

# Bulletin de veille du Réseau des Ecotoxicologues de l'INRA



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Céline Pelosi, Mickaël Hedde, Christian Mougín et Christine Sireyjol (UR 251 Pessac)  
Destinataires : les membres de la liste : [ecotox@listes.inra.fr](mailto:ecotox@listes.inra.fr)

## Edito

Voici pour cette rentrée notre 10<sup>ème</sup> bulletin de veille. Nous vous soumettons dans cet Edito une réflexion en cours au niveau national.

La publication du rapport IFRES, le renouvellement en cours du réseau ANTIOPES, l'élaboration du nouveau plan national Santé –Environnement, les réflexions et attentes des Alliances (ALLENVI, AVIESAN, ATHENA) pour répondre à la feuille de route de l'IFRES dans les champs santé et environnement et contribuer à l'établissement de la feuille de route de l'ANR, nous paraissent des opportunités à saisir pour soutenir la structuration d'un réseau d'équipes autour de thématiques scientifiques et d'objectifs opérationnels partagés dans les domaines de la toxicologie et de l'écotoxicologie.

Des échanges ont eu lieu lors du colloque de la SEFA à Besançon les 1 et 2 juillet 2014, vous trouverez à l'adresse : <http://www6.inra.fr/ecotox/Vie-du-reseau/Partenariat/Proposition-au-reseau-Ecotox-ANTIOPES> un texte de cadrage pour la structuration d'un volet écotoxicologie plus fort au sein du réseau ANTIOPES.

Ce texte est destiné à être diffusé le plus largement possible au sein de notre communauté, afin de recueillir vos avis et déclaration d'intérêt sur les enjeux et objectifs scientifiques proposés, pour le développement de l'axe écotoxicologie dans le cadre du réseau ANTIOPES.

Dans un souci de pragmatisme, cette proposition n'a pas l'ambition d'aborder la totalité des thématiques scientifiques relevant de l'écotoxicologie, ni de doubler des réseaux existants ou émergents en écotoxicologie. Mais nous pensons qu'elle pourrait être un élément moteur pour dégager des synergies entre les différentes initiatives.

Vous pouvez manifester l'intérêt de vos laboratoires pour cette initiative et les thématiques proposées à Jeanne Garric : [jeanne.garric@irstea.fr](mailto:jeanne.garric@irstea.fr)

Nous vous rappelons également le 5<sup>ème</sup> Séminaire d'Ecotoxicologie de l'INRA qui se tiendra du 25 au 27 novembre prochain à Biarritz. Des informations plus précises vous parviendront très prochainement, mais bloquez la date !!

N'hésitez pas à consulter le portail internet du réseau : <http://www6.inra.fr/ecotox> et à vous abonner aux actualités.

Bonne lecture, et bonne rentrée !

L'équipe de veille

Contact : [christian.mougin@versailles.inra.fr](mailto:christian.mougin@versailles.inra.fr)

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## ERA Evaluation du risque

### Chemical pollutant mixtures: how safe are they?



Communiqué de presse du JCR (Joint Research Center) sur une étude sur les effets de polluants dans l'eau, même à faible concentration lorsqu'ils sont mélangés. Les effets constatés lors des bioessais inciteraient à revoir la réglementation européenne.

... Results of the study highlighted the need of precautionary actions even in cases where individual toxicants are present at seemingly harmless concentrations. Some of the observed effects of chemical pollutant mixtures included: changes in marine microbial composition, microalgae toxicity, fish embryo toxicity and increased presence of genes linked to stress response.

The effects of complex chemical mixtures on wildlife and humans have rarely been analysed under environmentally relevant scenarios. To address this issue, the study proposes an innovative approach bridging the gap between ecological and chemical monitoring. Two mixtures were tested, composed of 14 and 19 substances of concern, each present at its safety limit concentration as imposed by European legislation: pesticides, pharmaceuticals, heavy metals, polyaromatic hydrocarbons, surfactants and plasticisers. ....

Effects of this chemical mixture have been also investigated as gene expression changes in four different organisms. The objective is to identify biomarkers that could be used as early warnings of exposure, even before other adverse outcomes become visible.....

The JRC, within its work programme on water quality assessment, contributed to the study by testing the effects of mixtures on its in-house model organism - the marine diatom (algae) *Thalassiosira pseudonana* - and performed an assay to detect the estrogenic receptor-binding compounds.

Voir la publication : [Toxicol Sci](#). 2014 Jun 23 Mixtures of Chemical Pollutants at European Legislation Safety Concentrations: How Safe are They?

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## ERA Publications Scientifiques / Divers

### A review of the direct and indirect effects of neonicotinoids and fipronil on vertebrate wildlife



Article rédigé dans le cadre de la Task Force on Systemic Pesticides publié dans la revue [Environ Sci Pollut Res Int](#). 2014 Jul 19. Il est consultable en open access.

Auteurs David Gibbons, Christy Morrissey, Pierre Mineau

... Given that the neonicotinoids have become the fastest-growing class of insecticides globally, we review here 150 studies of their direct (toxic) and indirect (e.g. food chain) effects on vertebrate wildlife—mammals, birds, fish, amphibians and reptiles. We focus on two neonicotinoids, imidacloprid and clothianidin, and a third insecticide, fipronil, which also acts in the same systemic manner. Imidacloprid and fipronil were found to be toxic to many birds and most fish, respectively. All three insecticides exert sub-lethal effects, ranging from genotoxic and cytotoxic effects, and impaired immune function, to reduced growth and reproductive success, often at concentrations well below those associated with mortality. Use of imidacloprid and clothianidin as seed treatments on some crops poses risks to small birds, and ingestion of even a few treated seeds could cause mortality or reproductive impairment to sensitive bird species. In contrast, environmental concentrations of imidacloprid and clothianidin appear to be at levels below those which will cause mortality to freshwater vertebrates, although sub-lethal effects may occur. .... Our research revealed two field case studies of indirect effects..... Evidence presented here suggests that the systemic insecticides, neonicotinoids and fipronil, are capable of exerting direct and indirect effects on terrestrial and aquatic vertebrate wildlife, thus warranting further review of their environmental safety.

[Accès au document](#)

### Risks of large-scale use of systemic insecticides to ecosystem functioning and services

Article rédigé dans le cadre de la Task Force on Systemic Pesticides publié dans la revue [Environ Sci Pollut Res Int](#). 2014 Jul 19. Il est consultable en open access.



**Auteurs :** Madeleine Chagnon, David Kreutzweiser, Edward A.D. Mitchell, Christy A. Morrissey, Dominique A. Noome, Jeroen P. Van der Sluijs

Large-scale use of the persistent and potent neonicotinoid and fipronil insecticides has raised concerns about risks to ecosystem functions provided by a wide range of species and environments affected by these insecticides. The concept of ecosystem services is widely used in decision making .... Neonicotinoid insecticides are frequently detected in soil and water and are also found in air, as dust particles during sowing of crops and aerosols during spraying. .... We review the state of knowledge regarding the potential impacts of these insecticides on ecosystem functioning and services provided by terrestrial and aquatic ecosystems including soil and freshwater functions, fisheries, biological pest control, and pollination services. .... However, here we document broader evidence of the effects on ecosystem functions regulating soil and water quality, pest control, pollination, ecosystem resilience, and community diversity. In particular, microbes, invertebrates, and fish play critical roles as decomposers, pollinators, consumers, and predators, which collectively maintain healthy communities and ecosystem integrity. Several examples in this review demonstrate evidence of the negative impacts of systemic insecticides on decomposition, nutrient cycling, soil respiration, and invertebrate populations valued by humans. Invertebrates, particularly earthworms that are important for soil processes, wild and domestic insect pollinators which are important for plant and crop production, and several freshwater taxa which are involved in aquatic nutrient cycling, were all found to be highly susceptible to lethal and sublethal effects of neonicotinoids and/or fipronil at environmentally relevant concentrations. By contrast, most microbes and fish do not appear to be as sensitive under normal exposure scenarios, though the effects on fish may be important in certain realms such as combined fish-rice farming systems and through food chain effects. .... Overall, we recommend improved sustainable agricultural practices that restrict systemic insecticide use to maintain and support several ecosystem services ...

