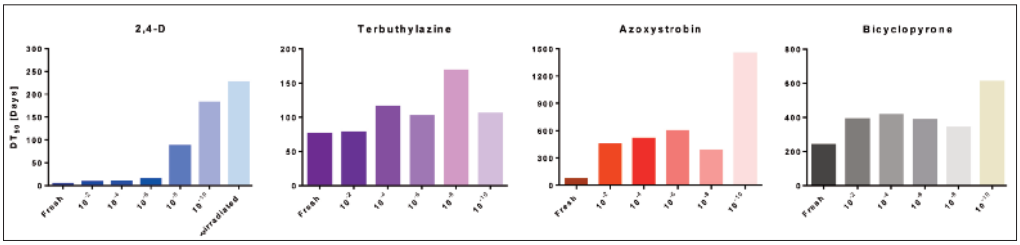
Soil Research Centre
Department of Geography and Environmental Science
University of Reading
RG6 6DW
Reading – UK
j.princivalle@pgr.reading.ac.uk

Objectives

- To explore the sensitivity of pesticide biodegradation to microbial diversity erosion
- To create a series of soils encompassing a microbial diversity gradient
- To assess the degradation of 2,4-D, Terbuthylazine, Azoxystrobin and Bicyclopyrone in these soils following the OECD 307 Guideline

Highlights

- 2,4-D degradability is preserved up to the 10^6 soil suggesting functional redundancy. Only extreme microbial erosion causes loss of 2,4-D degradation function
- Terbuthylazine degradation is not directly correlated with microbial diversity
- Azoxystrobin is highly sensitive to loss of diversity
- Relationship of Bicyclopyrone degradation with microbial diversity is not conclusively determined due to very long DT^{50}



Effect of reducing soil microbial diversity (fresh, 10^2, 10^4, 10^6, 10^8, 10^{10} and γ-irradiated soils) on degradation kinetics (DT^{50}). DT^{50} bigger than 10 years were, not included in the graphs.

Towards the identification and quantification of candidate metabolites of Tebuconazole fungicide

Eftychia Dermou, N. El Azhari, R. Rossi, L. Lucini, D.G Karpouzas, G. Tsiamis, F. Martin-Laurent, M. Trevisan, F. Ferrari

Presenter Eftychia Dermou

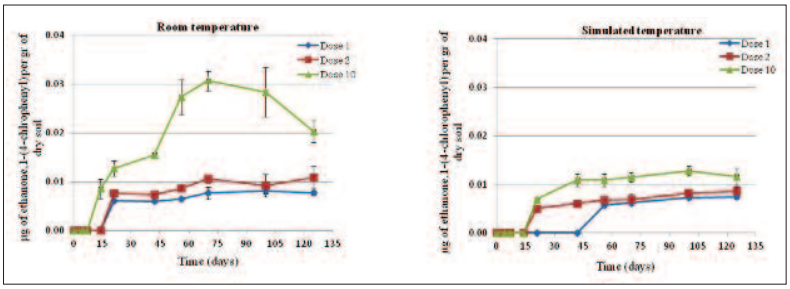
AEIFORIA srl., Loc. Faggiola 12-16,
I-29027 Gariga di Podenzano (PC) Italy
University of Patras, Department of Environmental and Natural Resources Management, 2 Georgiou Seferi St., Agrinio, Greece.
E-mail: efdermou@gmail.com

Objectives

- Determination of the dissipation and metabolism of tebuconazole fungicide in soil samples
- Identification and quantification of candidate metabolites

Highlights

- Initial rapid adsorption followed by a secondary tebuconazole release and slower phase of degradation
- No significant difference between room and stimulated temperature conditions
- Tebuconazole is being more persistent than in previous studies with the same soil origin.
- Triazole and triazolyl acetic acid were detected but not quantified. p-chlorophenol was neither detected nor quantified



Quantification of ethanone,1-(4-chlorophenyl) concentration in room and simulated temperature conditions for three tebuconazole dose levels in soil. This study was helded within the frameworks of the "LOVE-TO-HATE" project Marie Curie Actions, FP7-PEOPLE-2012-IAPP-324249, European Union (http://love-tohate.bio.uth.gr)

- Ethanone,1-(4-chlorophenyl) is the new metabolite detected and quantified
- It is the first time that ethanone,1-(4-chlorophenyl) is referred as a tebuconazole metabolite in soil

Volatilisation and aqueous deposition behavior of the herbicide Clomazone investigated with a closed laboratory chamber test system

Christian Staffa, Dennis Wallace, Gunnar Fent, Roland Kubiak

Presenter Christian Staffa

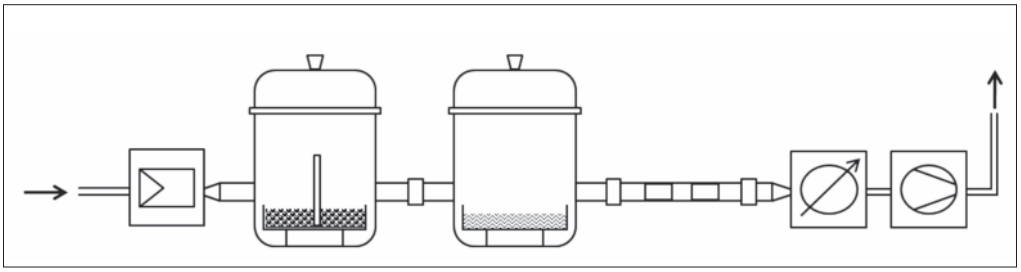
RLP AgroScience GmbH
Institute for Agroecology
Breitenweg 71
Neustadt an der Weinstraße - Germany
christian.staffa@agroscience.rlp.de

Objectives

- Deposition of volatilised plant protection products is a relevant entry path to adjacent aquatic and terrestrial non-target areas
- Development of a laboratory volatilisation and gaseous deposition chamber system
- Experiments were conducted to study the effects of soil moisture, organic matter content, temperature and air humidity on the volatilisation and deposition

Highlights

- Negligible deposition (< 0.3% of applied) was observed with air-dried soil in opposite to wet soil (60% WHCmax) with up to 5.6% deposition of test item applied
- Comparing a soil with Corg 0.6% vs. 1.6% reduced deposition by a factor of 0.8
- Increasing temperature from 20 °C to 30 °C increased deposition by a factor of 1.6
- Most unimportant factor was the air humidity with no clear effect on deposition



Test system, consisting of air humidity control, volatilisation chamber, deposition chamber, trapping system, flow controller and suction pump

What do laboratory studies tell us about the environmental fate of nanopesticides?

Melanie Kah, Anne-Kathrin Weniger, Thilo Hofmann

Presenter Melanie Kah

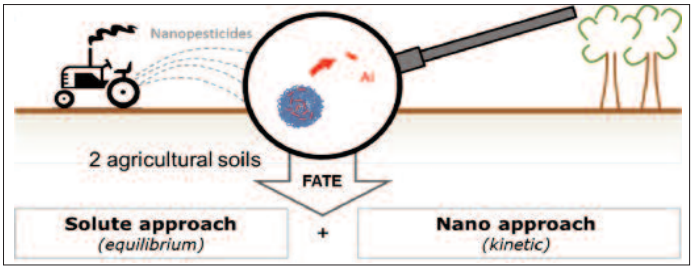
Department of Environmental Geosciences,
University of Vienna,
Althanstrasse 14, UZA 2
Vienna – Austria
melanie.kah@univie.ac.at

Objectives

- Assess the fate of nanopesticides in soil and water
- Use polymer-based formulations as models to test the effect(s) of nanocarriers' characteristics (e.g., size, surface charge, stability) on the fate of active ingredients
- Test the adequacy of currently applied approaches to assess environmental fate of pesticides (developed for solutes, and based on the equilibrium paradigm)

Highlights

- Sorption, degradation and leaching tests (OECD guidelines) indicate that some nanocarriers can significantly affect the fate of some active ingredients
- Interpretation in terms of e.g., transport or degradation, is not possible due to the inadequacy of the protocols applied (developed for solutes but applied to colloids)
- For short-lived nanoformulations (i.e., rapid release), current methods may be suitable
- For long-lived nanoformulations (i.e., slow release), kinetic approaches are necessary to adequately describe environmental fate



The fate of some nanopesticides can be well described by current methods (developed for solute, equilibrium approach). For others, consideration of colloidal behavior is necessary (kinetic approach)

Zeolites in crop protection

Caroline De Smedt, Michael Houbraken, Pieter Spanoghe

Presenter Michael Houbraken

Department of Crop Protection Chemistry
Faculty of Bioscience Engineering
Ghent University
Coupure Links 653
Ghent - Belgium
michael.houbraken@ugent.be

Objectives

- Evaluate zeolites and their potential role in crop protection
- Compare different types of zeolites on pesticide adsorption and desorption capacity

Highlights

- Fenpropimorph is the best adsorbed pesticide
- Zeolite type FAU is the best adsorbing substance
- The kinetics follows the pseudo-second-order model
- The isotherms follows the type-II isotherms (high affinity for adsorbate) and the type-V isotherms (modification of the adsorbent)

Biotransformation of metamitron in soil: a detailed insight into the biodegradation

Shizong Wang, Matthias Kästner, Anja Miltner, Qi Yang, Karolina M. Nowak

Presenter Shizong Wang

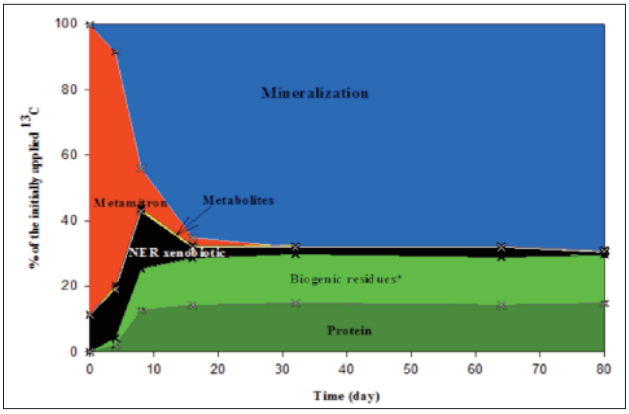
Helmholtz Center for Environmental Research-UFZ;
China University of Geosciences (Beijing)
Permoserstraße 15
Leipzig – Germany
blueskywsz@gmail.com

Objectives

- To investigate the degradation kinetic of metamitron in soil
- To investigate the degradation pathway of metamitron in soil
- To investigate the distribution of 13C-label in the fatty acids and amino acids
- To investigate the detailed turnover mass balance of metamitron in soil

Highlights

- First report on the detailed turnover mass balance of metamitron in soil
- Three metabolites and two pathways were identified
- Nearly all non-extractable residues are represented by non-toxic biogenic residues
- Metabolites derived from metamitron might present an environmental risk



*Detailed mass balance of 13C during the biodegradation process including biogenic residues. *Biogenic residues were calculated based on a conversion factor of 2 for proteins.*

Investigating the bioavailability of pesticide conjugates and bound residues in simulated human gut – azoxystrobin as a model compound

Maheswor Gautam, I.S. Fomsgaard

Maheswor Gautam

Aarhus University
Forsøgsvej 1
4200 Slagelse, Denmark
Email: maheswor.gautam@agro.au.dk

Objectives

- To elucidate the structures and bound residues of azoxystrobin in lettuce
- To undertake human gut simulation study to understand the effect of physicochemical and microbial ecology of the human gut on the stability of azoxystrobin congutes and bound residues

Highlights

- Xenobiotic metabolism of plant is known to sequester the conjugates and bound residues of such compounds in cellular compartments, mostly represented by vacuoles and cell walls
- Understanding of the fate of such conjugates and bound residues during human digestion is limited
- Some pesticide conjugates have been known to liberate native compounds in simulated human gut environment
- Dedicated LC-MS/MS and NMR methods will be developed for the structural elucidation of azoxystrobin conjugates and bound residues in lettuce. Further, simulated human gut studies will be undertaken to illustrate the liberation of native compounds of azoxystrobin due to the action of physicochemical and microbial environment existing in human gut.

SESSION II
FIELD STUDIES

Field studies are essential tools in higher pesticide risk assessment, offering information on the environmental risk of pesticides under realistic conditions. This chapter covers all aspects related to the design, execution, evaluation and interpretation of field studies; including strategies addressing the representativeness of field studies for risk assessment and the implementation of ecosystem services approaches in the field.
In addition, it specifically considers the role of field studies in connecting laboratory studies with landscape modelling and monitoring, the design of integrated testing strategies, improvements in the ecological relevance of the exposure scenarios, and the use of field information for mapping risks. The natural environmental field variability and the integration of the exposure and effect assessments might be addressed through the use of ecoregion and ecotype approaches to deal with the complexity and diversity of ecosystems and their services. Some papers explore the use of field studies results for defining specific protection goals and calibrating the lower and medium tier scenarios.

Session Chair
- Josè Tarazona, European Food Safety Authority (European Union)

Session Co-Chairs
- Jos Boesten, Alterra and Wageningen University (The Netherlands)
- Chris Lhytgo, European Food Safety Authority (European Union)
- Bernhard Gottesbüren, BASF (Germany)

Microbial degradation, sorption, and transport of four pesticides in four agricultural soils – subsoil profiles

Ole Stig Jacobsen, Finn Pilgaard Vinther

Presenter Ole Stig Jacobsen

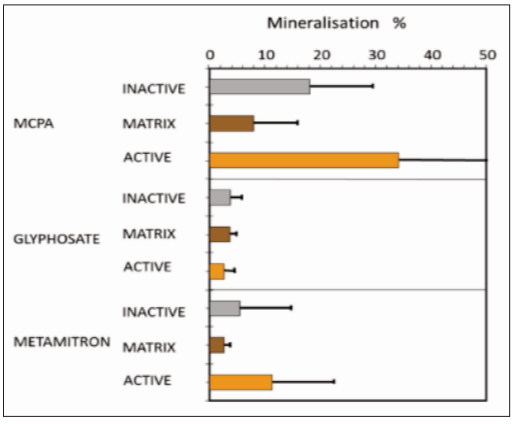
Geological Survey of Denmark and Greenland,
Øster Voldgade 10,
Copenhagen K,
Denmark
osj@geus.dk

Objectives

- The aim was to compile various aspects of the transport and degradation of pesticides in sandy and clayey soils
- The influence of actual microbial biomass in different soil horizons with reference to soil organic matter and the transport corridors to the uppermost groundwater
- Evaluate the difference in degradation in clay-matrix/inactive fractures/active fractures

Highlights

- The formation of metabolites was primarily occurring in the top soils.
- Macro-pores can have a higher microbial activity than found in the surrounding matrix soils



Actual mineralization of three pesticides in active, inactive pores and in clay matrix over a 25 days period

- Microbial activity in the hydraulically active and inactive macropores indicates that there is no quantitative microbial difference

Degradation and transport of ethylenethiourea in a sandy soil profile

Ole Stig Jacobsen

Presenter Ole Stig Jacobsen

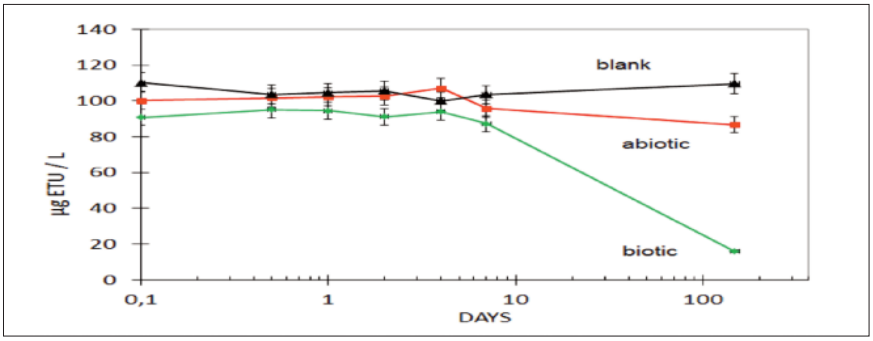
Geological Survey of Denmark and Greenland,
Øster Voldgade 10,
Copenhagen K,
Denmark
osj@geus.dk

Objectives

- Ethylenethiourea (ETU) is an important degradation product of EBDC fungicides
- Widely used in different kind of crops as potatoes and in large quantities
- ETU is mutagenic and is classified as probable human carcinogen
- Relatively stable and very polar and as such a potential contaminant in groundwater

Highlights

- The applied EBDCs degrade rapidly to ETU, which reaches the soil as wash-off
- ETU is only weakly absorbed by soil particles and moves to groundwater
- ETU was degraded in topsoil within the top soil 70% in 30 days
- Very few findings of ETU in soil lysimeters at 1 meter depth
- Column experiments in subsoils some similar degradation
- Under anoxic condition was degradation even higher
- Only few findings in the shallow groundwater



Decoposition of ETU in Topsoil under oxic condition. Initial concentration 120 µg ETU / L.

A tiered-based approach to study the dissipation and adsorption of isoproturon, tebuconazole and chlorpyrifos in soil

Evangelia S. Papadopoulou, Panagiotis A. Karas, Sofia Nikolaki, Veronika Storck, Federico Ferrari, Marco Trevisan, Fabrice Martin-Laurent, Dimitrios G. Karpouzas

Presenter Dimitrios Karpouzas

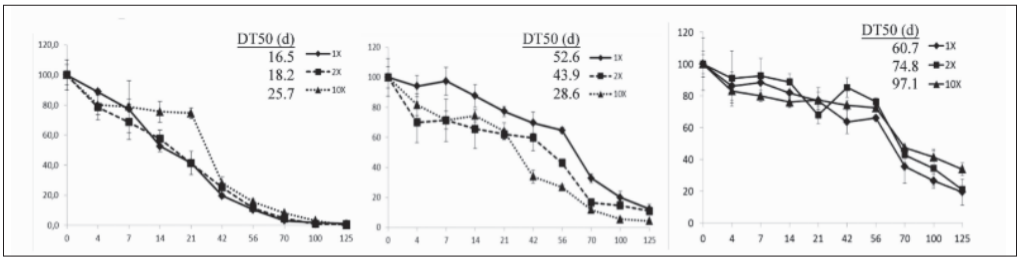
University of Thessaly, Department of Biochemistry
& Biotechnology
Ploutonos 26 & Aiolou
Larissa - Greece
dkarpouzas@bio.uth.gr

Objectives

- To determine the soil dissipation and metabolism of three model pesticides isoproturon (IPU), chlorpyrifos (CHL) and tebuconazole (TCZ) as a measure to assess the intensity and duration of the exposure of the soil microbial community
- To assess the adsorption of the three model pesticides

Highlights

- The dissipation of IPU, TCZ, and CHL was determined under extreme (Tier I-lab, x1, x2 and x10) and realistic (Tier II-field, x1, x2 and x5) exposure schemes
- IPU was demethylated to MDIPU and DDIPU and CHL was hydrolyzed to TCP
- IPU showed a uniform dose-dependent increase in its persistence
- CHL persistence was reduced with dose rates in the lab while the opposite was seen in the field
- Sorption increased in the order IPU>TCZ>CHL. IPU metabolites showed similar adsorption to IPU while TCP exhibited lower adsorption compared to CHL



The dissipation of IPU (left), CHL (middle) and TCZ (right) in soil in the lab scale study when applied at three dose rates (x1, x2 and x10 the recommended dose). DT50s presented are calculated the most appropriate kinetics model

Advances in the assessment of the soil microbial toxicity of pesticides: Are we ready to revise the relevant regulatory framework?