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## ERA Publications Scientifiques / Risk assessment : méthodes et pesticides

### Using phylogenetic information and chemical properties to predict species tolerances to pesticides

Guenard, G; von der Ohe, PC; Walker, SC; Lek, S; Legendre, P

PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES, 281 (1789): [10.1098/rspb.2013.3239](https://doi.org/10.1098/rspb.2013.3239) AUG 2014

Direct estimation of species' tolerance to pesticides and other toxic organic substances is a combinatorial problem, because of the large number of species-substance pairs. We propose a statistical modelling approach to predict tolerances associated with untested species-substance pairs, by using models fitted to tested pairs. This approach is based on the phylogeny of species and physico-chemical descriptors of pesticides, with both kinds of information combined in a bilinear model. (...) In cross-validation, 84-87% of the predicted tolerances for individual species were within a factor of 10 of the observed values. The approach can also be used to model other species response to multivariate stress factors.

[Accès au document](#)

### Risk assessment of pesticides detected in surface water of the Alqueva reservoir (Guadiana basin)

Palma, P; Kock-Schulmeyer, M; Alvarenga, P; Ledo, L; Barbosa, IR; de Alda, ML; Barcelo, D

SCIENCE OF THE TOTAL ENVIRONMENT, 488 208-219; [10.1016/j.scitotenv.2014.04.088](https://doi.org/10.1016/j.scitotenv.2014.04.088) AUG 1 2014

The purpose of this study was to evaluate the potential impact of the pesticides detected in the Alqueva reservoir (Guadiana Basin, South Iberian Peninsula) on the aquatic organisms belonging to this ecosystem. For this purpose, the occurrence and risk assessment of 25 pesticides and of a number of their degradation products were determined in the Alqueva surface waters. (...) The results thereby demonstrate that to have an efficient risk management process, the regulatory authorities of each country must consider an integrative chemical and ecotoxicological approach.

[Accès au document](#)

### A simulation study on effects of exposure to a combination of pesticides used in an orchard and tuber crop on the recovery time of a vulnerable aquatic Invertebrate



Focks, A; Luttik, R; Zorn, M; Brock, T; Roex, E; Van der Linden, T; Van den Brink, PJ

ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, 33 (7):1489-1498; [10.1002/etc.2502](https://doi.org/10.1002/etc.2502) JUL 2014

The aim of the present study was to assess whether population effects and recovery times increase when a population of a vulnerable aquatic invertebrate is exposed to concentrations of 1 or multiple pesticides. (...) The conclusion from the present study's simulations is that exposure to the evaluated pesticide packages may lead to increased mortality probabilities and effect sizes of the combination, but does not lead to longer recovery times for populations with synchronized reproduction than when exposed to the individual compounds.

[Accès au document](#)

### Competition Matters: Species Interactions Prolong The Long-Term Effects Of Pulsed Toxicant Stress On Populations



Kattwinkel, M; Liess, M

ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, 33 (7):1458-1465; [10.1002/etc.2500](https://doi.org/10.1002/etc.2500) JUL 2014

Recent empirical studies have revealed the importance of species competition for the effects of toxicants on populations. In the present study, the authors applied a generic individual-based simulation model of 2 competing species to analyze the consequences of interspecific competition for population dynamics under pulsed contamination.(...) The authors conclude that toxicant concentrations derived from risk assessments for pesticides that do not consider competition might be under-protective for populations in real-world systems. The consideration of competition is especially relevant for species with low reproductive capacities to enable a realistic estimation of recovery pace.

[Accès au document](#)

### Modeling the contribution of toxicokinetic and toxicodynamic processes to the recovery of Gammarus pulex populations after exposure to pesticides

Galic, N; Ashauer, R; Baveco, H; Nyman, AM; Barsi, A; Thorbek, P; Bruns, E; Van den Brink, PJ

ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, 33 (7):1476-1488; [10.1002/etc.2481](https://doi.org/10.1002/etc.2481) JUL 2014

(...) Standard effect risk assessment tools are not able to fully address the complexities arising from multiple exposure patterns, nor can they properly address the population recovery process. In the present study, we developed an individual-based model of the freshwater amphipod *Gammarus pulex* to evaluate the consequences of exposure to 4 compounds with different modes of action on individual survival and population recovery. (...) An integration of a TKTD submodel with a population model can be used to explore the ecological relevance of ecotoxicity endpoints in different exposure environments.

[Accès au document](#)

## ERA / Publications Scientifiques / Risk assessment : faune et pesticides

### Antioxidant and neurotoxicity markers in the model organism Enchytraeus albidus (Oligochaeta): mechanisms of response to atrazine, dimethoate and carbendazim



Novais, SC; Gomes, NC; Soares, AMVM; Amorim, MJB

ECOTOXICOLOGY, 23 (7):1220-1233; [10.1007/s10646-014-1265-z](https://doi.org/10.1007/s10646-014-1265-z) SEP 2014

The present study aimed to investigate the effects of dimethoate, atrazine and carbendazim on the antioxidant defences and neuronal function of the soil organism *Enchytraeus albidus*. (...) Dimethoate caused ChE inhibition, indicating an impairment of the neuronal function. Carbendazim impaired the antioxidant system, but no oxidative damage was observed, along with any effects on the ChE activity. The integrated biomarker response analysis was performed but we suggest modifications due to limiting artefacts.

[Accès au document](#)

## The direct and indirect effects of a glyphosate-based herbicide and nutrients on chironomidae (diptera) emerging from small wetlands



Baker, LF; Mudge, JF; Houlihan, JE; Thompson, DG; Kidd, KA

ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, 33 (9):2076-2085; [10.1002/etc.2657](https://doi.org/10.1002/etc.2657) SEP 2014

Laboratory and mesocosm experiments have demonstrated that some glyphosate-based herbicides can have negative effects on benthic invertebrate species. Although these herbicides are among the most widely used in agriculture, there have been few multiprestressor, natural system-based investigations of the impacts of glyphosate-based herbicides in combination with fertilizers on the emergence patterns of chironomids from wetlands. Using a replicated, split-wetland experiment, the authors examined the effects of 2 nominal concentrations (2.88 mg acid equivalents/L and 0.21 mg acid equivalents/L) of the glyphosate herbicide Roundup WeatherMax, alone or in combination with nutrient additions, on the emergence of Chironomidae (Diptera) before and after herbicide-induced damage to macrophytes. (...) Although direct toxicity of Roundup WeatherMax was not apparent, the authors observed longer-term impacts, suggesting that the indirect effects of this herbicide deserve more consideration when assessing the ecological risk of using herbicides in proximity to wetlands.