Dimitrios G. Karpouzas, Fabrice Martin-Laurent, Ines Petric, Edoardo Puglisi, Marco Trevisan, Federico Ferrari, George Tsiamis, Olivier Sibourg, Cedric Malandain

Presenter Dimitrios Karpouzas

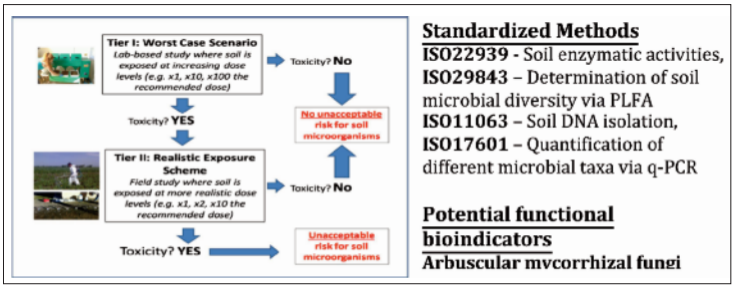
University of Thessaly, Department of Biochemistry & Biotechnology
Ploutonos 26 & Aiolou
Larissa - Greece
dkarpouzas@bio.uth.gr

Objectives

- To define a new framework of well-established experimental protocols and a toolbox of well standardized and advanced methods in order to set the scene for revising the current regulatory framework regarding pesticide soil microbial toxicity assessment which is far from comprehensive and up-to-date

Highlights

- A tiered approach where pesticides soil microbial toxicity is first assessed at lab scale (Tier I, high exposure) followed, if needed, by a field assessment (Tier II, realistic exposure) using advanced and standardized methods is proposed
- Issues discussed will be: a) pesticide dissipation: necessary, it defines exposure (intensity-duration), b) toxicity of metabolites or of bio-pesticides, c) spotting functional microbial groups as toxicity indicators d) define normal operating range of measurements to avoid erroneous interpretations and allow estimation of recovery, e) lack of standardized methods measuring microbial diversity



A general proposed scheme for assessing the soil microbial ecotoxicity of pesticides (left) and examples of standardized methods used to assess effects of pesticides on function and abundance (upper right)

Assessing the transfer of pesticides via subsurface lateral flow combining a tracing experiment with a high resolution spatiotemporal monitoring

Xavier Peyrard, Lucie Liger, Céline Guillemain, Corinne Brosse, Véronique Gouy

Presenter Xavier Peyrard

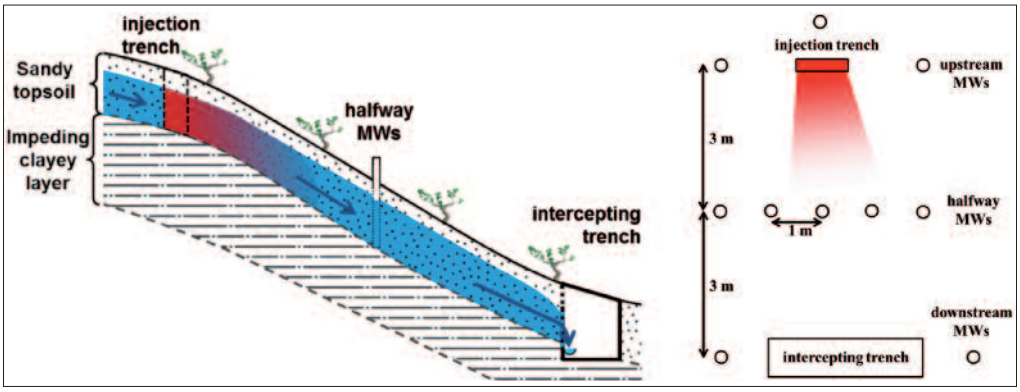
Irstea, UR MALY, centre de Centre de Lyon - Villeurbanne,
5 rue de la Doua - CS 70077
69626 Villeurbanne cedex
France
xavier.peyrard@irstea.fr

Objectives

- Study lateral flows and transfers thanks to an original experimental design
- Trace water driven by lateral flows in order to explore lateral flow pathways
- Explore the influence of water pathways on pesticide transfer mechanisms

Highlights

- Trenches are more suitable than monitoring wells to measure preferential flows
- Pesticides move with lateral flows according to their physico-chemical properties
- Preferential flows play a major role in lateral transfers
- Orption mechanisms are lower in preferential flows than in matrix flows



Drawings of the side view (left) and of the top view (right) of the tracing zone, representing monitoring well (MW) positions, trench used to inject bromide and pesticides, and trench intercepting lateral flows

Assessment of the impact of isoproturon, chlorpyrifos, and tebuconazole on soil microbial functions using a lab-to-field tiered approach

Giorgia Pertile, Celine Baguelin, Andrea Ferrarini, Flavio Fornasier, Panagiotis Karas, Evangelia Papadopoulou, Sonia Nikolaki, Veronika Storck, Federico Ferrari, Marco Trevisan, George Tsiamis, Olivier Sibourg, Cedric Malandain, Fabrice Martin-Laurent, Dimitrios G. Karpouzas

Presenter Giorgia Pertile

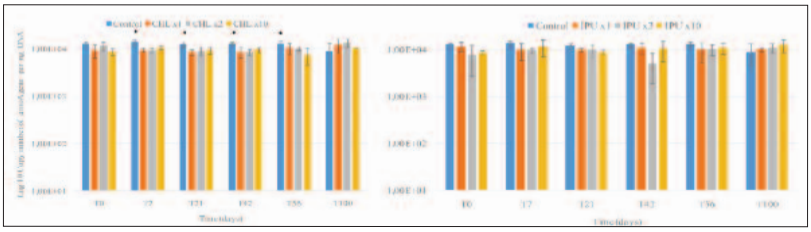
AEIFORIA, Fidenza, Italy
Universita Cattolica del Sacro Cuore, Piacenza, Italy
Giorgia.Pertile@unicatt.it

Objectives

- To evaluate the impact of three pesticides, isoproturon (IPU), tebuconazole (TCZ) and chlorpyrifos (CHL), on soil microbial functions following a lab (Tier I) to Field (Tier II) approach as part of an overall assessment of pesticide soil microbial toxicity assessment

Highlights

- P-cycling enzymes were more affected by pesticide applications especially IPU and CHL
- Lab applications of CHL and TCZ (x1, x2 and x10 the recommended dose) induced significant reductions in the abundance of AOA and AOB with a clear temporal pattern observed only in AOA
- Field applications of CHL and TCZ (x1, x2 and x5) induced significant reductions in the abundance of AOA only though no temporal pattern was evident
- No effect of any of the pesticides tested on the abundance of genes involved in denitrification and aromatic compound degradation was observed.



CHL induced significant reductions, even at the recommended dose, on the abundance of AOA in the lab study which were visible until 56 d (left), whereas IPU had no effect on AOA in the lab study (right)

Benefits of passive sampling for the monitoring of pesticides in surface and subsurface waters

Alexis Martin, Céline Guillemain, Matthieu Le-Dréau, Lucie Liger, Xavier Peyrard, Véronique Gouy, Christelle Margoum

Presenter Christelle Margoum

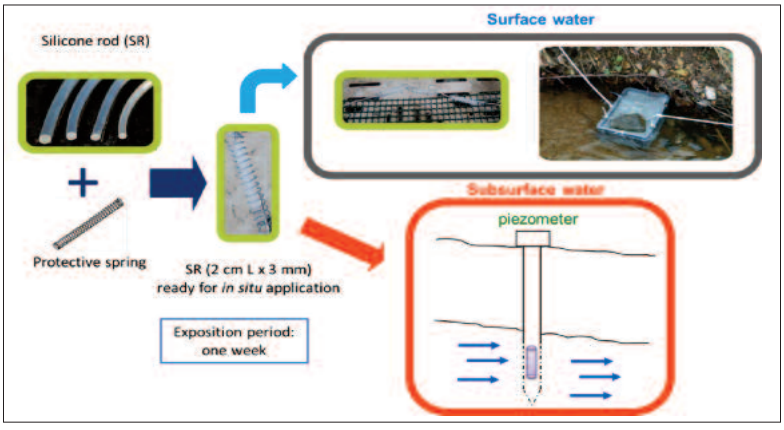
Irstea, UR MALY
5 rue de la Doua
CS 70077
Villeurbanne cedex
christelle.margoum@irstea.fr

Objectives

- Develop simple tools for the passive sampling of pesticides in waters
- Apply these passive samplers in surface and subsurface waters
- Define and characterize their field of application

Highlights

- Need for integrative tools to improve the sampling of pesticides in aquatic media
- Passive sampling is an alternative to grab or average automated sampling
- New silicone rods (SR) are single-use and low cost passive samplers for pesticides
- SR can be applied in either surface or subsurface waters
- SR allow to obtain qualitative or semi quantitative data
- Gradient of pesticide concentration can be easily shown with SR



Preparation of silicone rods and implementation in surface and subsurface waters.

Direct measurement of spray interception by cereal crops using the fluorescent dye tracer 1,3, 6, 8-pyrene tetra sulfonic acid tetra sodium salt (PTSA)

Lindsay Fogg, Tim Pepper, Chris Hatzenbeler, Neil Mackay, Gabriel Olchin

Presenter Tim Pepper

Cambridge Environmental Assessments (ADAS UK Ltd)
ADAS Gleadthorpe
Mansfield
Notts UK
tim.pepper@adas.co.uk

Objectives

- Develop a standard methodology for crop interception measurement
- Evaluate PTSA suitability as a tracer for direct measurement of crop residues
- Obtain interception values at early crop growth stages

Highlights

- PTSA residues were successfully extracted and quantified from crop samples and ground deposition targets
- High level of accuracy achieved using fluorometric analysis
- Values for crop interception obtained suggest that regulatory default values currently used for these growth stages may need revision.

Effect of wheat architecture on the fate of fungicides in the environment

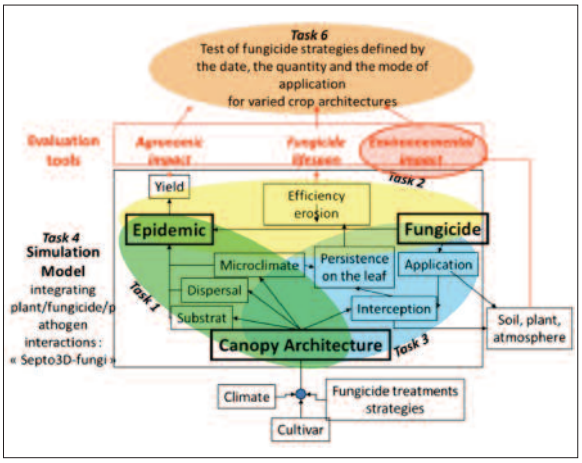
Carole Bedos, Laure Mamy, Valérie Pot, Nébila Lichiheb, Pierre Benoit

Presenter Carole Bedos

INRA-AgroParisTech
UMR 1402 ECOSYS
Thiverval-Grignon, France
carole.bedos@grignon.inra.fr

Objectives

- To reduce the use of pesticides by promoting disease escape and optimizing fungicide interception via adapted crop architectures
- To evaluate the adequacy of the identified strategies by assessing the environmental behavior of fungicides
- To use recommended models for the pesticide approval (PEARL, PRZM) to perform this evaluation for two wheat fungicides, based on scenarios tested in the field



Environmental assessment is one part of the ECHAP project which is supported by the research program "Assessing and reducing environmental risks from plant protection products" funded by the French Ministries in charge of Ecology and Agriculture"

Highlights

- The effect of wheat architecture on the fate of fungicides was found to be linked with the rate of fungicide interception by the crop during application
- Volatilization losses were significant for chlorothalonil whatever the architecture
- No leaching was simulated for both compounds because of their sorption in the soil
- Significant amounts of epoxiconazole remained in the soil profile due to its persistence

Evidence for the interest of suspect screening metabolomics to detect and identify known and unknown pesticide metabolites formed in agricultural soils

Veronika Storck, Luigi Lucini, Federico Ferrari, Evangelia S. Papadopoulou, Sofia Nikolaki, Panagiotis A. Karas, Dimitrios G. Karpouzas, Marco Trevisan, Fabrice Martin-Laurent

Presenter Veronika Storck

INRA, Dijon, France;
Aeiforia, Fidenza, Italy;
Catholic University of the Sacred Heart, Piacenza, Italy;
Enoveo, Lyon, France
vstorck@dijon.inra.fr

Objectives

- Pesticides transform into potentially (eco-)toxicologically relevant metabolites in the environment
- New analytical methods are needed for more comprehensive metabolite detection
- Analytical approach: UPLC-QTOF-MS/MS on soil extracts collected during field dissipation of three pesticides: chlorpyrifos, isoproturon and tebuconazole
- Objective: strengthen future pesticide environmental risk assessment (ERA)

Highlights

- Suspect screening metabolomics contain four steps: i) construction of metabolite library, ii) non-target MS, iii) target tandem MS, iv) molecular structure correlation
- Comprehensive metabolite libraries were designed containing empirical and theoretical metabolites
- Pros and cons of this approach are discussed and compared to other approaches
- Empirical and yet unknown metabolites were detected for each pesticide
- Example of the benefits of molecular structure correlation is provided
- Suspect screening metabolomics have the potential to rationalize the choice of metabolites to be monitored in ERA studies

Modelling exposure of workers, residents and by-standers to vapour of plant protection products after application to crops

E. van den Berg, C.M.J. Jacobs, K. Doan Ngoc, P. Spanoghe, G. Fragkoulis, M.C. Butler Ellis

Presenter Erik van den Berg

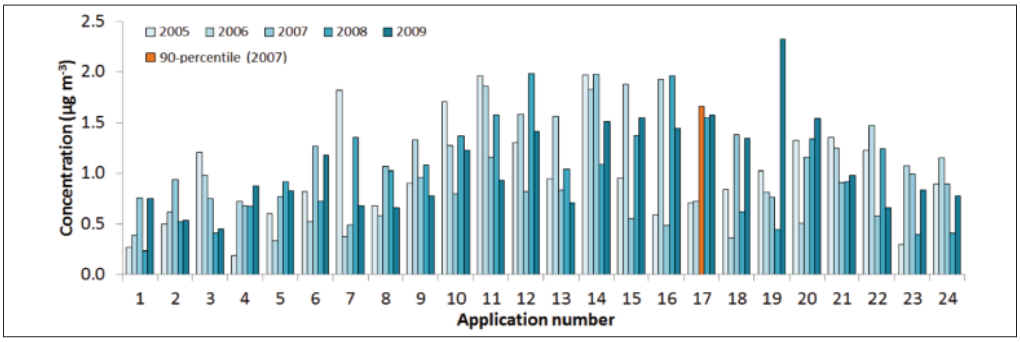
Alterra, Wageningen UR
PO Box 47
Wageningen
The Netherlands
erik.vandenberg@wur.nl

Objectives

- Development of models and scenarios to assess exposure of bystanders, residents, operators and workers (BROWSE) to plant protection products
- Development of higher tier options for vapour exposure
- Development of a model for worker exposure and emission following indoor use
- Proposal to assess resident or bystander exposure outdoor after indoor use

Highlights

- Effect of the actual period of application is demonstrated
- Effect of competing processes in combination with application timing is discussed
- The volatilization model PEARL has been extended for indoor applications.
- Further developments of model and scenarios for indoor use of PPP are proposed



Effect of weather conditions on maximum 24h-average outdoor vapour concentration upon application of PPP (vapour pressure 0.05mPa) during the growing season (Central Europe, April-September)

Multidimensional modelling of non-uniform water and solute application to the soil surface

Christoph Oberdörster, Klaus Hammel

Presenter Christoph Oberdörster

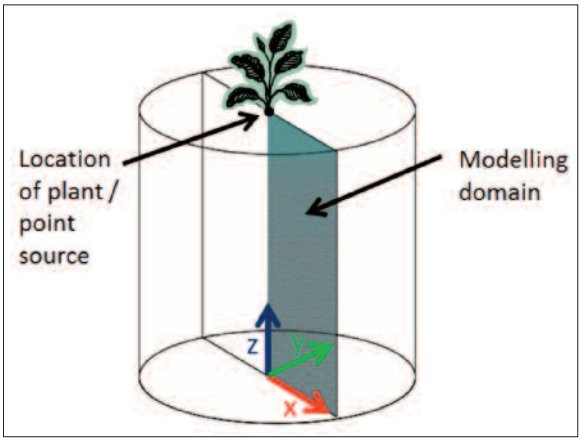
Bayer CropScience AG
Environmental Modelling
Alfred-Nobel-Straße 50
Monheim - Germany
christoph.oberdoerster@bayer.com

Objectives

- Consideration of agricultural practice which oftentimes leads to heterogeneous distributions of water and/or solute supply
- Simulation of advective-dispersive transport of tracers under transient conditions using the multidimensional modelling package Hydrus 2D/3D

Highlights

- Comparison of two different water/ tracer sources: uniform and point source
- Consideration of passive plant uptake
- The results show that non-uniform water flow and solute transport in soil becomes very complex taking the different boundary conditions into account
- However, multidimensional modelling appears to be a valuable means to provide spatially and temporally resolved predictions



Modelling domain considering symmetry aspects including position of the plant and the point source.

Research on European soil scenarios for permanent crops and crops grown on ridges

Sabine Beulke, Tineke De Wilde, Matteo Balderacchi, Floortje Garreyn, Wendy van Beinum, Marco Trevisan

Presenter Sabine Beulke

Fera Science Ltd.
Sand Hutton
York – United Kingdom
sabine.beulke@fera.co.uk

Objectives

- Develop and parameterise European scenarios for permanent crops (vines, pome fruit, bush berries, stone fruit, citrus, olives, hops, permanent grassland) to support the revision of the Guidance Document on Persistence in Soil (SANCO 9188/VI/97 rev. 8 12.07.2000) within EFSA procurement OC/EFSA/PRAS/2013/01
- Enable the use of existing scenarios for potatoes, as an example of a row crop grown on ridges.

Highlights

- GIS overlay of permanent crop cover, FOCUS climatic zone, regulatory zone and soil mapping unit / dominant typological unit.
- Information on EU cultivation practices in permanent crops (litter layer, cover vegetation, mechanical mixing, irrigation).
- Six scenarios that apply to the 95th spatial percentile of the concentration in total soil and pore water in the intended area of use for the Northern, Central and Southern regulatory zones according to EU regulation (EC) 1107/2009
- A tiered assessment scheme for permanent crops consisting of five tiers.
- PEARL scenario parameterisation.
- Scenario adjustment factors for permanent crops and potatoes.
- Fraction of the soil surface typically covered by ridges in potatoes.

The external scientific report is published on the EFSA website
http://www.efsa.europa.eu/en/supporting/pub/813e.htm

Slow degradation of fungicides in soils from cold temperate climate

Marit Almvik, Randi Iren Bolli, Agnethe Christiansen, Ole Martin Eklo, Roger Holten, Paulien Mulder, Gunvor Viki Senneset, Marianne Stenrød

Presenter Marit Almvik

Section Pesticide Chemistry
Division Plant Health
Norwegian Institute of Bioeconomy Research
Ås - Norway
marit.almvik@nibio.no

Objectives

- Study the laboratory and field degradation of slightly mobile fungicides and a mobile herbicide in Norwegian agricultural soils, as data on degradation of pesticides – and especially fungicides – is very scarce in the Northern Zone.
- Compare Norwegian DT50 values with the EU agreed endpoints in order to determine whether the EU endpoints for pesticides, which are predominantly based on degradation studies in soils from warm temperate climates, are representative for use in modeling and risk assessment in the Northern Zone or not.

Highlights

- DT50 values increased with increasing latitude and duration of winter season with cold soils; displaying a climatic effect on fungicide degradation.
- The fungicides boscalid and propiconazole were hardly degraded at all in some Norwegian soils.
- Pesticides that sorb strongly to soil may be even more persistent in cold temperate climates and degradation data from the Northern Zone should be included in order to set correct EU endpoints and achieve a correct assessment of pesticide fate in the Northern Zone.

The use of p-values and confidence intervals in the context of environmental safety and ecotoxicology studies

Zhenglei Gao, Thomas G. Preuss

Presenter Zhenglei Gao

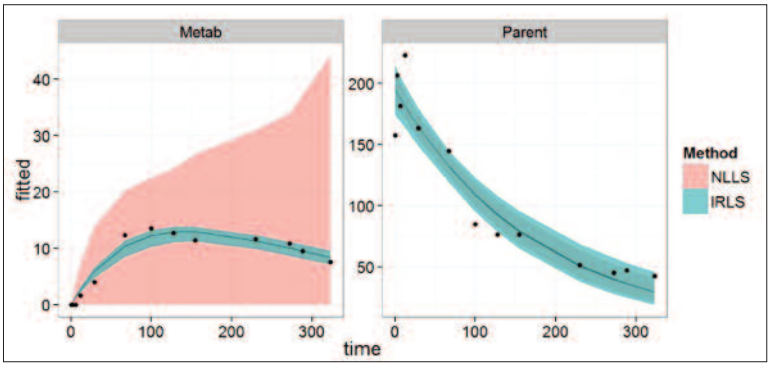
tier3 solutions GmbH
Kolberger Str. 61-63
Leverkusen
Germany
Zhenglei.gao@tier3.de

Objectives

- Discuss the exact message conveyed by a p-value.
- Review the nature of various uncertainty interval constructions.
- Promote proper use of p-values and intervals in the context of pesticide risk assessment.

Highlights

- Demonstrate how p-values can be misleading when the model is mis-specified.
- Worked examples are provided to illustrate different methods for quantifying the uncertainties.
- Several aspects associated with practical implementations are discussed including the trade-off between the simplicity of the frequentist scheme and the strengths of the computationally intensive Bayesian approach.



Prediction confidence intervals derived from two different methods for a Focus kinetic evaluation example. p-values from NLLS are misleading due to wrong assumptions in the model.

Volatilisation of pesticides after foliar application in vegetable greenhouses

Michael Houbraken, Kim Doan Ngoc, Frederik van den Berg, Pieter Spanoghe

Presenter Michael Houbraken

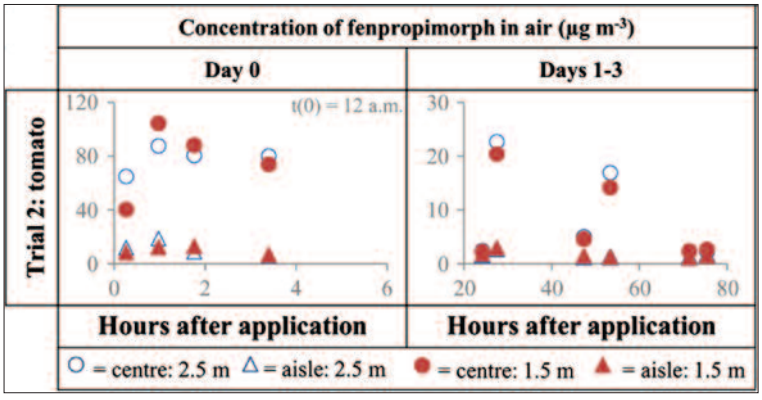
Department of Crop Protection Chemistry
Faculty of Bioscience Engineering
Ghent University
Coupure Links 653
Ghent - Belgium
michael.houbraken@ugent.be

Objectives

- Improve the current knowledge of the volatilisation process from plant surfaces
- Study the effect of competing processes on the volatilisation in greenhouses
- Complete a dataset to test and improve the PEARL model

Highlights

- Pesticides were found in greenhouse air up to four days after application
- Sampling height had little effect on pesticide concentration in the air
- Pesticide concentrations in the air were highest during the first hours after application and decreased remarkable in the days after application
- Penetration in the leaf surface and degradation of the substance compete with the volatilisation process
- Vapour pressure, ventilation rate and temperature in the greenhouse are important influencing factors



Measured concentrations of fenpropimorph in greenhouse air after application to a tomato crop. Note the difference in scale on the y-axis.

SESSION III
LANDSCAPE STUDIES

The agricultural landscape is the scale at which pesticides are used, so this also provides increasingly critical context for assessing risks to the environment and implementing management decisions. There are inherent challenges in scaling knowledge from laboratory or field-scale experiments to the landscape scale. Papers relevant to the landscape scale are herewith enclosed often integrating different investigation aspect such as the:

- Environmental fate at landscape levels
- Modelling approaches including integration of spatial and temporal variability
- Risk characterisation and integration of ecological processes at landscape scale
- Links between environmental monitoring, risk characterisation and risk management.

Session Chair

- Colin Brown, York University (United Kingdom)

Session Co-Chairs

- Neil Mackay, Dupont (United Kingdom)
- Pamela Rice, University of Minnesota (United States of America)
- Amy Ritter, Waterborne Institute (United States of America)

A CONCEPT TO MODEL THE FATE OF PESTICIDES AND THE RESULTING GROUNDWATER CONCENTRATIONS AT THE AQUIFER SCALE

Hans Kupfersberger, Gernot Klammler

Presenter Hans Kupfersberger

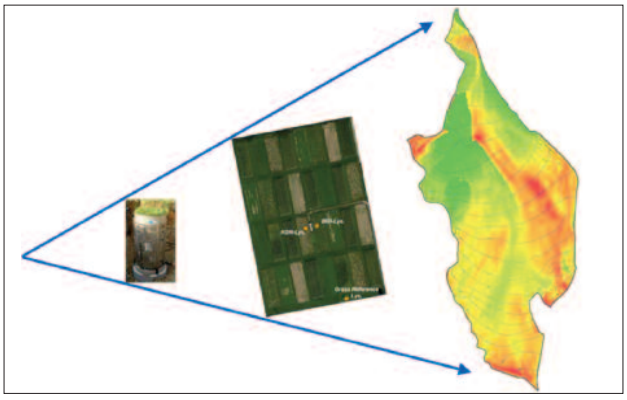
JOANNEUM RESEARCH Forschungsgesellschaft mbH
RESOURCES Institute for Water, Energy and Sustainability
Elisabethstr. 18
Graz - Austria
hans.kupfersberger@joanneum.at

Objectives

- Need to advance environmental fate modeling of pesticides to the aquifer scale
- Regional and transient groundwater flow and transport models improve our understanding of observed pesticide groundwater concentrations and support the formulation of aquifer scale risk mitigation measures and management options

Highlights

- The fate of metolachlor and metolachlor ESA at the lysimeter was modelled with PEARL and a good match of the measured concentrations could be obtained
- We bridge the gap from the lysimeter to the aquifer scale by a statistical approach
- We sequentially couple the soil water and pesticide fate model PEARL with the groundwater flow and transport model FEFLOW
- Coupled representation from the application on the ground to the distribution in the groundwater body will yield the general pattern and magnitude of observed metolachlor ESA concentrations



Principle of the regionalization approach implemented for nitrate transport in groundwater; field scale was used for verification of the statistical method

An advanced screening model of pesticide leaching: theory and evaluation

Jeremy Dyson, Nick Jarvis, Colin Brown, Paul Sweeney

Presenter Jeremy Dyson

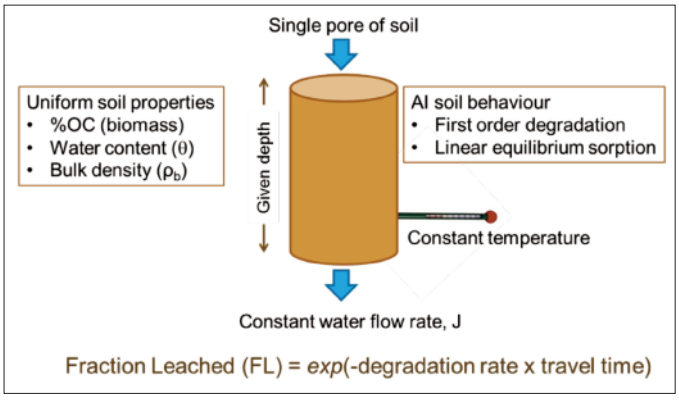
Syngenta Crop Protection AG
WRO 8.7.19
Schwartzwaldallee 215
Basel - Switzerland
jeremy.dyson@syngenta.com

Objectives

- Develop an advanced screening model to steward pesticide leaching generically
- Focus on key environmental/management variations that drive pesticide leaching
- Evaluate implications of these variations, particularly for site-specific stewardship

Highlights

- Jury et al. developed a screening model to evaluate steady leaching in single pore
- An advanced version can be derived by adding metabolites and soil variations
- A key advance is how degradation links to soil sorption and microbial activity
- Others are soil depth and dispersion variations, plus links to application methods
- Predicts FOCUS results well, when simulated with average drainage / temperatures
- May diagnose leaching vulnerability generically and link to stewardship advice



Schematic of the core screening model of Jury et al. Transformation to the advanced version by adding metabolites and key soil variations over depth (degradation, dispersion and links to applications).

Analysis of wash-off impact on the spatio-temporal soil loading of foliar applied agrochemicals in Europe

Jan Renger van de Veen, Gerald Reinken, Michael Schindler

Presenters Jan Renger van de Veen and Gerald Reinken

Tier3 solutions GmbH
Bayer CropScience AG
janrenger.vandeveen@tier3.de
jrvandeveen@hotmail.com

Objectives

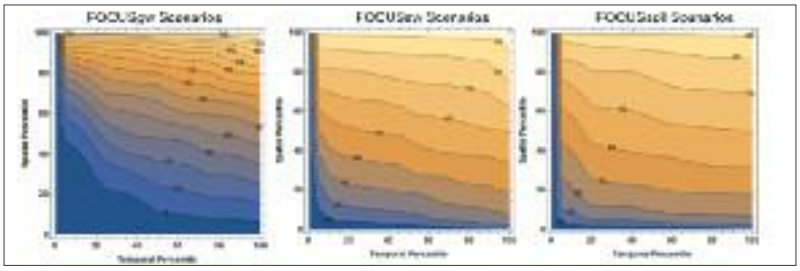
Existing FOCUS models are insufficiently harmonized regarding canopy processes and wash-off. Thus, a model independent wash-off estimation may be favourable. A simple model-independent wash-off approach by employing a single realistic worst case rainfall event of 20 mm rainfall 9 days after foliar treatment was evaluated.

Highlights

The proposed simple model-independent wash-off approach

- will lead to good estimation of average soil loading due to wash-off during the spring and summer cropping period
- is sufficiently protective to address impact of wash-off on the total soil loading
- allows the easy use of refinement values for the default wash-off parameter

Spatio-temporal dependencies of the wash-off fraction and wash-off soil loading are analysed and discussed with the help contour plot methodology



Contour plot analysis: Comparison of the wash-off fraction in the different FOCUS scenarios (groundwater, surface water, soil).

Assessing effects of agriculture activities on pesticide contents in an alluvial aquifer in South-Eastern Norway by an integrated approach

Jens Kværner, Ole Martin Eklo, Eivind Solbakken, Ivar Solberg, Stein Sorknes

Presenter Ole Martin Eklo

Norwegian Institute for Agricultural and
Environmental Sciences (Bioforsk)
Hogskolevn.7
Aas - Norway
olemartin.eklo@bioforsk.no

Objectives

- To identify effects of local agricultural practice on quality of groundwater in drinking water wells
- To identify effects of diffuse and point source pollution of pesticides to groundwater

Highlights

- Pesticides were found in the majority of the sampled wells (8 of 10)
- High concentrations of pesticides can be explained by point source pollution from washing sites of pesticide application equipment
- Combination of washing sites for pesticide equipment and groundwater wells require attention and good knowledge about properties of pesticide, soil and water to avoid contamination

Persistence of diquat will be followed up after 40 years of application

Ditch flow velocities in surface water exposure scenario's for Dutch orchards

Louise Wipfler, Harry Massop, Wim Beltman

Presenter Louise Wipfler

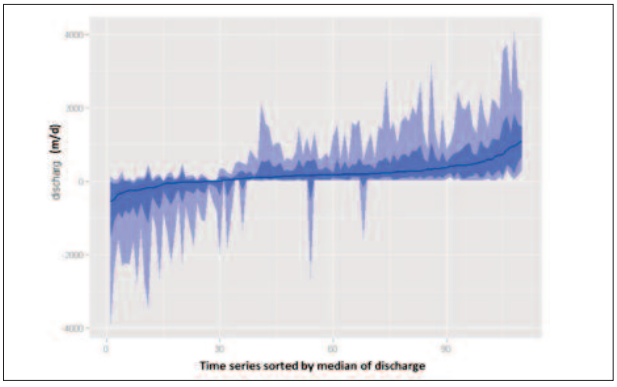
Alterra, Wageningen UR
Droevendaalse steeg 3a
PB Wageningen
The Netherlands
louise.wipfler@wur.nl

Objectives

- Quantify spatio-temporally variable water flow velocities in ditches near Dutch fruit orchards
- Focus on edge-of-field ditches in lowland areas
- Use of high resolution groundwater models
- Compare to current exposure scenario's used in Europe and the Netherlands

Highlights

- Groundwater- surface water exchange fluxes simulated by high resolution groundwater models are valuable for flow velocities quantification in lowland areas
- The approach produces realistic variabilities due to weather variability and typical lowland water management practices
- The derived daily velocity fluxes represent 110 ditches near orchards and cover 9 years, hence enabling to support probabilistic approaches used by EFSA and NL working groups for scenario derivation



Sorted time series of flow velocities. Blue line: median discharge (m/d), dark blue gives the 0-50th percen-tiles of the time series and light blue the 50th-90th percentiles

GIS APPROACH TO SIMPLIFY CONDUCT OF NATIONAL AND CONTINENTAL SCALE LEACHING VULNERABILITY ASSESSMENTS

Timothy Negley, Andy Newcombe, Gina Houck

Presenter Timothy Negley

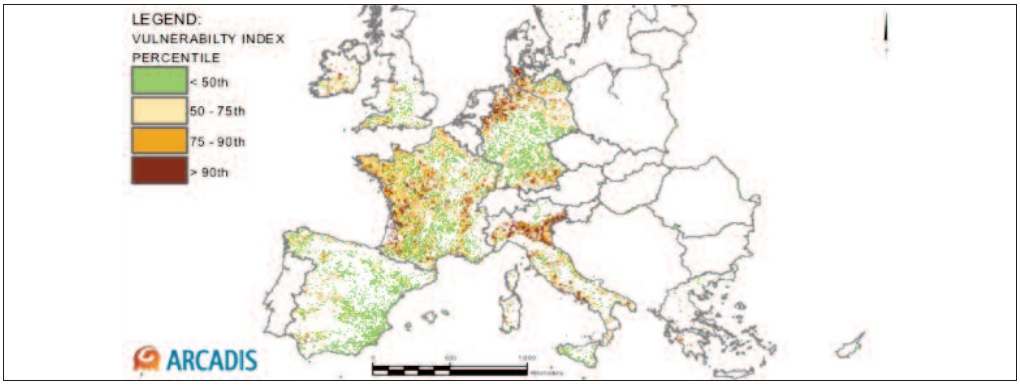
ARCADIS
Environmental Business Consulting
Towpath Road
Syracuse – New York (USA)
timothy.negley@arcadis.com

Objectives

- Develop a pragmatic index methodology to spatially characterize leaching potential
- Construct a geospatial model for use at regional, national, and continental scales
- Derive weighting factors via FOCUS PEARL for key vulnerability factors
- Demonstrate utility for site identification and evaluation of existing monitoring data

Highlights

- Continental scale crop assessments leverage readily accessible spatial data
- Analyses are rapid, logical, and reproducible using commercial GIS software
- Comparison to public monitoring databases can assess data representativeness
- Outliers or data gaps in monitoring databases can be elucidated for detailed review
- Proven successful for locating suitable sites for groundwater monitoring studies



Vulnerability index map showing regions of upper bound leaching potential for a hypothetical scenario.

Identifying priority zones in an agricultural catchment to mitigate glyphosate runoff

Ingeborg Joris, Nele Desmet, Daniel Wilczek, Wesley Boënne, Piet Seuntjens, Kim Koopmans, Dany Bylemans, Katrien Wouters, Karel Vandaele

Presenter Ingeborg Joris

VITO, Environmental Modeling Unit
Flemish Institute for Technological Research,
Boeretang 200
MOL Belgium
ingeborg.joris@vito.be

Not received

Objectives

- Develop a method to derive priority zones for applying mitigation measures for erosion control and mitigation of glyphosate runoff in an agricultural catchment.
- Use the information to target farmers that may have a significant impact on the glyphosate load to surface water.

Highlights

- The study catchment was selected based on results from geospatial pesticide emission modeling, historical glyphosate concentrations, and crop cover.
- Priority zones were derived based on a risk map which includes information about the topography, crop cover, the estimated glyphosate use, the potential erosion risk, and the connectivity of the agricultural parcels to the river.
- The theoretical risk map was validated in the field using field observations of runoff during stormflow events, and using observations of roads short-circuiting the runoff to the river.
- Target farmers are being encouraged to participate in a voluntary erosion control program supported by the local government, starting from 2016 on.
- Effect of mitigation measures on the glyphosate concentrations in the river will be assessed by monitoring two years before and three years after implementation of the measures.