[Accès au document](#)

## Genotoxicity evaluation of the insecticide imidacloprid on circulating blood cells of Montevideo tree frog *Hypsiboas pulchellus* tadpoles (Anura, Hylidae) by comet and micronucleus bioassays

de Arcaute, CR; Perez-Iglesias, JM; Nikoloff, N; Natale, GS; Soloneski, S; Larramendy, ML

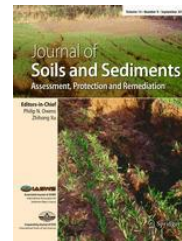
ECOLOGICAL INDICATORS, 45 632-639; [10.1016/j.ecolind.2014.05.034](https://doi.org/10.1016/j.ecolind.2014.05.034) OCT 2014

Acute toxicity and genotoxicity of imidacloprid (IMI) was evaluated on *Hypsiboas pulchellus* (Anura: Hylidae) tadpoles exposed under laboratory conditions. A lethal effect was used as the end point for lethality, whereas the frequency of micronuclei (MNs) and DNA single-strand breaks evaluated by the single cell gel electrophoresis assay were employed as end points for genotoxicity... This study

represents the first evidence of acute lethal and sublethal effects exerted by IMI on tadpoles of an amphibian species native to Argentina. Finally, our findings highlight the hazardous properties of this insecticide for nontarget living species exposed to this agrochemical.

[Accès au document](#)

## Short-term exposure to carbaryl and UV radiation increases the reproduction output of the collembolan *Folsomia candida*



Cardoso, DFN; Bastos, AC; Soares, AMVM; Loureiro, S

JOURNAL OF SOILS AND SEDIMENTS, 1559-1567; [10.1007/s11368-014-0892-6](https://doi.org/10.1007/s11368-014-0892-6) SEP 2014

Ecotoxicological risk assessment of chemical compounds is considered more accurate when mixtures of chemicals and/or interactions between chemicals and natural stressors are considered. To further simulate natural conditions, under which organisms are often exposed to combinations of natural and anthropogenic stressors, the combined exposure of a widely used insecticide, carbaryl, under UV radiation was evaluated. (...) This study highlights the importance of taking UV exposure conditions into account when assessing the impact of pesticides to soil biota and looking for more realistic scenarios while showing that soil sheltering occurs only up to a certain extent and that indirect effects can be observed. The opposite trends on responses obtained under standardized tests and short exposures to carbaryl provided some insight on the possible effects of carbaryl during collembolan life cycle.

[Accès au document](#)

## Focal bird species and risk assessment approach for nonagricultural grassland scenarios in central europe

Schabacker, J; Gerlach, J; Munderle, M; Dietzen, C; Ludwigs, JD

Environmental toxicology and chemistry, 33 (9):2055-2061 [10.1002/etc.2652](https://doi.org/10.1002/etc.2652)

The European Food Safety Authority (EFSA) guideline on risk assessment identifies pesticide exposure scenarios for nontarget wildlife; however, this scheme is not applicable to nonagricultural grassland. For example, different habitats and human utilization on golf courses attract bird



communities that differ from those found in agricultural fields with annual crop cycles. The present study determined focal bird species for amenity grasslands such as golf courses following the EFSA guideline. (...) The results of the field work combined with data from the literature identified reliable exposure scenarios to assess the risk of pesticides to birds found on golf courses.

[Accès au document](#)

### Lambda-Cyhalothrin and cypermethrin induce stress in the freshwater muddy fish, *Clarias batrachus*



Kumar, A; Sharma, B; Pandey, RS

Toxicological and environmental chemistry, 96 (1):136-149;  
[10.1080/02772248.2014.913865](https://doi.org/10.1080/02772248.2014.913865)

In order to understand the level of health risk posed by pyrethroid insecticides with strong soil-binding properties to freshwater fish, specifically living in muddy region of aquatic bodies, changes were examined in different biochemical stress markers in a freshwater muddy fish, *Clarias batrachus*, exposed to pyrethroid insecticides, cypermethrin and lambda-cyhalothrin, in low sub-acute concentrations parts per million (ppm) for 96 hr. (...) This risk assessment study draws attention towards the potential health risk of freshwater muddy fish, which are continuously being exposed to the high concentrations of such insecticides accumulated as runoff in the muddy bottom of aquatic bodies.

[Accès au document](#)

### Comparative Effect of Technical and Commercial Formulations of Methamidophos on Sperm Quality and DNA Integrity in Mice

Uriostegui-Acosta, M; Hernandez-Ochoa, I; Solis-Heredia, MD; Martinez-Aguilar, G; Quintanilla-Vega, B

ENVIRONMENTAL TOXICOLOGY, 29 (8):942-949;  
[10.1002/tox.21822](https://doi.org/10.1002/tox.21822) AUG 2014

Methamidophos (MET), widely used in developing countries, is a highly neurotoxic organophosphate pesticide that has been associated with male reproductive alterations. Commercial formulations of pesticides used by agricultural workers and urban sprayers are responsible for thousands of intoxications in developing countries and may not have the same effects as active pure ingredients. Therefore, we

compared effects of MET technical (METt) and commercial (METc) grades on sperm quality and DNA integrity. (...) In summary, the commercial formulation of MET was more reprotoxic and genotoxic than the active pure ingredient, highlighting that commercial formulations must be considered for more appropriate risk assessment of pesticide exposures.

[Accès au document](#)

### Community ecology theory predicts the effects of agrochemical mixtures on aquatic biodiversity and ecosystem properties

Halstead, NT; McMahon, TA; Johnson, SA; Raffel, TR; Romansic, JM; Crumrine, PW; Rohr, JR

ECOLOGY LETTERS, 17 (8):932-941; [10.1111/ele.12295](https://doi.org/10.1111/ele.12295) AUG 2014

Ecosystems are often exposed to mixtures of chemical contaminants, but the scientific community lacks a theoretical framework to predict the effects of mixtures on biodiversity and ecosystem properties. We conducted a freshwater mesocosm experiment to examine the effects of pairwise agrochemical mixtures [fertiliser, herbicide (atrazine), insecticide (malathion) and fungicide (chlorothalonil)] on 24 species- and seven ecosystem-level responses. (...) These results show that community ecology theory holds promise for predicting the effects of contaminant mixtures on biodiversity and ecosystem services and yields recommendations on which types of agrochemicals to apply together and separately to reduce their impacts.

[Accès au document](#)

### Effects of heavy metals and pesticides on survival of *Artemia franciscana*

Falis, M; Spalkova, M; Legath, J

Acta veterinaria brno, 83 (2):95-99;  
[10.2754/avb201483020095](https://doi.org/10.2754/avb201483020095) 2014

Assessment of the potential risk of pesticides is an important part of registration procedures in many countries. However, risk assessment of several pesticides used during the growing season has not been carried out. The aim of this study was to investigate the effects of pesticides (azoxystrobin and glyphosate), heavy metals (cadmium chloride, potassium dichromate, zinc disulphate) and their combinations on lethality to *Anemia franciscana*. (...) The results of this study provide information about the combined toxicity of pesticides used during the growing season and some heavy metals as major pollutants of the rural environment. A study of this kind has not been conducted yet. Further research for investigation of the combined toxicity of pollutants and pesticides is required.

[Accès au document](#)

## The impact of temperature stress and pesticide exposure on mortality and disease susceptibility of endangered Pacific salmon



Dietrich, JP; Van Gaest, AL; Strickland, SA; Arkoosh, MR  
 CHEMOSPHERE, 108 353-359;  
[10.1016/j.chemosphere.2014.01.079](https://doi.org/10.1016/j.chemosphere.2014.01.079) AUG 2014

Anthropogenic stressors, including chemical contamination and temperature stress, may contribute to increased disease susceptibility in aquatic animals. Specifically, the organophosphate pesticide malathion has been detected in surface waters inhabited by threatened and endangered salmon. In the presence of increasing water temperatures, malathion may increase susceptibility to disease and ultimately threaten salmon survival. This work examines the effect of acute and sublethal exposures to malathion on ocean-type subyearling Chinook salmon held under two temperature regimes.(...) Ecological risk assessments considering the effects of an individual stressor on threatened and endangered salmon may underestimate risk when additional stressors are present in the environment.