Implications of Data Set Selection on pan-European Modelling of Pesticides

Gerco Hoogeweg, Paul Sweeney, Megan Guevara, Lucy Fish

Presenter Gerco Hoogeweg

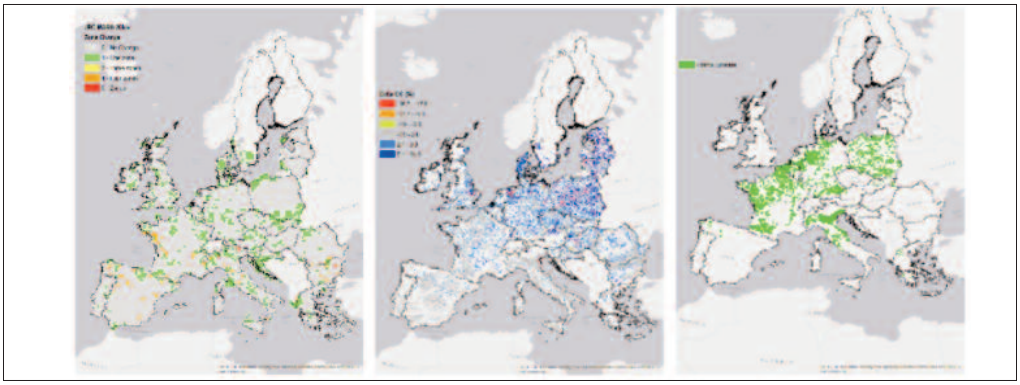
Lead and Manager, GIS and Data Technologies
Waterborne Environmental, Inc.
Harrison Street SE
Leesburg, VA 20175
USA
hoogewegg@waterborne-env.com

Objectives

- Determine the impact of dataset selection of a pan-European modelling framework to for calculating pesticide concentrations in groundwater and vulnerable areas
- Assess differences of climate datasets in the development of FOCUS zone maps
- Assess soil databases and impact on vulnerability modelling

Highlights

- Dataset selection and time period affect assigment of FOCUS zones to arable areas.
- Existing organic matter databases as significantly different for the topsoil
- New datasets provide better coverage of arable lands compare to EFSA recommended data
- Vulnerable areas developed with EFSA recommended data are a subset compared to vulnerable area developed with newer datasets



FOCUS zone change (left) and differences in OM% (middle) and joint vulnerable areas (right)

MACRO-DB: A RISK ASSESSMENT TOOL FOR MANAGEMENT OF PESTICIDE USE IN WATER PROTECTION AREAS IN SWEDEN

Mikaela Gönczi, Julien Moeys, Nicholas Jarvis, Jenny Kreuger

Presenter Mikaela Gönczi

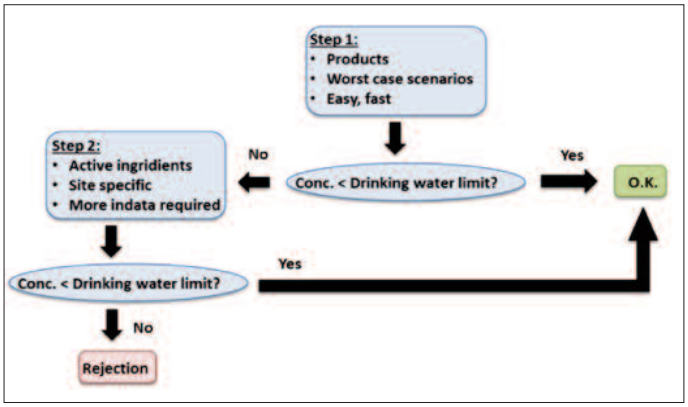
Centre for Chemical Pesticides (CKB)
Swedish University of Agricultural Sciences
Lennart Hjelms väg 9
Uppsala – Sweden
Mikaela.gonczi@slu.se

OBJECTIVES

- Develop a user-friendly risk assessment tool for pesticide leaching to drinking water
- Offer a method for the local authorities to base their decisions on pesticide use in water protection areas on best scientific knowledge
- Help prevent unnecessary conflicts between farmers and local authorities

HIGHLIGHTS

- MACRO-DB is a user-friendly tool mainly aimed for environmental inspectors, farmers and agricultural advisers and it is used in many municipalities in Sweden
- There are only a few site specific parameters that the user needs to provide
- Predefined sets of parameters for regional climate, underlying material, crop and pesticide properties are provided in the tool, as well as pedotransfer functions for soil hydraulic properties
- The results are given as a simulated concentration in the water reaching the groundwater and surface water



MACRO-DB is a tool in two steps for decisions on pesticide use in water protection areas in Sweden.

Modelling pesticide contamination in two small agricultural catchments using SWAT

Isabel Grijalvo Diego, Colin D. Brown, Jeremy Biggs, Adrianna Hawczak, Chris Stoate, John Szczur

Presenter Isabel Grijalvo Diego

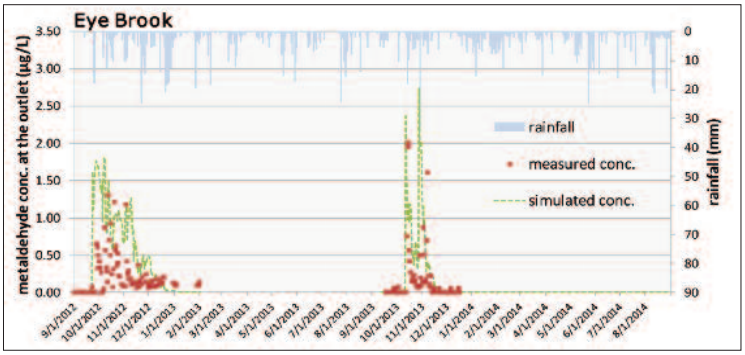
Environment Department
University of York
Heslington
York - UK
igd500@york.ac.uk

Objectives

- To develop a physically-based and spatially explicit model of the study area included within the Water Friendly Farming (WFF) project
- To establish the flow conditions in the catchments for the baseline period
- To model metaldehyde transport

Highlights

- The SWAT model underestimated most of the peaks of the simulated flow however most simulated flow was both graphically and statistically close to the observed flow
- The model results for daily stream flow calibration and validation indicated a good model performance
- SWAT was able to predict the temporal pattern for peaks in pesticide concentrations for the molluscicide metaldehyde in both catchments.
- The model will be used to assess the efficacy of a programme of mitigation measures



Graphical comparison for the measured and simulated data of metaldehyde concentration at one of the WFF catchments outlet (Eye Brook) for the baseline period (Sept 2012-2014).

Modelling pesticide transport from land to drinking water resources in five UK case study catchments

Stephanie Pullan, Mick Whelan, Ian Holman

Presenter Stephanie Pullan

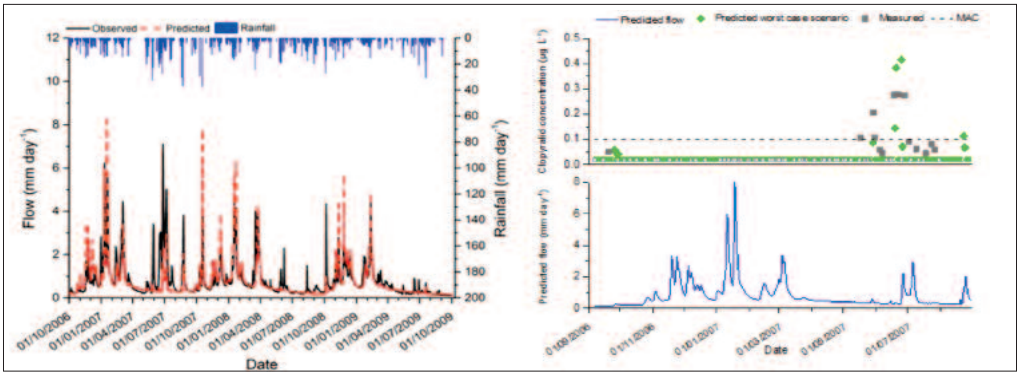
TSGE Consulting
St James Business Park, Grimbald Crag Court, Knaresborough
United Kingdom
stephanie.pullan@tsgeurope.com

Objectives

- Develop a parameter efficient catchment-scale pesticide exposure model
- Apply and evaluate in a small sub-catchment
- Upscale to and apply in five catchments with varying soil and climate properties

Highlights

- Soil-type-specific boundary conditions determine active hydrological pathways
- Acceptable simulations of discharge generated for all catchments
- Predicted pesticide exposure more challenging to evaluate due to data uncertainties
- Main uncertainties include pesticide application and measured concentration data
- Predicted exposure can inform water company risk assessments



Comparison of (a) measured rainfall and measured and predicted flow during the validation period (October 2006 – September 2009) and (b) predicted and measured clopyralid concentrations and predicted river flow between September 2006 and September 2007 in the Yare catchment, UK.

Modelling the exposure of water bodies to spray drift for fruit growing in the Netherlands

H.J. Holterman, J.C. van de Zande, H.T.L. Massop, J.J.T.I. Boesten, J.F.M. Huijsmans, M. Wenneker

Presenter Henk Jan Holterman

Wageningen UR
Business Unit Agrosystems Research
P.O. Box 16
Wageningen
The Netherlands
henkjan.holterman@wur.nl

Objectives

- Develop innovative model for downwind deposits of spray drift concerning pesticide application in fruit growing
- develop exposure assessment model for all edge-of-field water bodies in fruit growing areas in the Netherlands
- develop higher-tier assessment tool for authorization of pesticides in fruit growing considering the risk for aquatic organisms

Highlights

- Spray drift model developed based on 20 years of experimental drift data when spraying fruit crops
- High level of realism obtained due to innovative approach using a continuous dependence of spray drift on growth stages of the fruit crop during the growing season
- Local meteorological conditions (e.g. wind speed, wind direction) accounted for in the spray drift model
- Mitigation techniques for spray drift implemented in the model
- Exposure assessment model developed for all water bodies next to fruit orchards in the Netherlands
- Multiple spray events are accounted for, giving the model a realistic flexibility
- Exposure model will be used together with pesticide fate models to assess realistic exposure of water organisms to pesticides
- The exposure model can be used as a higher-tier tool for the authorization of pesticides in fruit growing

Multiyear FOCUS surface water modelling: options and proposals for realisation

Gerhard Goerlitz, Klaus Hammel, Thorsten Schad, Anastasiia Bolekhan, Simon Heine

Presenter Gerhard Goerlitz

Bayer CropScience AG
Alfred-Nobel-Str. 50
Monheim, Germany
gerhard.goerlitz@bayer.com

Objectives

- Analyse the impact of the weather pattern of the "typical" year chosen for FOCUS surface water step 3 calculations on the resulting PECsw
- Investigate possibilities to achieve more robust exposure estimate at a pre-defined vulnerability and thus "repair" the FOCUS system without major redesign
- Maintain continuity and consistency with the existing regulatory risk assessment schemes

Highlights

- The principle of a "typical" year based on seasonal averages does not ensure a robust exposure estimate, sometimes it results in a predicted concentration close to the best case year of a 20 year calculation, in other cases to the worst case year
- This arbitrariness is shown to be the result of the specific weather pattern in the selected year
- While this had already been shown for run-off scenarios it can also be shown for drainage scenarios
- Comparison of FOCUS with multiyear calculations shows that the present FOCUS system is not principally biased but positive and negative deviations seem roughly balanced
- By changing to a multiyear calculation similar to the procedure used in the FOCUS groundwater guidance, an overall defined and more robust outcome (worst case percentile) can be achieved
- Spatially explicit modelling can be used to quantify the vulnerability of the existing surface water scenarios and on this basis an appropriate percentile from the results of a multiyear calculation can be selected
- Other components of the FOCUS surface water system, e.g. the application timer will also need some adaptions

Multi-year FOCUS surface water modelling: problematics of the "typical" FOCUS year for drainage scenarios

Anastasiia Bolekhan, Simon Heine, Klaus Hammel, Gerhard Görlitz

Presenter Anastasiia Bolekhan

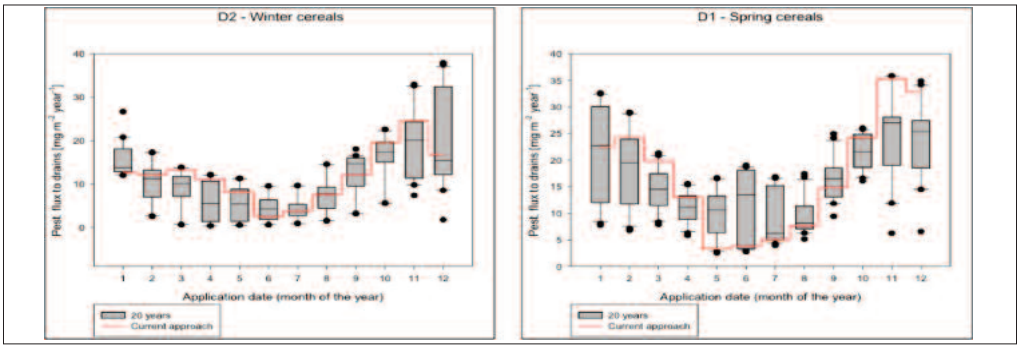
Bayer Crop Science AG
Alfred-Nobel-Straße 50
Monheim am Rhein – Germany
anastasiia.bolekhan@bayer.com

Objectives

- Investigate the conservativeness of the current FOCUS pre-selected year results as compared to the multi-year approach for drainage scenarios
- Assess the impact of different application dates on the percentile represented by the standard FOCUS year within the 20 year calculations

Highlights

- The FOCUS "typical" year concept is increasingly being questioned
- Investigations indicate that such an approach is not consistently conservative
- These concerns were addressed for the FOCUS drainage scenarios
- Results show that depending on the application period the FOCUS approach can range from a worst to a best case compared to the results of 20 year simulations
- Multi-year calculations with an appropriate percentile of annual concentrations might be a more robust solution for the surface water exposure assessment



 Comparison of the drainage mass fluxes calculated with current approach to the multi-year calculation

Pesticide runoff from cropped fields and vegetative buffers: modelling and mitigation strategies

Jeremy Dyson, Madarász Balázs, Derek Wallace, Rozalia Pecze

Presenter Jeremy Dyson

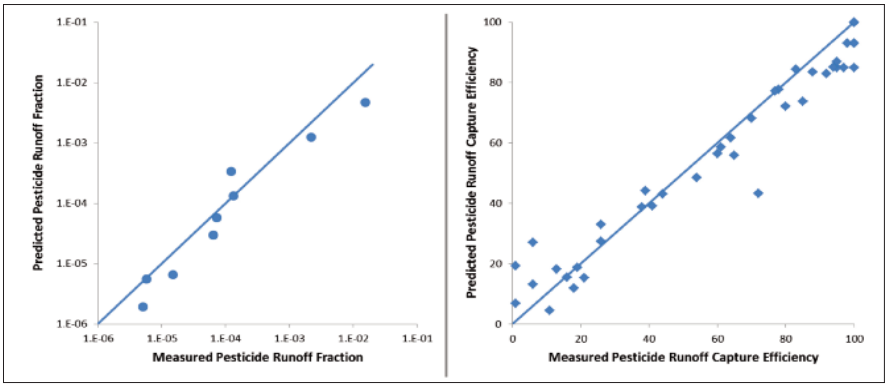
Syngenta Crop Protection AG
WRO 8.7.19
Schwartzwaldallee 215
Basel - Switzerland
jeremy.dyson@syngenta.com

Objectives

- Develop a physically-based model of pesticide runoff generation in cropped fields
- Develop a physically-based model of pesticide runoff capture by vegetative buffers
- Provide an evidence-based strategy to mitigate pesticide runoff for stakeholders

Highlights

- Pesticide runoff generation / capture is predicted well from runoff / erosion data
- Pesticide runoff generation rises non-linearly with increases in runoff and erosion
- Pesticide runoff capture only rises linearly as runoff and erosion capture increase
- This means better crop management is critical to runoff mitigation, not just buffers
- Better crop management also has synergistic effects on vegetative buffer efficiency
- The best strategy must be to improve productivity while enhancing protection



Predictions of pesticide runoff fraction and capture efficiency from the physically-based models using runoff and erosion data, plus pesticide partitioning between liquid and solid phases.

Spatial distribution of pesticide concentrations in Germany calculated with PELMO

Michael Klein, Matthias Trapp, Kai Thomas, Djamal Guerniche, Wolfram König, Philipp Klaas, Gabriele Holdt, Anne Osterwald

Presenter Michael Klein

Fraunhofer IME,
Auf dem Aber 1
Schmallenberg, Germany
michael.klein@ime.fraunhofer.de

Objectives

- Evaluation of the relevant FOCUS scenarios for national groundwater risk assessment in Germany
- Development of a GIS tool based on FOCUS PELMO and national geo-datasets with high spatial and temporal resolution
- Calculation of percolate concentrations in 1 m soil depth for 9 substances and 2 crops

Highlights

- Comparisons indicate that the FOCUS Hamburg scenario is not representing the 80th spatial percentile in Germany for different substance properties and crops

Spatial percentile of the FOCUS Hamburg scenario in Germany dependent on crop (WC = winter cereals, MZ = maize) and key pesticide parameters

- Soil weather combinations representing the 80th spatial percentile of pesticide percolate concentration in 1 m soil depth are overall based on less organic carbon in soil
- According to the conducted simulations there is no fixed scenario which always guarantees a targeted spatial percentile

Testing a regional scale pesticide fate model against monitoring data: necessity or endless quest?

Julien Moeys, Gustaf Boström, Mikaela Gönczi, Karin Steffens, Bodil Lindström, Nick Jarvis, Jenny Kreuger

Presenter Julien Moeys

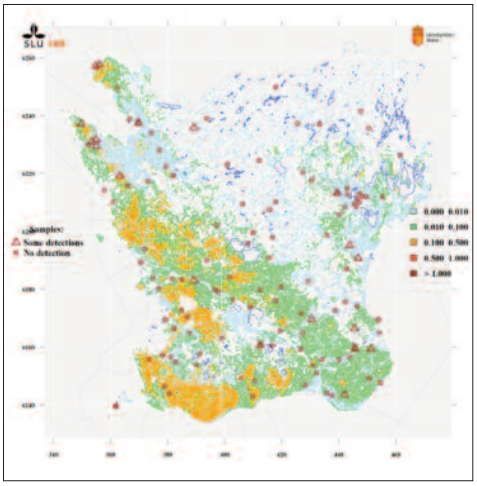
Swedish University of Agricultural Sciences
Department of Soil & Environment
Box 70 14
Uppsala – Sweden
Julien.Moeys@slu.se

Objectives

- MACRO simulation: pesticide leaching toward surface (sw) and groundwater (gw)
- 9 pesticides simulated: 10 gw + 7 sw scenarios (pesticide, crop, application date)
- Comparisons with regional pesticide monitoring database (128 gw + 12 sw sites)
- Simulated concentration 'censored' according to detection limits, for comparison

Highlights

- The model MACRO-SE can distinguish most (non)leachable compounds
- Runoff and erosion, and spray drift not accounted for



Total herbicide concentration (2 m depth) and location of samples with/without detections

- Measured/simulated concentrations (generally) in the same order of magnitude
- MACRO-SE is a powerful tool to integrate and disentangle all agronomic and environmental factors impacting pesticide losses
- Validation required by public authorities (for good reasons)
- But MACRO-SE is not a model for groundwater, nor a hydrological model
- Validation attempts fraught with difficulties, some hard or impossible to solve

TOXSWA CALCULATES METABOLITE FORMATION IN UPSTREAM CATCHMENT OF FOCUS STREAM

Wim Beltman, Paulien Adriaanse

Presenter Wim Beltman

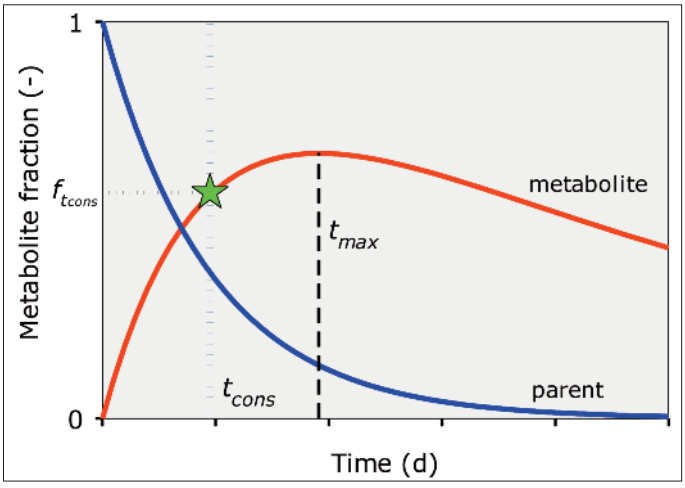
Alterra, Wageningen UR
PO Box 47, Wageningen, the Netherlands
wim.beltman@wur.nl

Objectives

- Simulate metabolite exposure of the aquatic ecosystem in registration procedure
- Include formation of metabolites in water in upstream catchment FOCUS streams
- Taking into account residence time of parent in catchment

Highlights

- New TOXSWA simulates formation of metabolites in water and in sediment
- Using conservative estimate of residence time parent in upstream catchment (tcons)
- Using time needed to form the maximum fraction of metabolite (tmax)
- Tcons is compared with tmax, to calculate metabolite fraction entering stream
- Metabolite fraction is calculated from DegT50 values of parent and metabolite iculties, some hard or impossible to solve.



Estimation of the metabolite fraction formed in the catchment of the FOCUS stream: tcons < tmax, hence the metabolite fraction entering the stream equals ftcons.

SESSION IV
MONITORING

Environmental monitoring has been used to formulate general pesticide policies and monitor their progress. Recently, the role of monitoring results in authorization decisions has gained importance, although still uncertainties about implementation and criteria exist. There are inherent challenges in demonstrating the appropriateness of monitoring results for this use. Papers relevant to environmental monitoring are herewith, including those that consider the:

- Linking monitoring results to actual use
- Appropriate monitoring strategies in relation to pesticide authorisation
- Pesticide risk indicators based on monitoring results.

Session Chair

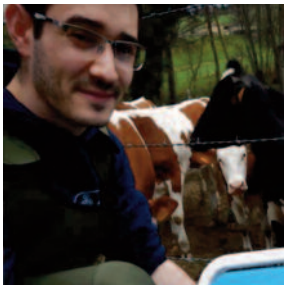
- Ton van der Linden, RIVM - National Institute for Public Health and the Environment (The Netherlands)

Session Co-Chairs

- Jenny Kreuger, Swedish University of Agricultural Sciences (Sweden)
- Benedict Miles, BASF (Germany)

Assessment of silicone rods for passive sampling of pesticides in freshwaters

Alexis Martin, Antoine Jolivet, Azziz Assoumani, Bachir El Moujahid, Marina Coquery, Jérôme Randon, Christelle Margoum



Presenter Alexis Martin

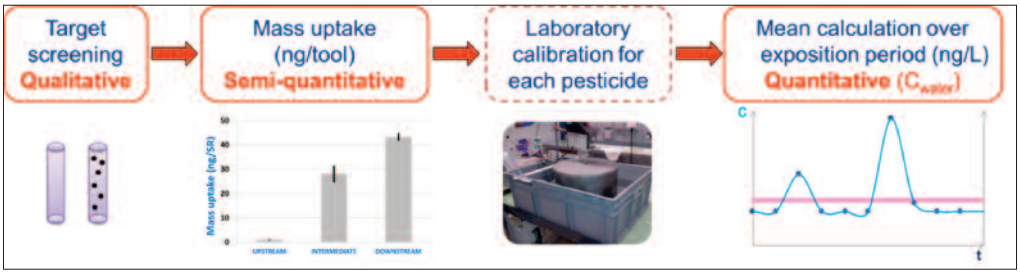
Irstea, UR MALY
5, rue de la Doua
Villeurbanne cedex
alexis.martin@irstea.fr

Objectives

- Set up of a new calibration system for passive samplers
- Determination of passive sampling constants of silicone rods (SR) for 27 pesticides
- Evaluate the effect of two flow velocities under controlled temperature conditions
- Assessment of information provided by in situ exposures of SR in freshwaters

Highlights

- Passive sampling allow to achieve ultratrace level of average concentrations
- New SR are single-use and low cost passive samplers for pesticides
- Flow velocity can affect sampling rates of pesticides
- Accumulation of pesticides in SR is controlled by diffusion in membrane or water boundary layer
- SR provide qualitative to quantitative information depending on pesticide polarity
- Aemi-quantitative information like gradient of pesticide contamination can easily be shown with SR
- Quantitative information is obtained for hydrophobic pesticides in river



Levels of information available with passive samplers

Comparison of predictive quality of 27 pesticide risk indicators

Frédéric Pierlot, Jonathan Marks-Perreau, Benoît Real, Nadia Carluer, Jean Villerd, Christian Bockstaller

Presenter Frédéric Pierlot

Chambre Régionale d'Agriculture de Lorraine /
Université de Lorraine
9 rue de la Vologne
Laxou France
frederic.pierlot@univ-lorraine.fr

Objectives

- Test the predictive capacity of 27 risk indicators in different conditions
- Have a better understanding of predictive capacity of those indicators
- Recommend the use of each indicator according to the studied cases

Highlights

- A large gradient of complexity of tools are tested
- A large panel of experimental data in different conditions are collected (soil, climate, active ingredients, different kinds of transfer)
- Different tests have being used for comparison (i.e.: correlation test, probability test yielding percentage of correct, over- and underestimation)

Qualitative → Quantitative

Simple indicators ↓ Complex indicators

	Classe (score)	Score (range)	Quantitative
Dose			QSA, IFT-MA
Dose * Transfer Coefficient			NRI
[Dose, ai properties]	EIQ	SIRIS	
[Dose, method of applying, buffer zone] - [a.i .properties]		ADSCOR	
[Dose, sensibilité milieu]	DEXiPM		
[Dose, method of applying, buffer zone, ai properties]-[environment, climat]	DAEG, ARTHUR		
[Dose * Transfer Coefficient*(soil* climat* ai properties)]			POCER
[Dose, method of applying, buffer zone, ai properties, environment]		I-Phy 1 and 2	
f(Dose,method of applying, buffer zone, ai properties, environment , climat)			EPRIP, SYNOPS
f(Dose, method of applying, buffer zone, ai properties, environment , climat)			MACRO

- Some indicators have better results for lixiviation and some others for drainage or runoff

Impact of bioturbation on pesticide exposure of benthic organisms: a modelling approach

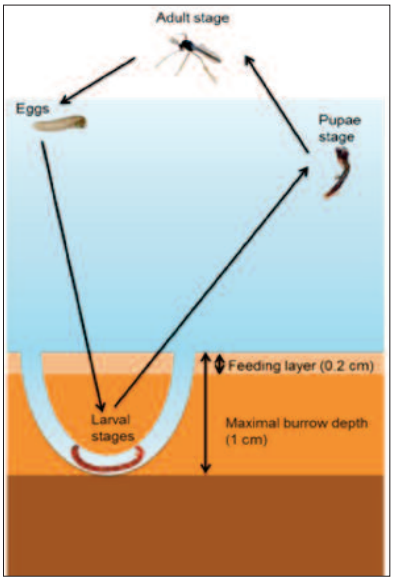
Helena Bergstedt, Louise Wipfler, Wim Beltman, Hans Baveco, Paulien Adriaanse, Mechteld ter Horst

Presenter Helena Bergstedt

Environmental Risk Assessment
Alterra – Wageninen UR
Wageningen – The Netherlands
helena1.bergstedt@wur.nl

Objectives

- Assess the impact of bioturbation on the water and the adsorbed concentration profile of pesticides in sediment
- Assess the impact of bioturbation on the pesticide exposure of benthic organisms via pore water and via ingestion
- Assess the impact of bioturbation on the effect of pesticides on benthic organisms



Live cycle of C. riparius (adapted from Diepens et al., submitted)

Highlights

• Bioturbation incorporated in the TOXSWA model
• Getting a better understanding of the impact of bioturbation on vertical transport of substances in sediment and its effect on benthic organisms while using TKTD and population models
• First step towards a better understanding of the complex feedback mechanisms between pesticide exposure, benthic organisms and bioturbation

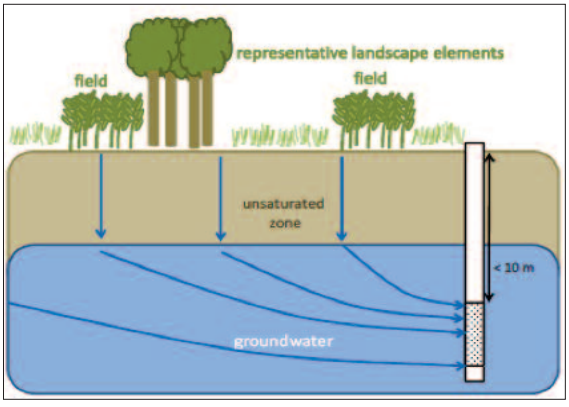
Proposal for options for specifying the groundwater protection goal at national level within the EU

Bernhard Gottesbüren, Jos Boesten, Sabine Beulke

As prepared by and presented on behalf of a number of participants of the 7th EU Modelling Workshop, Vienna 21-23 October 2014 (http://pfmodels.org/downloads/EMW7_options_groundwater_protection_goals.pdf)

Objectives

- Develop proposals for different options for risk managers in the EU and EU member states to define a specific protection goal for groundwater
- Define (i) the type of groundwater in which the concentration has to be assessed, (ii) the spatio-temporal dimensions of this concentration and (iii) the decision criteria



Example Option No 5
1.Concentration in groundwater not influenced by infiltrating surface water at 10 m below the soil surface
2. Groundwater sampling wells with filters at least 10 m below the soil surface 3. All such wells in the area of use of the substance excluding areas that will never be used for production of drinking water
4.Annual average concentrations
5. 90th percentile in space combined with the median (50th percentile) of the annual average concentrations

Highlights

- Catalogue of 5 questions (C5Q) (type of concentration, spatial units, spatial statistical population of these units, temporal statistical population of concentrations, percentile from the resulting combined spatio-temporal statistical population)
- 7 options for specific protection goals for groundwater were proposed.
- Cover the full range that could be considered relevant by risk managers
- The options include also an impact assessment on product registrations
- Member States may express preference for options or define own based on C5Q

Long-term pesticide monitoring in Sweden

Jenny Kreuger, Therese Nanos, Bodil Lindström, Mikaela Gönczi

Presenter Jenny Kreuger

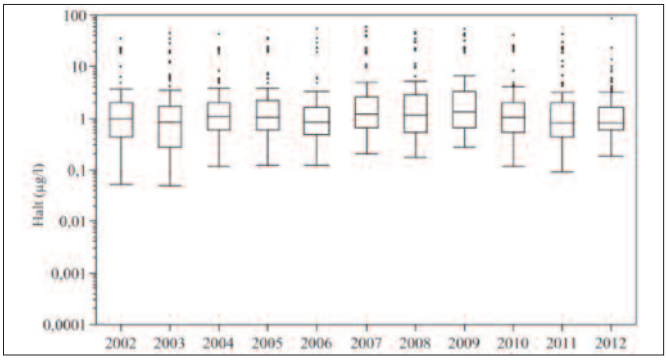
Swedish University of Agricultural Sciences (SLU)
Centre for Chemical Pesticides (CKB)
Uppsala – Sweden
jenny.kreuger@slu.se

Objectives

- Present results from the long-term Swedish pesticide monitoring programme
- Investigate if there are any trends for pesticide concentrations/exceedances
- Focus on surface water monitoring results

Highlights

- Results demonstrated a marked decline in pesticide concentrations in surface waters when implementing best management practices, including the reduction of point-sources, some 15-20 years ago
- However, during later years there is no general trend of decreasing concentrations (Figure 1), despite efforts to reduce also non-point source pollution, e.g. from wind-drift and surface runoff



Box-plot of summed concentrations (µg/l) of pesticides detected in surface waters 2002-2012 within the Swedish national monitoring programme.

- Nevertheless, most pesticides are generally detected in surface waters below its EQS/WQO value, although some are frequently detected above the 0.1 µg/l-level and some also quite regularly above its EQS/WQO

Transport losses of pesticides – linking usage to surface water findings in four monitoring catchments, Sweden

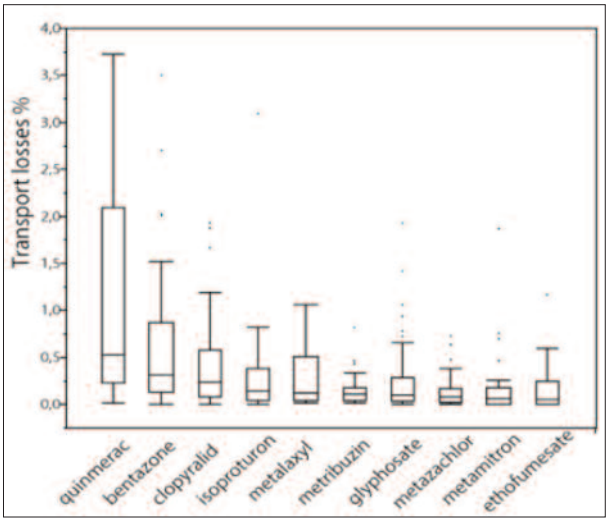
Therese Nanos, Bodil Lindström, Jenny Kreuger

Presenter Therese Nanos

Department of Aquatic Sciences and Assessment
Swedish University of Agricultural Sciences
Lennart Hjelms väg 9
Uppsala – Sweden
therese.nanos@slu.se

Objectives

- To investigate and understand the links between applied amounts of pesticides and concentrations in stream water in four monitoring catchments in Sweden
- To calculate transport losses in % and g/ha for substances analyzed between 2002-2013 for all catchments and per catchment, to analyze the importance of catchment characteristics and to highlight differences in interpretation of leaching losses



Pesticides with the highest transport losses (%) to surface water, sorted by median losses, from the four monitoring catchments during 2002-2013

Highlights

- For all catchments, transport losses are commonly less than 1% of the applied amount of pesticides and with most values < 0.1%
- For all catchments, median values of the top ten substances ranged from 0.6 % (quinmerac) to 0.05 % (ethofumesate) in transport loss
- Of the top ten substances with the highest relative transport loss, all but one are herbicides

Monitoring of pesticides in rivers in Korea

Chan-Sub Kim, Kyeong-Ae Son, Geun-Hwan Gil, Geon-Jae Im, Yang-Bin Ihm

Presenter Chan-Sub Kim

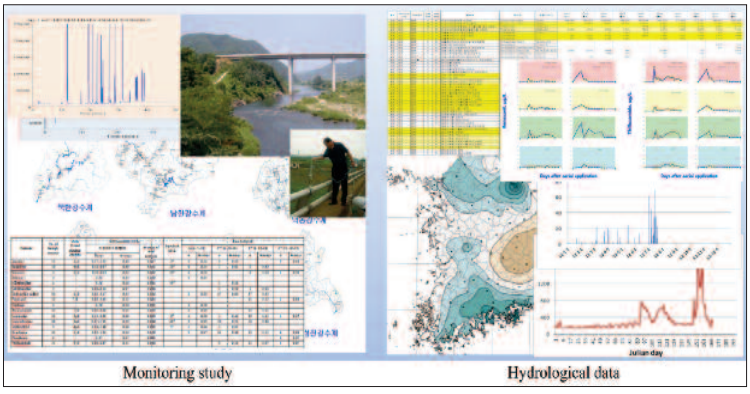
Department of Agro-Food Safety
National Academy of Agricultural Science
166 Nongsaengmyeong-ro, Iseo-myeon,
Wanju-gun, Jeollabuk-do, Republic of Korea
chskim@korea.kr

Objectives

- Develop a survey system for pesticide residue monitoring in river nationwide
- Evaluate occurence levels of pesticides concerned in major river basins
- Attempt a quantitative approach for risk assessment based hydrological data

Highlights

- 94 sites were selected through main and branch streams of four major river basins
- Water samples at these sites were collected four times per year
- Fenoxanil, hexaconazole, isoprothiolane, iprobenfos and thifluzamide as fungicides were mainly detected in rice season
- Diazinon, phenthoate and endosulfan residues as insecticides were detected with low frequencies and low residue levels
- Alachlor, butachlor, dithiopyr, metolachlr and oxadiazon as herbicides were detected in their residue level of 0.01-0.65 μg/L



Monitoring study Hydrological data

Implications of spatial and temporal averaging of concentration data for a pesticide in groundwater at the field scale considering different specific protection goals

Benedict Miles, Horst Staudenmaier, Bernhard Gottesbueren

Presenter Benedict Miles

BASF SE
Speyerer Strasse 2
Limburgerhof
Germany
benedict.miles@basf.com

Objectives

- In the context of a field leaching study, investigate the implications of spatial and temporal averaging for different potential conservative specific protection goals for groundwater that consider shallow groundwater beneath a treated field

Highlights

- Even in a field that appears homogeneous, small-scale heterogeneities lead to localized concentration peaks above the regulatory trigger of 0.1 µg/L occurring in the uppermost groundwater and detected in individual samples
- If the most conservative specific protection goal of every square meter of groundwater at all times is assumed, then this would result in a negative evaluation for the substance in question. However, if spatial and temporal averaging are considered in the definition of the protection goal, even at the scale of a single field, then the same data result in a positive evaluation for the substance

Use of groundwater monitoring result in the authorisation procedure of plant protection products. A case study in North East Netherlands

Carolien Steinweg, Ton van der Linden, Cors van den Brink

Presenter Carolien Steinweg

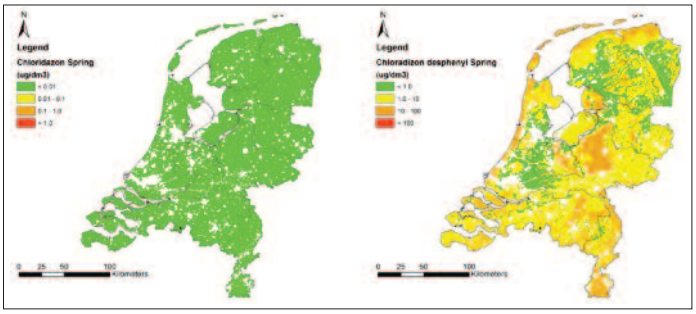
Royal HaskoningDHV
Chopinlaan 12
Groningen – The Netherlands
carolien.steinweg@rhdhv.com

Objectives

- Use measurements from monitoring networks to influence decision making
- Determine connectivity between measured pesticides (parent and metabolite) and their use
- Compare the regional with the national theoretical pesticide vulnerability
- Compare the theoretical vulnerability with monitoring data