[Accès au document](#)

## Novel biopesticide based on a spider venom peptide shows no adverse effects on honeybees

Nakasu, EYT; Williamson, SM; Edwards, MG; Fitches, EC; Gatehouse, JA; Wright, GA; Gatehouse, AMR

PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES, 281 (1787): [10.1098/rspb.2014.0619](https://doi.org/10.1098/rspb.2014.0619) JUL 22 2014

Evidence is accumulating that commonly used pesticides are linked to decline of pollinator populations; adverse effects of three neonicotinoids on bees have led to bans on their use across the European Union. Developing insecticides that pose negligible risks to beneficial organisms such as honeybees is desirable and timely. One strategy is to use recombinant fusion proteins containing neuroactive peptides/proteins linked to a 'carrier' protein that confers oral toxicity. Hv1a/GNA (Galanthus nivalis agglutinin), containing an insect-specific spider venom calcium channel blocker (omega-hexatoxin-Hv1a) linked to snowdrop lectin (GNA) as a 'carrier', is an effective oral biopesticide towards various insect pests. (...) These tests suggest that Hv1a/GNA is unlikely to cause detrimental effects on honeybees, indicating that atracotoxins targeting calcium channels are potential alternatives to conventional pesticides.

[Accès au document](#)

## Toxicity of three biocides to springtails and earthworms in a soil multi-species (SMS) test system



Schnug, L; Jensen, J; Scott-Fordsmand, JJ; Leinaas, HP

SOIL BIOLOGY & BIOCHEMISTRY, 74 115-126;  
[10.1016/j.soilbio.2014.03.007](https://doi.org/10.1016/j.soilbio.2014.03.007) JUL 2014

Effects of three biocides, esfenvalerate, picoxystrobin and triclosan, were studied in a Soil-Multi-Species (SMS) test system with four springtail- and one earthworm species exposed for eight weeks.(...) The results suggest that interspecific interactions such as resource- and interference competition may influence the toxicity of biocides. SMS test systems may hence be a suitable method for investigating direct and indirect effects in combination under standardized laboratory conditions.

[Accès au document](#)

## Comparing population recovery after insecticide exposure for four aquatic invertebrate species using models of different complexity

Baveco, JM; Norman, S; Roessink, I; Galic, N; Van den Brink, PJ

Environmental toxicology and chemistry, 33 (7):1517-1528,  
[10.1002/etc.2605](https://doi.org/10.1002/etc.2605)

Population models, in particular individual-based models (IBMs), are becoming increasingly important in chemical risk assessment. They can be used to assess recovery of spatially structured populations after chemical exposure that varies in time and space. The authors used an IBM coupled to a toxicokinetic-toxicodynamic model, the threshold damage model (TDM), to assess recovery times for 4 aquatic organisms, after insecticide application, in a nonseasonal environment and in 3 spatial settings (pond, stream, and ditch). (...) By using comparisons between models of different complexity and species with different life histories, the authors obtained an understanding of the role spatial processes play in recovery and the conditions under which the full time-varying exposure needs to be considered. The logistic model, which is amenable to an analytic approach, provided additional insights into the sensitivity of recovery times to density dependence and spatial dimensions.

[Accès au document](#)

## Saving two birds with one stone: using active substance avian acute toxicity data to predict formulated plant protection product toxicity

Maynard, SK; Edwards, P; Wheeler, JR

Environmental toxicology and chemistry, 33 (7):1578-1583; [10.1002/etc.2590](https://doi.org/10.1002/etc.2590)

Environmental safety assessments for exposure of birds require the provision of acute avian toxicity data for both the pesticidal active substance and formulated products. As an example, testing on the formulated product is waived in Europe using an assessment of data for the constituent active substance(s). (...) A database of 383 formulated products was compiled from acute toxicity studies conducted with northern bobwhite (*Colinus virginianus*) or Japanese quail (*Coturnix japonica*) (unpublished regulatory literature). (...) A further analysis highlights the fact that significant reductions (61% in this dataset) could be achieved by using a sequential testing design (Organisation for Economic Co-operation and Development test guideline 223), as opposed to established single-stage designs.

[Accès au document](#)

## Effects of chemical and thermal stress on acetylcholinesterase activity in the brain of the bank vole, *Myodes glareolus*



Swiergosz-Kowalewska, R; Molenda, P; Halota, A

ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY, 106 204-212 [10.1016/j.ecoenv.2014.04.021](https://doi.org/10.1016/j.ecoenv.2014.04.021) AUG 2014

One of the most important issues in ecotoxicology is better understanding the effects of interactions between chemical pollutants and physical environmental factors on animals. To fill this knowledge gap, changes in the activity of acetylcholinesterase (AChE) in the brain samples of bank voles *Myodes (Clethrionomys) glareolus* due to temperature effects, and two chemical stressors were studied in a full factorial laboratory experiment (27 treatments). (...) Nickel exhibited no effect on AChE activity. In contrast, AChE was drastically inhibited by chlorpyrifos and low temperature, but interactions between all factors significantly influenced the enzyme activity during the elimination phase of the experiment. High mortality was observed in the groups exposed to high concentrations of nickel and chlorpyrifos.

[Accès au document](#)

## ERA Publications Scientifiques / Vers de terre et pesticides

### Earthworm tolerance to residual agricultural pesticide contamination: Field and experimental assessment of detoxification capabilities

Givaudan, N; Binet, F; Le Bot, B; Wiegand, C

Environmental pollution, 192 9-18; [10.1016/j.envpol.2014.05.001](https://doi.org/10.1016/j.envpol.2014.05.001) SEP 2014

This study investigates if acclimatization to residual pesticide contamination in agricultural soils is reflected in detoxification, antioxidant enzyme activities and energy budget of earthworms. (...) Pesticide stress was reflected in depletion of energy reserves in *A. chlorotica*. Acute exposure of pre-adapted and naive *A. caliginosa* to pesticides (fungicide Opus (R), 0.1 µg active ingredient epoxiconazole g(-1) dry soil, RoundUp Flash (R), 2.5 µg active ingredient glyphosate g(-1) dry soil, and their mixture), revealed that environmental pre-exposure accelerated activation of the detoxification enzyme sGST towards epoxiconazole.

[Accès au document](#)

### Exposure Assessment to Glyphosate of Two Species of Annelids

Garcia-Torres, T; Giuffre, L; Romaniuk, R; Rios, RP; Pagano, EA

Bulletin of environmental contamination and toxicology, 93 (2):209-214; [10.1007/s00128-014-1312-8](https://doi.org/10.1007/s00128-014-1312-8) AUG 2014

Adult mortality, biomass, fecundity and viability of cocoons were studied in *Eisenia fetida* and *Octolasion tyrtaeum*, in response to glyphosate exposure in soil. Exposure tests were carried out following USEPA procedure, with five concentrations of glyphosate in soil and a control. (...) Adverse effects were observed at concentrations that greatly exceeded the recommended field application rates of glyphosate.

[Accès au document](#)

### The binding interactions of imidacloprid with earthworm fibrinolytic enzyme

Wang, YQ; Zhang, HM; Chen, T

Journal of molecular structure, 1072 114-121; SI [10.1016/j.molstruc.2014.04.080](https://doi.org/10.1016/j.molstruc.2014.04.080) AUG 25 2014

In this paper, several studies were conducted to elucidate the binding mechanism of earthworm fibrinolytic enzyme (EFE) with imidocloprid (IMI) by using theoretical calculation, fluorescence, UV-vis, circular dichroism spectroscopy and an enzymatic inhibition assay. (...) In a word, the above analysis offered insights into the binding mechanism of IMI with EFE and could provide some important information for the molecular toxicity of IMI for earthworms.

[Accès au document](#)

### Glyphosate herbicide affects belowground interactions between earthworms and symbiotic mycorrhizal fungi in a model ecosystem

Zaller, JG; Heigl, F; Ruess, L; Grabmaier, A

Nature / SCIENTIFIC REPORTS, [10.1038/srep05634](https://doi.org/10.1038/srep05634) JUL 9 2014

Herbicides containing glyphosate are widely used in agriculture and private gardens, however, surprisingly little is known on potential side effects on non-target soil organisms. In a greenhouse experiment with white clover we investigated, to what extent a globally-used glyphosate herbicide affects interactions between essential soil organisms such as earthworms and arbuscular mycorrhizal fungi (AMF). (...) These sizeable changes provide impetus for more general attention to side-effects of glyphosate-based herbicides on key soil organisms and their associated ecosystem services.

[Accès au document](#)

### Effects of three pesticides on the earthworm *Eisenia fetida* under laboratory conditions: Assessment of mortality, biomass and growth inhibition



Jovana, M; Tanja, M; Mirjana, S

European journal of soil biology, 62 127-131; [10.1016/j.ejsobi.2014.03.003](https://doi.org/10.1016/j.ejsobi.2014.03.003) MAY-JUN 2014

To assess the toxic effects of three pesticides on non-target organism, we exposed the earthworm *Eisenia fetida* (Savigny 1826) to artificial soil supplemented with different concentrations of the examined pesticides based on the recommended agricultural doses (RAD). (...) Although *E. fetida* was found susceptible to the organophosphorus

insecticide Galition, due to the significant positive growth inhibition at the highest concentration, the value of LC50 was higher than its RAD. On the other hand, metaldehyde limacide Gardena was found ecologically safe because the LC50 value was higher than its RAD and weight was not significantly changed.

[Accès au document](#)

## Droit et politique de l'environnement

### Cour administrative d'appel de Nantes : Algues vertes, action en responsabilité après la mort d'un cheval

Nota : la Cour a retenu la responsabilité de l'Etat.

Texte du communiqué de la cour de cassation : La Cour administrative d'appel de Nantes était saisie de l'action en responsabilité formée contre l'Etat par M. P., dont le cheval était mort après s'être enlisé dans une vasière sur la plage de Saint-Michel-en-Grève (Côtes d'Armor), le 28 juillet 2009.

Comme elle avait déjà eu l'occasion de le faire dans de précédents arrêts du 1er décembre 2009 et du 22 mars 2013, concernant notamment la commune de Saint-Michel-en-Grève, la Cour a retenu en son principe la responsabilité de l'Etat du fait de la prolifération des algues vertes, en raison de ses carences à mettre en œuvre de manière suffisamment efficace les règles nationales et européennes relatives à la protection des eaux contre les pollutions d'origine agricole, pollutions qui sont la cause principale des marées vertes.

[Accès au document](#)

### Consultation : Projet d'arrêté relatif au relatif aux conditions d'épandage par voie aérienne des produits mentionnés à l'article L. 253-8 du code rural et de la pêche maritime

23/06/2014 Cette consultation organisée par le Ministère de l'Agriculture du 23 juin au 15 juillet 2014 inclus concerne les produits phytosanitaires.

Contexte des projets de décisions : Le présent projet d'arrêté fixe les conditions encadrant l'octroi de dérogation à l'interdiction d'épandage de produits phytosanitaires par voie aérienne, dans une optique de développement de méthodes alternatives et de réduction du recours au traitement aérien. Il abroge les dispositions antérieures définies par l'arrêté du 23 décembre 2013 et renforce les dispositions visant à une meilleure protection de l'environnement et des populations.



[Télécharger la note de présentation du projet d'arrêté](#)

[Consulter le projet d'arrêté](#)

[Accès au document](#)

## ERA / Normes Methodes

### EFSA - Technical Report: An R application on Pesticides: the SHVAL tool



**Abstract:** EFSA (PRAS Unit) have been requested to provide a Guidance Document (GD) on bees, which was published in July 2013. The GD uses Shortcut Values (SVs) in the estimation of the oral risk to bees. SVs express the theoretical residue intake of the bees using information on the feed consumption and residue level in pollen and nectar. The sugar content of the nectar is also an important element.

The SHVAL tool [presented in this report](#) allow for an estimation, via simulation, of the Shortcut Value's 90th percentile and its 95% confidence interval.

#### **Pour en savoir plus :**

The SHVAL tool, an application developed in R, presented in this report allows for the estimation of the Shortcut Value's 90th percentile and its 95% confidence interval.

The SHVAL tool returns the probabilistic distributions fitted to the data and the empirical density distribution of the Shortcut Value's 90th percentile over the 1000 iterations (fields). The tool is available to the public upon request.

[Accès au document](#)

### EFSA consults on guidance to predict pesticide concentrations in soil

10 July 2014 : .... The document provides an approach for assessing the exposure of soil organisms to these chemicals. EFSA has developed a software tool for calculating these soil concentrations. This is available to download from the website of the European Commission's Joint Research Centre (JRC).

The public consultation that runs until **4 September 2014**.

[Accès au document](#)

### EFSA - Call for tender - Integrating toxicokinetics in chemical risk assessment: application to human,

### animal and environmental risk assessment

**Deadline: 20 October 2014**

Published in the Official Journal of the European Union of 29.08.2014- 2014/S 165-294195 -

[Accès au document](#)

### EFSA launches toxicokinetics project

Article extrait du site Chemical watch qui commente l'appel d'offres de l'EFSA : Integrating toxicokinetics in chemical risk assessment ...

Extrait :....The contract will cover human and animal health, and environmental risk assessment.

Toxicokinetics follows what happens to a chemical in the body, and can be used to determine the relationship between an internal dose of a compound and its toxicity.

In April, Efsa's scientific committee and emerging risks (SCER) unit published a report on methods and tools to assess chemical hazard. This picked up on a number of techniques to investigate toxicokinetics, including in vitro systems, computer models and omics techniques (transcriptomics, proteomics and metabolomics).

In particular, the SCER highlighted the need to bring together exposure data with toxicokinetic processes and toxicity data for risk assessment of single chemicals and chemical mixtures. It proposed three priority recommendations for single and multiple chemicals:

- to develop "prototype" tools and models, using specific case studies, to integrate exposure, toxicokinetic information and toxicity data in risk assessment;
- to build databases containing parameters for the models; and
- to create computer programs to analyse and integrate data. [Efsa call for tender](#)

[Accès au document](#)

### The OECD expert meeting on ecotoxicology and environmental fate – Towards the development of improved OECD guidelines for the testing of nanomaterials



Dana Kühnela, Carmen Nickelb



Science of The Total Environment Volume 472, Pages 347-353, [10.1016/j.scitotenv.2013.11.055](https://doi.org/10.1016/j.scitotenv.2013.11.055) 15 February 2014

A noter : Les chercheurs ont passé en revue les guides OCDE pour voir quelles modifications seraient nécessaires pour les adapter à l'évaluation des nano matériaux.

Abstract: On behalf of the OECD Working Party on Manufactured Nanomaterials (WPMN) an expert meeting on ecotoxicology and environmental fate of nanomaterials (NMs) took place in January 2013 in Berlin. Experts ... discussed the applicability of OECD test guidelines (TGs) for chemicals to nanomaterials. The objective was to discuss the current state of the relevant science and provide recommendations to the OECD WPMN on (1) the need for updating current OECD TGs and the need for developing new ones specific to nanomaterials; and (2) guidance needed for the appropriate and valid testing of environmental fate and ecotoxicity endpoints for NMs.