Highlights

- Recommendations for operating water quality monitoring networks for pesticide monitoring and using the data in the national decision making process
- Vulnerability maps of the Netherlands to determine the theoretical vulnerability of pesticides (parent and metabolites)
- Regional information can be used to bring attention to pesticides which are exceeding standards (chloridazon desphenyl)



Leaching vulnerability of chloridazon and chloridazon desphenyl in the Netherlands

- Regional data supports reviewing pesticides with a high risk of leaching to groundwater (bentazon, mecoprop)

Complementarity of passive samplers and bio-indicators to evaluate surface water contamination by pesticides in agricultural catchments

Matthieu Le Dréau, Arnaud Chaumot, Adeline François, Olivier Geffard, Christelle Margoum, Stéphane Pesce, Caroline Martin, Nicolas Mazzella, Véronique Gouy

Presenter Véronique Gouy

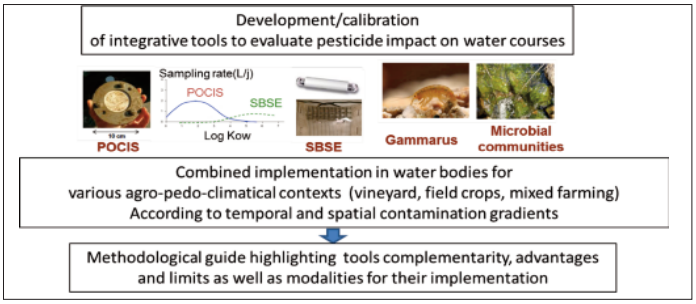
Irstea, UR MALY, centre de Lyon-Villeurbanne,
5 rue de la Doua- CS 70077
Villeurbanne cedex
veronique.gouy@irstea.fr

Objectives

- Assess the ability of integrative tools to evaluate pesticides impact in surface water
- Highlight their complementarity, advantages and limits to reach this goal
- Provide a pragmatic methodology to help their use by water quality managers

Highlights

- SUD (2009/128/EC) establishes a framework for a sustainable use of pesticide
- National programs promote best agricultural practices to reduce environmental risks
- Tools are needed to evaluate the efficiency of practices changes on water quality
- Temporal representativeness and sensitivity of grab sampling are limited
- Integrative samplers and bio-indicators can get over these limits
- These tools were applied in waterbodies for 3 distinct agro-pedo-climatical contexts
- Their ability to discriminate spatio-temporal contamination gradients was proved
- Further studies involving stakeholders in water intake protection zones are planned



Framework used to evaluate the interest and the applicability of the integrative studied tools

Industry experiences with groundwater monitoring: different study types for different purposes

Ludovic Loiseau, Benedict Miles, Russell Jones, Graham Reeves

Presenter Ludovic Loiseau

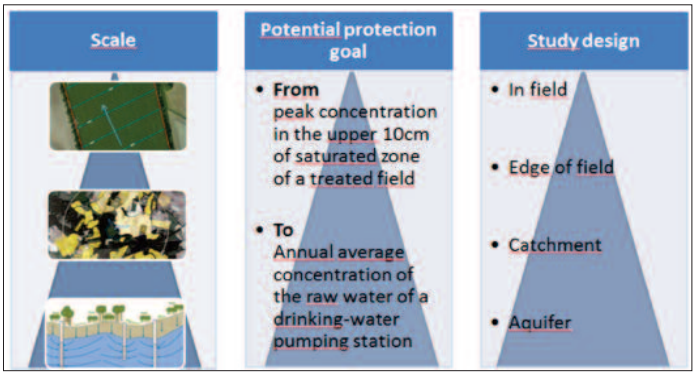
Syngenta Crop Protection AG
Schwarzwaldallee, 215
Basel, Switzerland
ludovic.loiseau@syngenta.com

Objectives

- The SETAC EMAG-Pest groundwater subgroup aims to develop a guidance document on groundwater monitoring for regulatory purposes. To support this, an action was initiated within the group to collect and summarise industry experience on groundwater monitoring

Highlights

- Monitoring data of pesticides in groundwater provide information to evaluate their potential impact of their use on grounwater quality
- Monitoring studies represent the highest tier of the groundwater exposure assessment, but there are no EU guidelines to support their design and interpretation
- The number of monitoring studies conducted by the PPP industry has increased in recent years. The experimental designs and the objectives can be different and it is the intention to present the methodologies in relation to different options of potential protection goals for groundwater that might be associated with them



Conceptual relation between the scale of monitoring studies, the potential protection goal they address and their experimental design

Analysis of pesticides surface waters monitoring data to identify typical contamination patterns at national scale

Cécile Malavaud, Véronique Gouy, Nadia Carluer

Presenter Cécile Malavaud

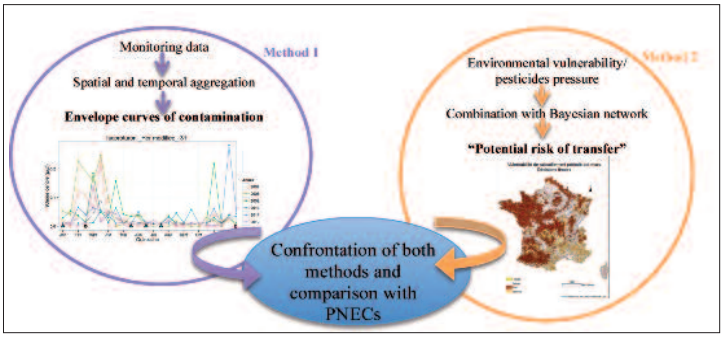
Non point pollutions department
Irstea
5 rue de la Doua
Villeurbanne - France
cecile.malavaud@irstea.fr

Objectives

- Get a better characterization of pesticides contamination patterns at national scale
- Identify temporal contamination tendencies for various agro-pedo-climatic contexts
- Confront monitoring data with a national risk assessment method (ARPEGES)

Highlights

- EU WFD requires evaluations of the waterbodies' chemical status and its evolution
- Grouping analyses by homogeneous areas permits to deal with monitoring limits
- Envelope curves of surface waters contamination are defined
- Spatio-temporal variability of isoproturon contamination patterns is highlighted
- Contamination patterns are relevant with agricultural practices and catchments' vulnerability
- Relation between risk assessment and observed concentration is investigated.



Framework used to analyse pesticides surface waters monitoring data at national scale

Impact of the use of different geodatasets on leaching vulnerabilty analyses

Jutta Agert

Presenter Jutta Agert

Bayer CropScience AG
Alfred-Nobel-Straße 50
Monheim am Rhein, Germany
jutta.agert@bayer.com

Objectives

- Understanding of the impact of different databases on leaching vulnerability assessments
- Application of a robust leaching vulnerability assessment within the context of groundwater monitoring

Highlights

- Groundwater monitoring studies that represent a range of vulnerable situation help to clarify the leaching risk of a compound. A leaching vulnerability assessment can set monitoring sites into context
- Leaching vulnerability depends on environmental conditions which are spatially distributed
- Different geodata bases for environmental data exist on European and national scale
- A case study with a comparison of different leaching assessment approaches based on different geodata layers at both European and national scale exemplarily shows the impact of the use of different environmental databases for such an assessment
- Similar spatial distributions of leaching vulnerability resulting from analyses with different data sources strengthen the confidence in the results. Different spatial distributions of leaching vulnerability resulting from such analyses indicate where a refinement is required for a robust leaching vulnerability assessment

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Design of ground water monitoring studies

Russell L. Jones

Presenter Russell L. Jones

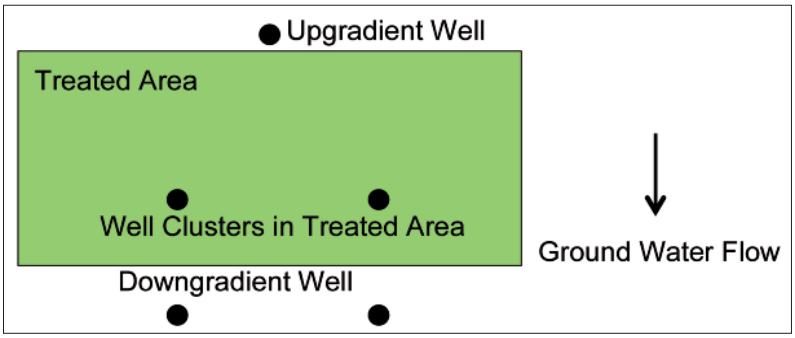
Bayer CropScience
2 T. W. Alexander Drive
Research Triangle Park, NC – USA
russell.jones@bayer.com

Objectives

- Tailoring the design of a ground water study to the specific objectives of the study and the properties of the compound being investigated
- Considering the spatial and temporal variability of ground water residues in study designs

Highlights

- The advantages and disadvantages of conducting field leaching studies involving intensive sampling at one or a few sites versus limited monitoring at a relatively larger number of sites
- Design of studies with an initial set of monitoring wells and then adding deeper or more distant wells when needed to respond to study results
- Role of tracers, soil suction lysimeters, and soil samples
- Prospective versus retrospective studies



Typical locations for the initial well clusters in a prospective ground water study

Long term monitoring in an alluvial aquifer: linking groundwater quality and uses

Nicole Baran, Maritxu Saplairoles

Presenter Nicole Baran

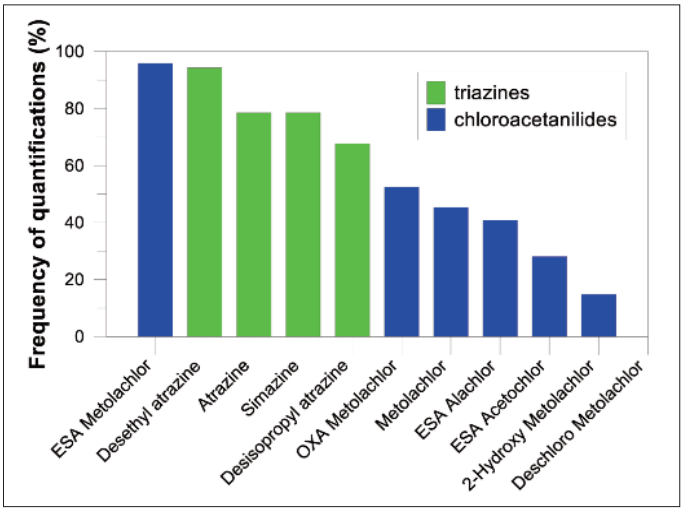
BRGM (French Geological Survey)
3, avenue C. Guillemin
Orléans cedex 2 - France
n.baran@brgm.fr

Objectives

- Understand spatial and temporal variability of groundwater contamination
- Characterize pesticide transfer into groundwater
- Link hydrodynamic functioning, land uses and pesticide properties

Highlights

- Long-term groundwater quality monitoring with high frequency of measurements
- Parent molecules and metabolites transfer are affected by hydrodynamic regimes



Groundwater quality is affected by parent molecules and metabolites of allowed and withdrawn pesticides

- Annual variability of concentrations appears to be driven by both land-uses and climatic conditions for a given molecule
- Long-term variability of concentrations appears to be driven by molecules properties too

Comparison of national monitoring catchments of Sweden to the Swedish groundwater scenarios

Tim Häring, Benedict Miles, Lucas Garcia, Fredrik Stenemo, Jenny Kreuger

Presenter Tim Häring

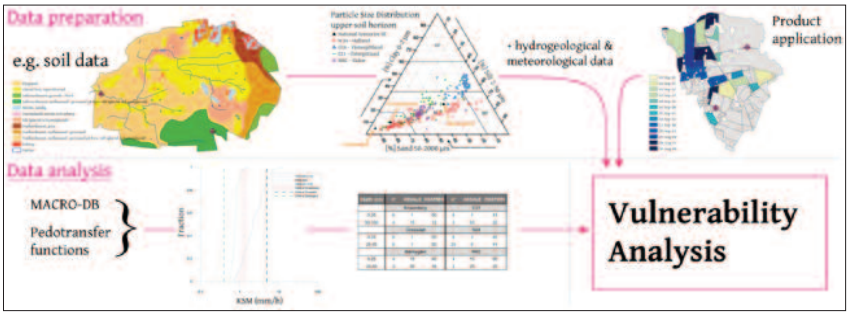
BASF SE
Crop Protection – Environmental Fate Modelling
Speyerer Str. 2
Limburgerhof
Germany
tim.haering@basf.com

Objectives

- Analysis of national long-term pesticide monitoring catchments of Sweden
- Comparison to national groundwater scenarios regarding leaching vulnerability
- Enable higher-tier refinement of national groundwater risk assessment

Highlights

- Three of the four monitoring catchments are generally representative of the soils and hydrogeological settings of the national GW modeling scenarios
- The Näsbygård modelling scenario is located in one of the monitoring catchments
- Yearly farmer interviews to keep track of applied plant protection products
- Estimated hydraulic properties and macropore flow parameters show a fairly good agreement between the soils from the national groundwater scenarios and the soils within the monitoring catchments
- SLU monitoring catchments may be useful in the registration process



Groundwater quality is affected by parent molecules and metabolites of allowed and withdrawn pesticides

Long-term lessons on pesticide leaching obtained from the Danish Pesticide Leaching Assessment Programme

Annette E. Rosenbom, Preben Olsen, Finn Plauborg, Walter Brüsch, Anne Louise Gimsing, Jeanne Kjær.

Presenter Annette E. Rosenbom

Geological Survey of Denmark and Greenland
Øster Voldgade 10
Copenhagen K– Denmark
aer@geus.dk

Objectives

- To extract long-term lessons learned from 12 years of monitoring results from the Danish Pesticide Leaching Assessment Programme (PLAP) including three loamy and two sandy fields
- Is there differences in leaching from the loamy and sandy fields, especially in leaching scenarios that resulted in estimated annual flux-averaged concentrations exceeding the maximum acceptable concentration of 0.1 µg L-1 (hereafter MAC) at 1 m b.g.s. and/or detection in groundwater in concentrations exceeding MAC?

PLAP-field seen from above – please visit HTTP://PESTICIDVARSLING.DK
Rosenbom et al. (2015), Envi. Pol. 201, 75-90

Highlights

- Field-results reveal shortcomings in the EU authorization procedure for pesticides
- The plough layer can be bypassed via preferential transport in e.g. wormholes
- Pesticides properties are decisive for leaching pattern on the sandy fields
- The hydrogeological settings control the leaching patterns on the loamy fields
- Pesticide detection frequency seems to be independent of the month of the year

Groundwater monitoring for regulatory purposes – first steps of a SETAC group to develop a guidance document

Anne Louise Gimsing, Arnaud Boivin, Wiebke Tüting, Jutta Agert, Wolfram König, Jenny Kreuger, Ludovic Loiseau; Andy Massey, Benedict Miles, Andy Newcombe

Presenter Anne Louise Gimsing

Danish Environmental Protection Agency
Strandgade 29
Copenhagen - Denmark
anlgi@mst.dk

Objectives

- The aim of the groundwater (GW) expert working group is to develop a guidance document on groundwater monitoring for regulatory purposes. Preliminary feedback and suggested next steps from the expert group on the following four topics will be presented

Highlights

- Utilizing monitoring data in regulatory context: Monitoring data can be used in the regulation of pesticides, but use of such data is not straight forward
- Monitoring and modelling: When monitoring data are available, they are always compared with modelling results (FOCUS or national modelling)
- Groundwater Monitoring "good practices": The design of a monitoring study and the quality of the data are key to generate valuable monitoring results. The study design should be tailored to the questions that the study is expected to answer
- Interpretation of GW monitoring data / representativity of GW monitoring: How to interprete/use monitoring data and the representativity of monitoring are probably the two main recurrent questions associated with monitoring. These two questions are raised for both compound specific monitoring studies and for public monitoring programmes which may be available. Recommendations are needed on how results should be used and to define what the monitoring data should represent/cover for both types of monitoring studies/programmes. How can these two types of monitoring complement each other?

Long-term trends of pesticide use, stream water concentrations and potential environmental risks in small agricultural catchments

Marianne Stenrød, Ole Martin Eklo, Marit Hauken

Presenter Marianne Stenrød

NIBIO – Norwegian Institute for Bioeconomy Research
Høgskoleveien 7
Ås - Norway
marianne.stenrod@bioforsk.no

Objectives

- Assess measured pesticide concentrations in small agricultural streams in relation to use patterns, weather conditions and mixture toxicity on aquatic organisms
- Identify environmental challenges of pesticide use in the northern climate
- Improve the utilization of monitoring data for management purposes

Highlights

- Pesticide monitoring in agricultural streams has been included in the Norwegian Agricultural Environmental Monitoring Programme (JOVA) since 1995
- Climate change will affect pesticide transport patterns and we see an increased frequency of flood events in the streams trough the JOVA monitoring period
- Use of the herbicide glyphosate and fungicides has increased through the period
- Slow degradation of pesticides in cold northern climate could cause particular persistence, leaching and runoff risks connected to autumn sprayed pesticides like glyphosate (e.g. autumn rain, freeze-thaw events, release of soil frost)

Northern climate challenges affecting pesticide transport; potential hot spot for pesticide leaching on release of soil frost. (Photo: Stine Marie Vandsemb).

What information can we get from monitoring studies?