Experts at the workshop agreed that the majority of the OECD TG for chemicals were generally applicable for the testing of NM, with the exception of TG 105 (water solubility) and 106 (adsorption-desorption). Additionally, the workshop also highlighted considerations when conducting OECD chemical TG on nanomaterials (e.g., sample preparation, dispersion, analysis, dosimetry and characterisation). These considerations will lead to the future development of proposals for new TG and guidance documents (GDs) to ensure that OECD TG give meaningful, repeatable, and accurate results when used for nanomaterials.

This report provides a short overview of topics discussed and the main outcomes.

[Accès au document](#)

## ECETOC publishes report on new information and weight-of-evidence in PBT/vPvB assessment of chemicals



An ECETOC task force has reviewed the new information and 'weight-of-evidence' approach set out in Annex XIII of REACH as amended in 2011, to better assess whether a chemical substance is persistent, bioaccumulative and toxic (PBT), or very persistent /very bioaccumulative (vP/vB).

An integrated evaluation strategy is proposed with focus on P and B assessment (on T sufficient guidance exists). In principle, if the available screening information indicates the absence of PBT or vPvB properties, there is no need or obligation for higher-tier assessment and/or further testing. .... Further research is recommended on several topics (endpoints), to fill gaps in knowledge before developing new criteria and specific guidance that allow regulatory conclusions to be drawn, in particular for terrestrial B assessment.

It is recommended to confine the PBT assessment primarily to the 'compartment(s) of concern' to which most of the substance to be assessed would be initially partitioning...

Screening level assessment of the B potential (in the aquatic environment ) is based on the solubility of the substance in water and octanol, its octanol-water and octanol-air partition coefficients, results of in vitro studies and model calculations.

The Summary and free PDF of the report are available via <http://bit.ly/ecetoc-sr18>

[Accès au document](#)

## USA et Canada: EPA Pollinator Risk Assessment Guidance

Ce guide de 59 pages est co-signé par trois administrations

- Office of Pesticide Programs United States Environmental Protection Agency

- Health Canada Pest Management Regulatory Agency Ottawa, ON, Canada

- California Department of Pesticide Regulation Sacramento, CA

This document provides guidance to risk assessors for evaluating the potential risk of pesticides to bees, particularly honey bees (*Apis mellifera*). This guidance is not limited to identifying the **risk assessment process** but includes consideration of the underlying **data** on which the process is based.

For purposes of brevity, this guidance refers to the White Paper in Support of the Proposed Risk Assessment Process for Bees1 submitted to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP) for review and comment in September 2012. ....

Additional recommendations from the FIFRA SAP that cannot be implemented at this time, because the science supporting such efforts has not been sufficiently vetted, will be considered as the science evolves.

[Accès au document](#)

## EFSA - Scientific Opinion of the PPR Panel: Science behind the RA for non-target terrestrial plants

Article paru dans EFSA journal, présentant l'opinion du Panel concernant l'effet des produits phytosanitaires sur les plantes non ciblées par ces produits. (effets colatéraux) 21/07/2014 EFSA Journal 2014;12(7):3800 [163 pp.]. doi:[10.2903/j.efsa.2014.3800](https://doi.org/10.2903/j.efsa.2014.3800)

Following a request from the European Food Safety Authority, the Panel on Plant Protection Products and their Residues developed an opinion on the science to support the development of a risk assessment scheme of plant (crop) protection products on **non-target terrestrial plants (NTTPs)**. This scientific opinion is largely a literature review on the most up-to-date knowledge of factors

influencing phytotoxicity testing and risk assessment of NTTPs.

Specific protection goals (SPGs) were defined for off-field, in-field and endangered species. SPGs are closely linked to **ecosystem services** and functions, and include maintaining provision of water regulation, food web support, aesthetic values, genetic resources and biodiversity. Gaps were identified in standard guidelines currently used in lower tier testing (tier I/II). In these guidelines, tests are conducted at the seedling/juvenile stage using mostly annual crops, and effects are recorded at the juvenile/vegetative stage under greenhouse conditions with plants grown individually or in monoculture. Endpoints measured do not include the overall effect on the whole life cycle (germinating seeds, seedling, juvenile stages, flowering, and seed production and germinability). .... In terms of exposure, droplet drift is considered to be the most important factor for off-field emissions to non-target areas. Models are available to calculate loadings from spray drift. Higher tier assessment is not required if the risk based on the tier II level can be managed by risk mitigation measures. When required, higher tier tests should be conducted under more realistic conditions. They may include additional laboratory/greenhouse tests (e.g. to measure reproductive endpoints or species interactions), microcosms or field experiments with experimentally or already established species. Other issues were considered, including exposure to mixtures, adjuvants, co-formulants and metabolites. Recommendations for the improvement of current guidelines and the elaboration of new guidelines and risk assessment schemes are provided.

Commentaires personnels : Les auteurs soulignent que les espèces non ciblées sont parfois plus sensibles, donc plus vulnérables face aux produits utilisés.

[Accès au document](#)

## EFSA Report: Dermal and inhalation exposure of birds and mammals to pesticides

**External Scientific Report publié le 16/06/2014 sur le site de l'EFSA :** Scientific services to support EFSA systematic reviews: Lot 5 Extensive literature search and reviews as preparatory work for the update of the Guidance of EFSA on the Risk Assessment for Birds and Mammals with regards to dermal and inhalation exposure

Steve Fryday, Nick Jarratt and Jonathan Stein, Food and Environment research Agency, York, UK

**ABSTRACT:** Birds and mammals may be exposed to pesticides through various routes including diet, drinking water, and contact with contaminated environments, overspray or inhalation of sprayed pesticides or volatile compounds.

While dietary exposure and risk is well accounted for in current risk assessments this is not the case for other routes of exposure. The aim of this study was to conduct an electronic literature search (ELS) to identify information that would assist with the development of models of

dermal and inhalation in birds and mammals in agricultural habitats.

[Accès au document](#)

## Ecotox / Dispositifs expérimentaux et plateformes

### SEBIO : une UMR dédiée aux Stress environnementaux et biosurveillance des milieux aquatiques

Extrait du site INERIS Magazine, 2014.



A propos de SEBIO : une collaboration Ineris/ULH/ URCA

SEBIO compte environ 70 personnes, réparties sur les trois sites de tutelle de l'UMR, qui s'intéressent à trois questionnements : l'impact des stress environnementaux sur la physiologie des organismes animaux aquatiques; l'influence des autres paramètres environnementaux et biotiques sur ces réponses et la place de ces biomarqueurs comme outils dans la surveillance des milieux aquatiques.

Pour donner plus de poids et de visibilité à l'expertise française en écotoxicologie aquatique, l'INERIS s'est associé aux universités de Reims et du Havre pour créer l'unité mixte de recherche SEBIO : « Stress environnementaux et biosurveillance des milieux aquatiques ».

**Pour quelles raisons vous être associés dans l'UMR SEBIO ?**

Wilfried Sanchez, écotoxicologue à l'INERIS : Pour comprendre la genèse de l'unité il faut avoir à l'esprit que l'INERIS est avant tout un centre d'expertise. Cette thématique de biosurveillance des milieux aquatiques s'est fortement développée ces dernières années et nous avons souhaité nous adosser à une activité de recherche plus forte. Nous nous sommes donc tournés vers nos collègues de l'équipe "interactions animal-environnement" de l'université de Reims et du laboratoire "écotoxicologie et milieux aquatiques" du Havre.

Alain Geffard, professeur à l'université de Reims Champagne Ardenne : Il existait déjà de nombreuses

collaborations entre nos trois équipes, de façon bi- ou trilatérale. L'idée a germé de rapprocher au sein du même groupe les recherches fondamentales sur le développement de biomarqueurs d'intérêt et celles sur l'application de ces outils : de faire un pont entre le fondamental et l'appliqué.

**Quelles sont les missions de cette unité ?** AG : Ses missions sont multiples : création de connaissances, formation par la recherche, enseignement avec le portage de différentes formations... Et surtout transfert des outils à l'opérationnel. C'est ce positionnement qui fait l'originalité de SEBIO...

[Accès au document](#)

## Ecotox / Publications des membres du réseau ecotox

### Hair as a noninvasive tool for risk assessment: Do the concentrations of cadmium and lead in the hair of wood mice (*Apodemus sylvaticus*) reflect internal concentrations?

**Author(s):** Tete, Nicolas; Afonso, Eve; Crini, Nadia; Drouhot, Severine; Prudent, Anne-Sophie; Scheifler, Renaud  
**Source:** Ecotoxicology and environmental safety, 108 233-41; 2014-Oct DOI: [10.1016/j.ecoenv.2014.07.010](https://doi.org/10.1016/j.ecoenv.2014.07.010)

**Abstract:** There is an increasing need for developing noninvasive markers of accumulation when studying the transfer of pollutants in wildlife, in response to problems caused by sacrifice of animals (disturbed population dynamics, respect of ethical protocols). Thus, the aim of this work was to determine whether trace metal (TM) concentrations in hair could be used as an accurate noninvasive estimator of internal and environmental concentrations. For that purpose, on a 40km site surrounding an ancient smelter, 321 wood mice (*Apodemus sylvaticus*) were sampled on seven squares (500\*500m) and 4 squares in fall 2010 and spring 2011, respectively. The relationships between the cadmium (Cd) and lead (Pb) concentrations in hair and those in the liver, kidneys, and soils were described. The results indicated that hair concentration was a relatively good predictor of Pb concentrations in organs ( $p < 0.001$ , 0.46).

**Address:** Chrono-Environnement, UMR 6249  
[nicolas.tete@univ-fcomte.fr](mailto:nicolas.tete@univ-fcomte.fr)

[Accès au document](#)

### Depleted Uranium Disturbs Immune Parameters in Zebrafish, *Danio rerio*: An Ex Vivo/In Vivo Experiment.

**Author(s):** Gagnaire, Beatrice; Bado-Nilles, Anne; Sanchez, Wilfried

**Source:** Archives of environmental contamination and toxicology, 67 (3):426-35; 2014-Oct DOI: [10.1007/s00244-014-0022-x](https://doi.org/10.1007/s00244-014-0022-x)

**Abstract:** In this study, we investigated the effects of depleted uranium (DU), the byproduct of nuclear enrichment of uranium, on several parameters related to defence system in the zebrafish, *Danio rerio*, using flow cytometry. Several immune cellular parameters were followed on kidney leucocytes: cell proportion, cell mortality, phagocytosis activity and associated oxidative burst and lysosomal membrane integrity (LMI). Effects of DU were tested ex vivo after 17h of contact between DU and freshly isolated leucocytes from 0 to 500g DU/L. Moreover, adult zebrafish were exposed in vivo during 3days at 20 and 250g DU/L. Oxidative burst results showed that DU increased reactive oxygen species (ROS) basal level and therefore reduced ROS stimulation index in both ex vivo and in vivo experiments. ROS PMA-stimulated level was also increased at 250g DU/L in vivo only. Furthermore, a decrease of LMI was detected after in vivo experiments. Cell mortality was also decreased at 20g DU/L in ex vivo! experiment. However, phagocytosis activity was not modified in both ex vivo and in vivo experiments. A reduction of immune-related parameters was demonstrated in zebrafish exposed to DU. DU could therefore decrease the ability of fish to stimulate its own immune system which could, in turn, enhance the susceptibility of fish to infection. These results encourage the development and the use of innate immune analysis by flow cytometry in order to understand the effects of DU and more generally radionuclides on fish immune system and response to infectious diseases.

**Address:** Institut de Radioprotection et de Sureté Nucleaire (IRSN), E-mail Address: [beatrice.gagnaire@irsn.fr](mailto:beatrice.gagnaire@irsn.fr)

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### Exploring ecotoxicological fish bioassay for the evaluation of uranium reprotoxicity



**Author(s):** Simon, O.; Floc'h, E.; Geffroy, B.; Frelon, S.

**Source:** Environmental Toxicology and Chemistry, 33 (8):1817-1824; 2014, [10.1002/etc.2586](https://doi.org/10.1002/etc.2586)

**Abstract:** Although reproduction in fish is known to be sensitive to metal exposure, few ecotoxicological studies have focused on the toxicological effects of metals. Because uranium (U) is naturally present in aquatic ecosystems (0.6-2 mg/L), freshwater organisms are subjected to chronic U exposure. Although new standardized assays are currently being developed to mimic realistic exposure conditions, they could be improved by taking into account the contamination that occurs throughout the life cycle of fish. The authors initially evaluated the effect of food (commercial flakes vs pure *Spirulina*) and ionic composition of the exposure medium on the reproductive performance of *Danio rerio*. The effects of U exposure on reproduction then were assessed (1) for the F0 adult stage at short exposure times (5 d, 20 d, and 40 d), and (2) for the F0 stage and the F1 generation after 200 d of exposure to control, low (20 g U/L), and moderate (250 g U/L) waterborne levels of U. Reproductive endpoints (reproductive success, fecundity, number of spawns, egg and larvae viability, and hatching) were measured mainly after the first spawn and after 10 d of cumulative spawns. The authors evaluated the plasticity of these endpoints and compared the effect of exposure conditions to identify the most relevant markers of the effect of U exposure on reproductive performance of *D. rerio*.

**Addresses:** Laboratoire de Biogéochimie, Biodisponibilité et Transferts des radionucléides, **E-mail Address:** [olivier.simon@irsn.fr](mailto:olivier.simon@irsn.fr)

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### Longitudinal variation in cadmium influx in sunflower (*Helianthus annuus* L.) roots as depending on the growth substrate, root age and root order

**Author(s):** Laporte, M. A.; Denaix, L.; Dauguet, S.; Nguyen, C.

**Source:** Plant and Soil, 381 (1/2):235-247; 2014

**Abstract:** Aims: In a previous work, we observed a longitudinal decrease in Cd 2+ influx starting from the root tip in first order lateral roots of sunflower (*Helianthus annuus* L.) grown in hydroponics. This variable influx was expected to impact the total Cd 2+ uptake depending on the root system architecture and on how steep was the decrease of the influx. Here, we examined the influence of the culture substrate, of the age and order of lateral roots on the longitudinal variation of Cd 2+ influx. Methods: By using short-term exposures to 109Cd-labelled solution (5 to 200 nM), we compared the longitudinal variations in Cd 2+ roots influx depending on the growth substrate (hydroponics or sand), on the root age and order. Results: In second order laterals, Cd 2+ influx decreased from the apex to the root base, as for first order laterals. For sand cultures compared to hydroponics, the mean Cd 2+ influx was lower and decreased more steeply with the distance from the apex. The influx also decreased with increasing root age and order, markedly in hydroponics but less for sand cultures. Conclusion: Results suggested that for a given root surface area, the Cd 2+ uptake by a root system

should increase with increasing number of root tips and decreasing individual root length.