Paul Sweeney, Derek Wallace, Gerco Hoogeweg

Presenter Paul Sweeney

Syngenta UK
Capital Park, Fulbourn
Cambridge - United Kingdom
paul.sweeney@syngenta.com

Objectives

- Use modelled data to evaluate methods for approximating 90th centile
- Evaluate large Scale modelling datasets to identify backing drivers governing leaching
- Extrapolation from modelling results to large-scale monitoring studies

Highlights

- Tolerance interval approach provides the best methodology for identifying specific percentiles
- Proposed method to limit the time that monitoring studies need to be conducted
- New methodology to extract backing driver variables from modelled data
- Evaluation of various methodologies for identifying key drivers governing leaching from a large-scale monitoring study

EU GROUNDWATER MONITORING FOR SUSTAINABLE AGRICULTURE: 1,3-DICHLOROPROPENE SOIL FUMIGANT

Steve Knowles, F. Celico, S. Kennedy, A. Pulido-Bosch

Presenter Steve Knowles

Dow AgroSciences,
Milton Park, Abingdon, UK,
sknowles@dow.com

Objectives

- 1,3-dichloropropene (cis & trans isomers) is a soil fumigant which is applied either by drip irrigation or by soil injection
- It has been used safely for 40 years with excellent efficacy on all species of nematodes
- Telone is registered in over 33 countries extending over 120 crops in well defined use areas

Highlights

- Extensive EU groundwater monitoring has been conducted across six EU countries since 2002 to support higher tier modelling
- Field measurements from aquifers in close proximity to areas of high 1,3-D use form a dataset as part of a long-term stewardship program
- Residues of 1,3-dichloropropene, 3-chloroacrylic acid metabolite and process impurities are being determined using GLP validated analytical methods with an LOQ=0.05 µg/L for each analyte
- Very low detection rates have been determined in agreement with higher tier modelling

Pesticide risk potential of small water bodies

Uta Ulrich, Constanze Krüger, Georg Hörmann, Nicola Fohrer

Presenter Uta Ulrich

Institute for Natural Resource Conservation
Dep. Hydrology and Water Resources Management, Christian-Albrechts-University
Olshausenstr. 75
Kiel- Germany
uulrich@hydrology.uni-kiel.de

Objectives

- Compilation of pesticide concentrations in small water bodies (catchment < 10 km²) according to German National Action Plan
- Documentation of current state of knowledge
- Assessment of pesticide concentration patterns

Highlights

- 53.762 data sets from 765 samples in Germany were collected from peer-reviewed literature and Federal State authorities from which 7% show contaminations >limit of quantification
- Within the 3.573 data sets with positive findings, 266 data sets (8%) exceed Environmental Quality Standards for priority substances or river basin specific pollutants
- Most frequently detected compounds are metolachlor, terbuthylazine and isoproturone. Among the 15 most frequently detected compounds, 4 transformation products are observed
- 55% of the samples contained more than one pesticide, maximum amount is 36 pesticides within a sample
- Amount of data sets are similar in terms of application periods (spring/autumn) but differ in terms of type of water bodies (53.163 for flowing, 599 for standing water bodies)

Spatial distributed modelling to identify vulnerable leaching areas for monitoring

Gregor Spickermann, Stéphanie Roulier, Reinhard Wegner

Presenter Gregor Spickermann

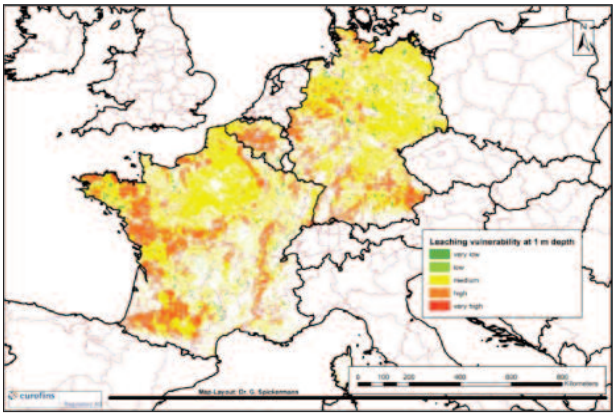
Eurofins Regulatory AG
Weidenweg 15
Rheinfelden (AG)
Switzerland
GregorSpickermann@eurofins.com

Objectives

- Identify vulnerable leaching areas under agricultural land for a specific plant protection product in a part of Central Europe (France, Belgium and Germany)
- Use of the spatial distributed groundwater leaching model MetaPEARL in ArcGIS 10.1 and considering substance specific parameters (DT50, Koc)
- Use of spatial data sets like European Soil Database (ESDB), Corine Land Cover (CLC) and WorldClim
- Use of spatial cropping data based on Eurostat data on NUTS2 level

Highlights

- Identification of the core cultivation regions of specific crops in the area of interest



- For the core potato cultivation region in France, Belgium and Germany in summary 13 rural districts with a high leaching vulnerability could be identified for the considered plant protection product
- The identified areas with high leaching vulnerability could be used as representative areas for groundwater monitoring

Leaching vulnerability at 1m depth for a plant protection product based on MetaPEARL simulations

SESSION V
RISK MITIGATION FOR THE PROTECTION OF WATER

The regulatory risk assessment of pesticides aims at defining the conditions of use that lead to acceptable risks and, when applied to ground water or surface, the conditions of use that guarantees that quality criteria are respected. This may include the request for risk mitigation measures, applied to application rates or frequency, hydro/pedological criteria, application methods or farming practices. This chapter covers the following aspects of risk mitigation in the area of water protection:

• Identification and/or development of risk mitigation measures applied to ground or surface water
• Methods to evaluate/measure the potential efficacy of novel risk mitigation measures, including modelling and monitoring
• Approaches to routinely monitor the efficacy of risk mitigation measures implemented in the field.

Session Chair

• Anne Alix, Dow Agro Sciences (United Kingdom)

Session Co-Chairs

• Arnaud Boivin, ANSES - National Institute for Public Health and the Environment (France)
• Gerhard Goerlitz, Bayer (Germany)
• Irene Hanke, AGROSCOPE (Switzerland)

Pilot-scale wetlands to assess impacts of water flow on pesticide removal from drainage water

Sylvie Dousset, Romain Vallée, David Billet

Presenter Sylvie Dousset

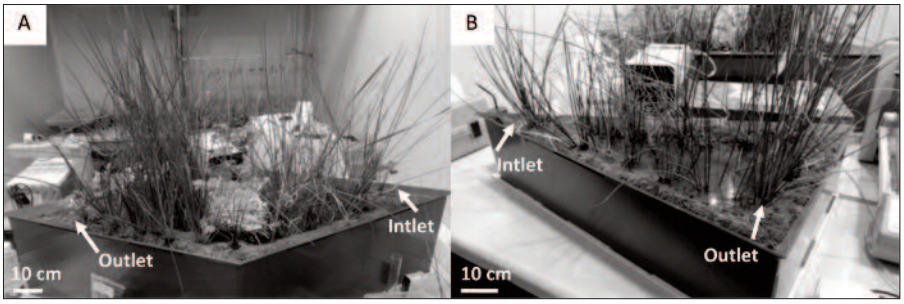
LIEC, UMR 7360,
CNRS-Université de Lorraine,
Bd des Aiguillettes, BP 70239
Vandœuvre-lès-Nancy, France
Sylvie.dousset@univ-lorraine.fr

Objectives

- Measure the effectiveness of wetlands on pesticide removal from drainage water
- Assess the impacts of water residence time (WRT) on the effectiveness of wetlands
- Determine the fate of pesticides accumulated in constructed wetlands (CWs)

Highlights

- Measured effectiveness was from 22 to 100% of the pesticide applied amount
- Efficiency was related to the pesticide properties, such as sorption capacity
- Wetlands were less effective during short WRT (28.6 to 100%) than long WRT (42 to 100%) of the charge steps
- Pesticides were rapidly degraded during the step without flow
- DT50 values in the aqueous phase were less than 4 days in the 2 pilot wetlands
- CWs may reduce the amounts of pesticides exported by drainage water



Experimental pilots of Jallaucourt (A) and Ollainville (B) in the phytotronic room after75 days of experiment.

MERLIN-Expo, an integrated exposure assessment tool for pesticides legislation requirements

Nicoleta Suciu, Alice Tediosi, Taku Tanaka, Federico Ferrari, Ettore Capri, Gabriella Fait

Presenter Gabriella Fait

Aeiforia Srl
Località Faggiola 16
Gariga di Podenzano (Piacenza) – Italy
gabriella.fait@aeiforia.eu

Objectives

- Assess the exposure of environment and human health to chemicals, including pesticides
- Describe the main functionalities of MERLIN-Expo, a tool for modelling human exposure to chemicals
- Frame MERLIN-Expo in EU chemical regulations

Highlights

- Exposure and risk evaluation of chemicals
- Coupling environmental exposure and pharmacokinetic models
- MERLIN-Expo as a higher tier exposure tool
- Pesticide risk assessment and risk management policies
- MERLIN-Expo potential application in EU chemical regulations
- Monitor updates and news on EU legislations and policies related to risk assessment and management of chemicals (www.4funproject.eu/en/observatory)

Logo of the MERLIN-Expo tool (www.merlin-expo.4funproject.eu).

First experience with the new EFSA guidance on exposure assessment in soil – An industry perspective

Krisztian Szegedi, Bernhard Gottesbüren

Presenter Krisztian Szegedi

BASF SE
Speyerer Strasse 2
Limburgerhof
Germany
krisztian.szegedi @basf .com

Objectives

- The new EFSA guidance on exposure assessment in soil introduces a new assessment scheme for calculating predicted environmental concentrations in soil
- The draft version of the guidance has been commented by several stakeholders, including authorities and industry. Both groups proposed several changes to the guidance
- Most critical comments were related to the complexity of the assessment scheme and overly emphasized conservativeness of lower tier scenarios
- First experiences with the revised guidance document and with the related software tools will be presented

Highlights

- Critical but constructive discussion of the guidance
- Potential regulatory impacts of the guidance will be discussed
- Practicability of the guidance will be discussed
- Practical ideas for a daily work with the guidance proposed

Assessing groundwater vulnerability of a avian feed additive in Europe

Gerco Hoogeweg, Isha Khanijo

Presenter Gerco Hoogeweg

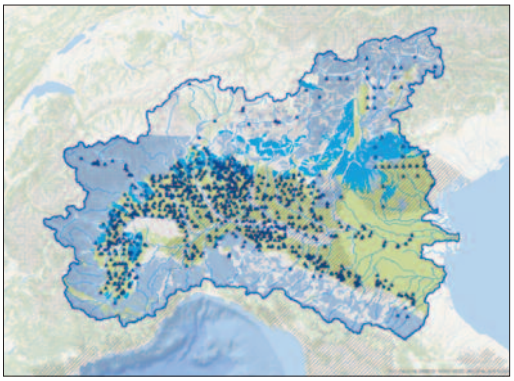
Lead and Manager, GIS and Data Technologies
Waterborne Environmental, Inc.
897B Harrison Street SE
Leesburg, VA
USA
hoogewegg@waterborne-env.com

Objectives

- Determine the concentration of a feed additive at 1.0m depth using standard FOCUS modelling scenarios based EFSA feed addtives guidance
- Link the FOCUS PEARL model with an aquifer model to model concentrations in an aquifer
- Predict avian feed additive concentrations in aquifers at depths representing drinking water abstraction points in the Jokioinen and Piacenza FOCUS zones

Highlights

- Using standard EFSA guidance recommeded scenarios (Jokioinen and Piacenza), the PECgw were several orders of magnitude greater than the 0.1 ug/L regulatory level due to a large half-life



Location of drinking water wells and shallow aquifers in the Po Valley, Italy.expo.4funproject.eu).

- Linking FOCUS PEARL with ADAM was achieved by reformatting the PEARL output file to match the ADAM required input files
- Drinking water abtraction occurs at depth ranging from 3m to over 300m in the western Po Valley and 14 m to 44.5 m in the Northeastern Estonia
- Predicted concentrations of the feed additive at drinking water abstraction depths are several orders of magntiude smaller, but still exceed the regulatorylimit

Modelling best management practices for sugarcane in the Pioneer River Watershed

Gerco Hoogeweg, Amy Ritter, Aldos Barefoot, Neil McKay

Presenter Gerco Hoogeweg

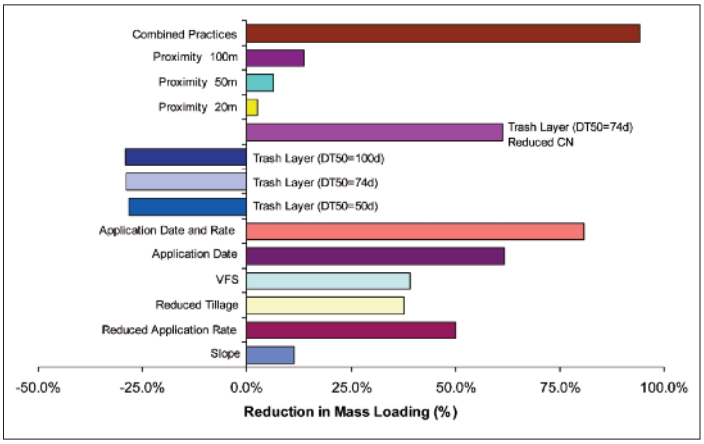
Lead and Manager, GIS and Data Technologies
Waterborne Environmental, Inc.
897B Harrison Street SE
Leesburg, VA
USA
hoogewegg@waterborne-env.com

Objectives

- Use models to evaluate off-target of diuron loads into rivers due to diuron use on sugarcane
- Determine the effectiveness of sugarcane BMPs on a watershed level
- Determine impact of Queenslands risk management framework for water quality improvement

Highlights

- Banded applications and dry season application timing provide annual mass reductions of over 50%



Reduction in mass flux for various management practices at the watershed level

- Vegetative filter strips and buffer strips may reduce mass loadings at the watershed scale by 25-40%
- Implementation of the Mackay Whitsunday NRM ABCD framework can result in 20-80% mass reduction

Forcing MACRO pesticides fate model with STICS crop model to simulate pesticides flows in innovative cropping systems

Sabine-Karen Yemadje, Julien Moeys, Mats Larsbo, Eric Justes, Enrique Barriuso, Marjorie Ubertosi, Nicolas Munier-Jolain, Laure Mamy

Presenter Sabine-Karen Yemadje

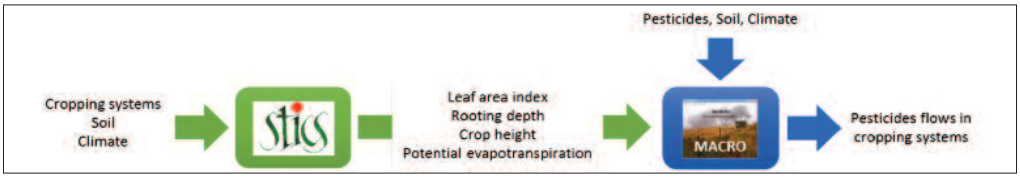
INRA - UMR 1402 ECOSYS
Thiverval-grignon, France
sabine-karen.yemadje@grignon.inra.fr

Objectives

- Innovative cropping systems

Highlights

- Innovative cropping systems can help reducing chemical protection but it is impossible to carry out in situ experiments to study the sustainability of each of them
- Pesticides fate models can estimate pesticides flows and concentrations in the environment however, in these models, the representation of agricultural practices remains incomplete
- To assess the pesticide environmental impacts of innovative cropping systems, an in silico tool, STICS_MACRO, has been developed by forcing the MACRO pesticides fate model with the STICS crop model
- The outputs of MACRO and of STICS_MACRO were compared to measurements of water flows and pesticides concentrations in groundwater
- The STICS_MACRO model simulates better than MACRO the dynamics of crop development and the evapotranspiration, and the pesticides concentrations



This work consists of externally forcing the MACRO pesticides fate model using some variables coming from the STICS crop model. The project is supported by INRA and by the research program "For the Ecophyto plan (PSPE1)" funded by the French Ministry in charge of Agriculture.

Realistic approaches to define representative application dates for FOCUS exposure modelling

Gabriel Olchin, Neil Mackay

Presenter Gabriel Olchin

DuPont Crop Protection
1350 Elkton Road
Newark, Delaware USA
gabriel.p.olchin@dupont.com

Objectives

- Define and compare three approaches for setting application dates for FOCUS exposure modelling: relative, absolute, and a season length proportion
- Evaluate practicality of FOCUS PAT-selected application dates from the three approaches compared against the labelling intentions and field biology data
- Develop a strategy for selecting application dates that minimizes regulatory refinement to application date selection

Highlights

- Intent and underlying assumptions of the standard FOCUS scenarios should be strongly considered when selecting an approach for defining application dates
- Field biology (e.g. date when a specific growth stage is reached) should be considered when defining application dates to support targeted applications
- Comparisons across all FOCUS scenarios are made against the FOCUS PAT selected application dates and the three proposed approaches for defining the application windows; selected dates are then cross-checked against typical field conditions/practices
- In our analysis, 'relative' application dates (sometimes recommended by regulators) may have limited utility beyond a certain length of time, at which variability between the scenarios can result in unrealistic application dates and artificial application conditions
- Application dates can be more meaningfully represented across the scenarios when expressed as a percentage of the growing season (emergence to harvest); when supported by mechanization practice and field data to confirm agronomic suitability of timing (particularly for wet heavy clay soils) this approach should be considered as an acceptable and alternative method for selecting application dates

Development of a harmonized risk mitigation toolbox dedicated to pesticides in farmland in Europe: outcome of the MAgPIE workshop

Anne Alix, Katja Knauer, Martin Streloke, Burkhard Golla, Veronique Poulsen

Presenter Anne Alix

Dow AgroSciences
3 Milton Park
Abingdon, UK
aalix@dow.com

Objectives

- Risk mitigation measures are a key component in defining the conditions of use of pesticides in Europe
- A two stage workshop was organized to develop a toolbox of risk mitigation measures designed for a more flexible and harmonized management and use of pesticides for agricultural purposes

Highlights

- The workshop reached the following objectives:
  1) gather a state of the art of the current knowledge and developments of risk mitigation measures for pesticides in European countries and, if available, beyond Europe
  2) discuss risk mitigation practices and their more effective future implementation and development together with all stakeholders, i.e. experts from national authorities, research sector, industry and farmers
  3) discuss the links between risk assessment and risk management and on how to account for and represent risk mitigation options in risk assessment
  4) build a network to share information to feed their respective actions.

Introducing the HYDRUS (2D/3D) Software suite for assessing potential risk of polluting groundwater with pesticides

Efstathios Diamantopoulos, Natalia Kurinova, Jirka Šimůnek, Klaus Hammel, Bernhard Jene, Christoph Oberdörster, Tom Schröder

Presenter Diamantopoulos Efstathios

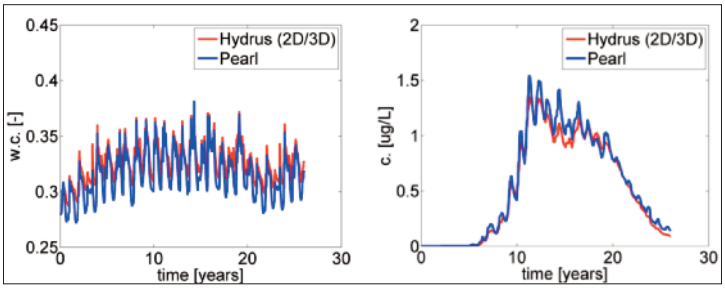
Institut fur Geoökologie
Technische Universität Braunschweig
Langer Kamp 19c
Braunschweig - Germany
e.diamantopoulos@tu-bs.de

Objectives

- Introducing the Hydrus (2D/3D) suite to the modelling framework of the EU registration according to FOCUS
- Evaluating various FOCUS scenarios using the Hydrus (2D/3D) software
- Comparing water and solute dynamics predicted by Hydrus (2D/3D) and PEARL

Highlights

- Very good agreement between the two models for cumulative water fluxes, water dynamics and solute concentration at a depth of one meter
- Deviations between Hydrus (2D/3D) and PEARL were smaller than those between the individual models (e.q. MACRO, PEARL, PELMO and PRZM) recommended for regulatory exposure assessment in the EU
- Hydrus (2D/3D) can reliably predict water and solute dynamics in the FOCUS scenarios



Water content (left) and concentration of dummy substance A (right) at one meter depth predicted by Hydrus2D/3D and PEARL for a simulation period of 26 years and for the Châteudun scenario.

Study of the effect of a new adjuvant on spray drift

Paolo Balsari, Paolo Marucco, Paolo Vai, Anne Alix

Presenter Paolo Marucco

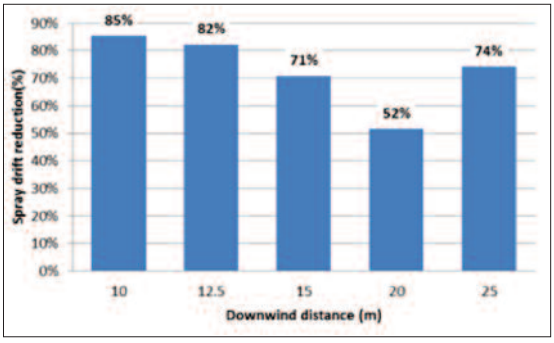
DiSAFA - Crop Protection Technology
Dipartimento di Scienze Agrarie Forestali e Ambientali
Università di Torino
Largo P. Braccini 2
Grugliasco (TO) – Italy
paolo.marucco@unito.it

Objectives

- Assess the effect of a new adjuvant on spray quality from hydraulic nozzles
- Measure spray drift in laboratory (wind tunnel) and in in the field (vineyard) with and without the new adjuvant
- Evaluate solutions to reduce buffer zones width

Highlights

- Use of adjuvant GF 3380 provided an increment of droplets Volume Median Diameter (VMD) by 37% either using conventional or air induction nozzles



Spray drift reduction measured in the field at the different sampling distances operating the air induction nozzles Albuz TVI 8002 fed with the solution of water, Spinetoram insecticide (GF 1587) and GF 3380 adjuvant with respect to the reference application made using conventional hollow cone nozzles Albuz ATR 80 orange fed with the solution of water + GF 1587

- Finer droplets (<100 μm) were considerably reduced thanks to the application of the new adjuvant GF 3380
- Amount of spray drift measured in vineyard applying the adjuvant GF 3380 and using air induction nozzles enabled to reduce the amount of spray drift measured in vineyard up to 85% with respect to conventional spray application

Risk management and risk mitigation for aerial uses of pesticides

Petra Pucelik-Günther

Presenter Petra Pucelik-Günther

Federal Office for Consumer Protection and Food Safety
Messeweg 11-12
Braunschweig - Germany
petra.pucelik-guenther@bvl.bund.de

Objectives

- Discussion starter for harmonisation
- Establishing drift values for aerial spraying
- Developing specific risk assessment for aerial spraying

Highlights

- Aerial spraying is only allowed for steep slope vineyards and for forest canopies in Germany
- Additional permission is needed by the responsible state authority for use
- Best available technique has to be used: helicopters with directly mounted spraying equipment and drift-reducing nozzles
- Spray drift values for aerial use for both situations were established
- Health protection: specific requirements for actives and products
- Aquatic risk assessment: additional dilution factors for big rivers
- Terrestrial risk assessment: additional data on the influence of former pesticide use on preservation of important species
- Different buffer zones for federal waterways and smaller standard water bodies
- No buffer zones for terrestrial non-target areas in vineyards because of the good conservation status of important plant and animal species
- Monitoring and reporting required to prove the conservation status in future
- Non-spray areas in forests to allow retreat zones for repopulation of sprayed areas with important terrestrial species
- Refined risk assessment including local requirements can be used for special situations

Risk assessment for protected crops – Approaches towards harmonized leaching scenarios

Stephan Sittig, Johannes Witt, Gerhard Görlitz

Presenter Stephan Sittig

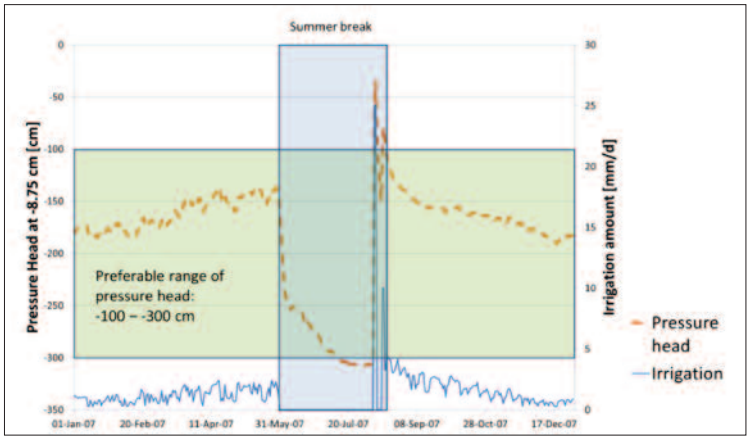
Knoell Consult
Dynamostrasse 19
Mannheim – Germany
ssittig@knoell.com

Objectives

- Create scientifically sound and easy-to-construct scenarios for leaching assessment of Southern European greenhouses according to EFSA protected crop guidance

Highlights

- Approach takes into account specific greenhouse conditions regarding climate, irrigation, and cropping
- Irrigation regime is tailored on plant requirements and includes over-irrigation
- Irrigation regime is validated by comparison with literature amounts, recommended pressure heads, and cultivation practices



Dynamics of pressure heads and irrigation amounts for greenhouse tomatoes in Sevilla soil, calculated using FOCUS PEARL 4.4.4.

New tools for environmental risk assessment of Co-formulants under REACH

Mauro Balboni

Presenter Mauro Balboni

Dow AgroSciences SA
Bachtobelstrasse 4
Horgen – Switzerland
mbalboni@dow.com

Objectives

- Raise awareness on regulatory frame for coformulants in plant protection products
- Set baseline for risk assessment of coformulants under REACH Regulation
- Inform that sector- specific (ECPA) risk assessment tools are available
- Outline expected legislation developments for coformulants

Highlights

- Coformulants are regulated under REACH, separately from (EC) No 1107/2009
- ECPA has developed sector-specific tools for their risk assessment (REACH-IN)
- REACH-IN tools cover REACH and Plant Protection guidance /methodology
- REACH-IN tools provide a use-specific and realistic risk assessment
- Specific focus on operator, worker, bystander (OWB tool) safety assessment
- Specific focus on local environmental (LET tool) safety assessment
- Expected future interaction between REACH and (EC) No 1107/2009 is outlined
- More information at: http://www.ecpa.eu/information-page/regulatory-affairs/reach

SESSION VI

SUSTAINABLE USE OF PPPS AND ENVIRONMENTAL QUALITY

Based on the requirements set by the Sustainable Use Directive, the minimization of plant protection products impact or "footprint" is the main prerequisite for the continuation of their use. In the present chapter, approaches based on scientific evidence and studies, aiming at the safeguarding of the quality of natural and occupational environment will be presented. Furthermore, the influence of training, the public awareness on the environmental safety and the potential gaps in knowledge are addressed in some of the papers herewith enclosed. Readers can extract useful information on how to bridge the "knowledge and practice" for the benefit of safety for humans, environment and agricultural income.

Session Chair

- Kyriaki Machera, Phytopathological Institute (Greece)

Session Co-Chairs

- Ettore Capri, Università Cattolica del Sacro Cuore (Italy)
- Richard Glass, Eurofins (United Kingdom)

An interactive tool on agricultural runoff & best management practices

Manpriet Singh, Céline Géneau, Ettore Capri, Karla Kemp, Jeremy Dyson

Presenter Manpriet Singh

PhD student Agrisystem Doctorate School
Via E. Parmense 84 / Scharwaldallee 215
Italy
manprietkaur.singh@unicatt.it

Objectives

- Use the Agricultural Runoff and Best Management Practice Tool to educate farmers and advisers about how to recognize in-field poor soil, crop and water management practices and possible ways to correct these
- Validate the use of the Tool, also in vineyards, including demonstration to different stakeholders
- Promote the Tool by using web based e-learning and e-training platforms to reach out to professionals employed in the agro-food chain

Highlights

- The Water Framework Directive (WFD, 2000/60/EC) collates different existing regulations and policies on water quality and its main objective is to achieve a good status of all waters
- In-field practices that could be important to achieve a good status of water bodies are not always addressed in river basin management plans
- Agricultural runoff is a complex process affected by both natural and management factors and often underestimated in catchment based programs of measures meant to implement the WFD
- The Agricultural Runoff and Best Management Practice Tool developed by Syngenta can be used at field and catchment levels to assess runoff potential and based on this, draft farm or catchment specific mitigation plans
- It is a perfect tool to open dialogue with farmers, advisers and other important stakeholders to review current soil, crop and water management practices and look into possible runoff mitigation measures

The OpenTEA platform, a new e-learning tool to achieve a sustainable use of pesticides

Gabriele Sacchettini, Maura Calliera, Ettore Capri

Presenter Gabriele Sacchettini

Centro di ricerca OPERA
Istituto di Chimica Agraria ed Ambientale
Università Cattolica del Sacro Cuore
Via E. Parmense 84
Piacenza – Italy
gabriele.sacchettini@unicatt.it

Objectives

- Contribute to SUD (2009/128/EC) implementation building a new training tool
- Develop a platform to collect/integrate most relevant materials on pesticide use
- Build a self-growing tool pointing on web-Users active role

Highlights

- In SUD (2009/128/EC), training plays a key role for a sustainable use of pesticide
- Consultation process shows needs to collect, complete, upload available material
- In OpenTEA, Web User can upload new material and build personalised program
- The platform is moderated and materials are uploaded after a validation process
- It was scientifically evaluated involving a group of stakeholders and likely users
- Final adjustments were finalised and now it is freely available on www.opentea.eu

Home page of OpenTEA platform developed in the frame of the EU project BROWSE (www.browseproject.eu).

New risk indicators approach for Operators, Workers, Bystanders and Residents for a sustainable use of plant protection products

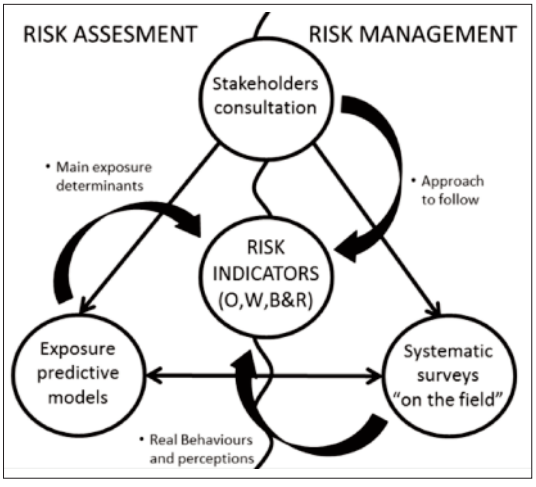
Gabriele Sacchettini, Maura Calliera, Alexandru Marchis, Richard Glass, Clare Butler Ellis, Kyriaki Machera, Rianda Gerritsen-Ebben, Pieter Spanoghe, Ettore Capri

Presenter Gabriele Sacchettini

Centro di ricerca OPERA
Istituto di Chimica Agraria ed Ambientale
Università Cattolica del Sacro Cuore
Via E. Parmense 84
Piacenza – Italy
gabriele.sacchettini@unicatt.it

Objectives

- Develop new risk indicator approaches addressing new EU legal requirements
- Develop a complementary tool to the ones already available for risk indicators
- Promote pragmatic instruments easy to use by Member State



Framework used is mainly focusing on the use of the results of three different but interconnected activities developed in the frame of the EU project BROWSE (www.browseproject.eu).

Highlights

- SUD (2009/128/EC) establishes a framework for a sustainable use of pesticide
- Indicators in SUD are needed to monitor Member States risk reduction trends
- Risk analysis was made including procedures of risk assessment and management
- Stakeholders were involved in the decision making process through a consultation
- Specific toolboxes of practical indirect risk indicators of exposure were developed
- Toolboxes are meant to be used by Member States based on their specific context

SUPTraining project: development of an e-learning platform for the sustainable use of pesticides

Maura Calliera, Gabriele Sacchettini, Ettore Capri

Presenter Maura Calliera

Centro di ricerca OPERA
Istituto di Chimica Agraria ed Ambientale
Università Cattolica del Sacro Cuore
Via E. Parmense 84
Piacenza – Italy
maura.calliera@unicatt.it

Objectives

- To design and validate, in collaboration with other European experts and two certification organisations, a new e-learning platform to train professional users, advisors and distributors to the use of PPPs for their sustainable use in a multi-institutional EU research project funded under Erasmus+ framework
- develop an useful tool to get prepared for relative national certificate test
- build a common basis for any European stakeholders willing to start the process of transferring the SUPTraining outputs to another context

Highlights

- SUD (2009/128/EC) establishes a framework for a sustainable use of pesticide
- In SUD, Training of professional users, distributors and advisors plays a key role
- 6 WPs are included on defining, developing and validating an e-learning platform
- By September 2016, the platform will be freely available on www.sup-training.eu

Stakeholder's survey views and priorities regarding factors limiting the plant protection products (PPPS) risk evaluation

Maura Calliera, Gabriele Sacchettini, Alexandru Marchis, Ettore Capri

Presenter Maura Calliera

Centro di ricerca OPERA
Istituto di Chimica Agraria ed Ambientale
Università Cattolica del Sacro Cuore
Via E. Parmense 84
Piacenza – Italy
maura.calliera@unicatt.it

Objectives

- An explorative survey was launched: to better explore the underlying reasons about the pesticide risks gap between risk assessment (RA) and risk management (RM) and
- To outline how knowledge in risk assessment is interpreted by risk managers and translated into risk management options

Highlights

- Data on the variability exposure in space and time are missing, standard scenarios used for the assessment are not always relevant or are not context specific
- Models and computational tools are not sufficient to represent the complexity of use and are not flexible to represents different scenarios
- There is a lack of scientific basis or knowledge to express effects in terms that are of relevance for protection of human health (i.e. mortality, morbidity) or the environment (i.e. ecosystem services), lack of available data (epidemiological, nutritional, etc) to assess risk-benefit in the characterisation. Results of the RA extrapolated to the whole population may not be representative of societal needs. Attitude toward risk are not properly considered
- Availability of context specific data, trust in pesticide use data methodology and reliability of data on use, consistency between mitigation measures and local conditions of use are the main factors that limiting the effectiveness of RM
- Risk management responsibility is not clearly distributed between authorities

Pesticide Risk Indicators Evaluation Report (PRIER) – A web based tool to collect information on Pesticide Risk Indicators

Jörn Strassemeyer, Roel Kruijne, Tracey Ware, Laura de Baan, Ton Van der Linden, Vincent Van Bol,Brenda Harris, Stanislaw Stobiecki8, Wojciech Śliwiński, Grant Stark, Mark Montforts, Karin Nienstedt, Bernard Blum

Presenter Jörn Strassemeyer

Julius Kühn-Institute
Stahnsdorfer Damm 81
Kleinmachnow, Germany

Objectives

- To develop an overview of existing Pesticide Risk Indicators (PRI)
- Address the question on how PRIs can be used as tools in (monitoring) plant protection policies
- List information on the type of indicator, its aims and protection goals, the input data requirements, purpose of indicator, user-friendliness and further features

Highlights

- Based on a PRI Evaluation Report Form (PRIER) an online tool was developed where developers of PRIs can enter characteristics of their PRIs
- The tool also provides summary tables and graphs of the characteristics of PRIs already entered in the tool
- The online-PRIER consists of (1) a graphical-user-interface (GUI) for entering the answers to the questions of the PRIER; (2) an online database (Oracle) in which the answers are stored and (3) a results section, where an overview of the database is given
- The online PRIER can be tested under the following web page: http://sf.jki.bund.de/oecd-prier/secured/index.jsf

Developing groundwater scenarios for Russia and comparison of their vulnerability with European groundwater scenarios

Victoria Kolupaeva, V. Gorbatov

Presenter Victoria Kolupaeva

Russian Institute of Phytopathology,
Institute 5
BolshiyeVyazemy - Russia.
ogiyvita@rambler.ru

Objectives

- To develop Russian groundwater scenarios for assessing pesticide movement potential
- To compare the vulnerability of the Russian and European scenarios

Highlights

- Environmental fate modeling of pesticides for assessing their movement potential to groundwater is an important part of the registration process in Russia
- Russian risk assessment bases on human toxicological criteria
- Nine realistic worst-case scenarios collectively represent the Russian agriculture
- Russian standard scenarios describe the overall 99th percentile of the leaching concentrations
- Russian scenarios are more vulnerable to pesticide loss than European ones and this fact partially compensated using human toxicological criteria for decision making but not excluded groundwater pollution

Scenario zones in Russia

Enhance knowledge: guidelines and software to achieve the sustainable pesticide use directive goals

Maura Calliera, Adriano Politi, Floriano Mazzini, Tiziano Galassi, Pierluigi Meriggi, Andrea Minuto, Ettore Capri.

Presenter Adriano Politi

Syngenta Italia S.p.A.,
Via Gallarate –139
Milano, Italy
adriano.politi@syngenta.com

Objectives

- To ensure that all pesticide professional users, distributors and advisers have access to 'appropriate and competent training' (Article 5, Directive2009/128/EC)
- To develop common views and to achieve solutions that reduce or mitigate risks and increase the quality of the production, safety of food in a safety-working environment, leading ultimately to sustainable agriculture
- to better understand farmers' pesticide risk management and risk perceptions, and identify critical issues that must be considered when planning training programs to encourage behavioral change, which could lead to an exposure reduction

Highlights

- Guidelines for open field farms and greenhouses that retrace the on-farms life cycle of the pesticides, from their purchase and transport to the farm until application to the crop, and finally to disposal of remnants and empty containers
- Flow chart that schematically shows the different choices or behaviors to be adopted and checklists that identify farm structural and behavioral critical points
- A shift from formal training on pesticide use that supposes lack of knowledge by farmers, to a training system more perception oriented and context-specific, could have a better impact to achieve the Sustainable Pesticide Use

Pesticide management and protection of agricultural products in developing countries (Congo and India)

Marco Pellizzoni, Matteo Anaclerio, Anna Carlomagno, Luigi Lucini, Marco Trevisan, Giuseppe Bertoni

Presenter Marco Pellizzoni

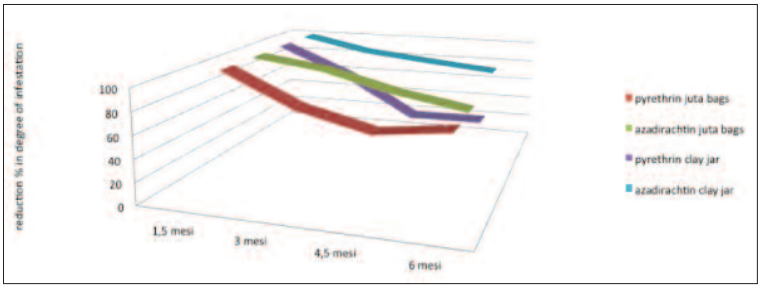
Istituto di Chimica Agraria ed Ambientale
Università Cattolica del Sacro Cuore
Via E. Parmense 84
Piacenza – Italy
marco.pellizzoni@unicatt.it

Objectives

- Promotion of sustainable strategies for the conservation of foodstuffs
- Promotion of good practices for the management of pesticides

Highlights

- Protection of cereals and legumes for a period sufficient to ensure the use of them without any risk for the consumer and without direct treatment of grains, is possible by:
  - o Applications of bio-pesticides (azadirachtin and pyrethrins) with active principles obtainable by local native plants
  - o Protective nets imbued with permethrin (2%), which are effective against the beetles of the foodstuffs
  - o Homemade leaves preparations made from Azadirachta indica, which have repellent/insecticides effects (tests in progress)
- A guide to sustainable use of pesticides in developing countries has been realized



Percentage reduction in the level of infestation of grains stored for six months in traditional local structures whose outer surfaces have been treated.

finito di stampare a Fidenza (PR - Italy)
nel mese di agosto 2015
presso Mattioli 1885

Notes