**Addresses:** INRA, UMR 1391 ISPA, 33140, Villenave d'Ornon, France. **E-mail Address:** [Christophe.Nguyen@bordeaux.inra.fr](mailto:Christophe.Nguyen@bordeaux.inra.fr)

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### Root biomass production in populations of six rooted macrophytes in response to Cu exposure: Intra-specific variability versus constitutive-like tolerance



**Author(s):** Marchand, L; Nsanganwimana, F; Lamy, J B; Quintela-Sabaris, C; Gonnelli, C; Colzi, I; Fletcher, T; Oustriere, N; Kolbas, A; Kidd, P; Bordas, F; Newell, P; Alvarenga, P; Deletic, A; Mench, M

**Source:** Environmental pollution (Barking, Essex : 1987), 193 205-15; 2014-Oct DOI: [10.1016/j.envpol.2014.07.001](https://doi.org/10.1016/j.envpol.2014.07.001)

**Abstract:** Intra-specific variability of root biomass production (RP) of six rooted macrophytes, i.e. *Juncus effusus*, *Phragmites australis*, *Schoenoplectus lacustris*, *Typha latifolia*, *Phalaris arundinacea*, and *Iris pseudacorus* grown from clones, in response to Cu exposure was investigated. Root biomass production varied widely for all these macrophytes in control conditions (0.08µM) according to the sampling site. Root biomass production of *T. latifolia* and *I. pseudacorus* in the 2.5-25µM Cu range depended on the sampling location but not on the Cu dose in the growth medium. For *P. australis*, *J. effusus*, *S. lacustris*, and *P. arundinacea*, an intra-specific variability of RP depending on both the sampling location and the Cu-dose was evidenced. This intra-specific variability of RP depending on the sampling location and of Cu-tolerance for these last four species suggests that Cu constitutive tolerance for all rooted macrophytes is not a species-wide trait but it exhibits variability for some species. Copyright 2014 Elsevier Ltd. All rights reserved.

**Address:** INRA, UMR 1202 BIOGECO **E-mail Address:** [marchand.lilian@gmail.com](mailto:marchand.lilian@gmail.com)

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## Suitability of *Miscanthus* species for managing inorganic and organic contaminated land and restoring ecosystem services - A review



**Author(s):** Nsanganwimana, F.; Pourrut, B.; Mench, M.; Douay, F.

**Source:** Journal of Environmental Management, 143 123-134; 2014, [10.1016/j.jenvman.2014.04.027](https://doi.org/10.1016/j.jenvman.2014.04.027)

**Abstract:** The mitigation of potential health hazards and land scarcity due to land use change can be addressed by restoring functional and ecosystem services of contaminated land. Physico-chemical remediation options are criticized as being costly and not providing environment-friendly solutions. The use of plants and associated microorganisms could be a sustainable, cost-effective option to reduce pollutant exposure. Phytomanagement aims at using valuable non-food crops to alleviate environmental and health risks induced by pollutants, and at restoring ecosystem services. Suitable plant species must be tolerant to contaminants, reduce their transfer into the food chain, and efficiently produce marketable biomass. Based on *Miscanthus*' capacity to sequester inorganic contaminants into the root system and to induce dissipation of persistent organic contaminants in soil, these plant species are favorable for phytostabilization and phytodegradation. Among *Miscanthus* species, the noninvasive hybrid *Miscanthus giganteus*, with a high lignocellulosic content, is a promising biomass crop for the bio-economy, notably the biorefinery and bioenergy industries. Planting this species on contaminated and marginal land is a promising option to avoid changes in arable land use to mitigate the food vs. biofuel controversy. ...

**Addresses:** Laboratoire Genie Civil et geo-Environnement Equipe Sols et Environnement. E-mail Address: [francis.douay@isa-lille.fr](mailto:francis.douay@isa-lille.fr)

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## Current use of and future needs for soil invertebrate functional traits in community ecology



**Author(s):** Pey, B.; Nahmani, J.; Auclerc, A.; Capowiez, Y.; Cluzeau, D.; Cortet, J.; Decaens, T.; Deharveng, L.; Dubs, F.; Joimel, S.; Briard, C.; Grumiaux, F.; Laporte, M. A.; Pasquet, A.; Pelosi, C.; Pernin, C.; Ponge, J. F.; Salmon, S.; Santorufo, L.; Hedde, M.

**Source:** Basic and Applied Ecology, 15 (3):194-206; 2014, [10.1016/j.baae.2014.03.007](https://doi.org/10.1016/j.baae.2014.03.007)

**Abstract:** Soil invertebrates are assumed to play a major role in ecosystem dynamics, since they are involved in soil functioning. Functional traits represent one of the main opportunities to bring new insights into the understanding of soil invertebrate responses to environmental changes. They are properties of individuals which govern their responses to their environment. As no clear conceptual overview of soil invertebrate trait definitions is available, we first stress that previously-described concepts of trait are applicable to soil invertebrate ecology after minor modification, as for instance the inclusion of behavioural traits. A decade of literature on the use of traits for assessing the effects of the environment on soil invertebrates is then reviewed. Trait-based approaches may improve the understanding of soil invertebrate responses to environmental changes as they help to establish relationships between environmental changes and soil invertebrates. Very many of the articles are dedicated to the effect of one kind of stress at limited spatial scales. Underlying mechanisms of assembly rules were sometimes assessed. The patterns described seemed to be similar to those described for other research fields (e.g. plants). The literature suggests that trait-based approaches have not been reliable over eco-regions. Nevertheless, current work gives some insights into which traits might be more useful than others to respond to a particular kind of environmental change. This paper also highlights methodological advantages and drawbacks. First, trait-based approaches provide complementary information to taxonomic ones. However the literature does not allow us to differentiate between trait-based approaches and the use of a priori functional groups. It also reveals methodological shortcomings .... To overcome these shortcomings, the last part aims at proposing some solutions and prospects. It concerns notably the development of a trait database and a thesaurus to improve data management.

INRA, UR251 PESSAC. E-mail Address: [mickael.hedde@versailles.inra.fr](mailto:mickael.hedde@versailles.inra.fr)

[Accès au document](#)



## Differential accumulation of soluble proteins in roots of metallicolous and nonmetallicolous populations of *Agrostis capillaris* L. exposed to Cu



**Author(s):** Hego, Elena; Bes, Clemence M; Bedon, Frank; Palagi, Patricia M; Chaumeil, Philippe; Barre, Aurelien; Claverol, Stephane; Dupuy, Jean-William; Bonneu, Marc; Lalanne, Celine; Plomion, Christophe; Mench, Michel

**Source:** Proteomics, 14 (15):1746-58; 2014, [10.1002/pmic.201300168](http://dx.doi.org/10.1002/pmic.201300168)

**Abstract:** Differential expression of soluble proteins was explored in roots of metallicolous (M) and non-M (NM) plants of *Agrostis capillaris* L. exposed to increasing Cu to partially identify molecular mechanisms underlying higher Cu tolerance in M plants. Plants were cultivated for 2 months on perlite with a CuSO<sub>4</sub> (1-30 µM) spiked-nutrient solution. Soluble proteins extracted by the trichloroacetic acid/acetone procedure were separated with 2DE (linear 4-7pH gradient). After Coomassie Blue staining and image analysis, 19 proteins differentially expressed were identified using LC-MS/MS and Expressed Sequence Tag (ESTs) databases. At supra-optimal Cu exposure (15-30 µM), glycolysis was likely altered in NM roots with increased production of glyceraldehyde-3-phosphate and methylglyoxal based on overexpression of triosephosphate isomerase and fructose biphosphate aldolase. Changes in tubulins and higher expressions of 5-methyltetrahydropteroyltriglutamatehomocysteine methyltransferase and S-adenosyl methionine synthase underpinned impacts on the cytoskeleton and stimulation of ethylene metabolism. Increased l-methionine and S-adenosylmethionine amounts may also facilitate production of nicotianamine, which complexes Cu, and of l-cysteine, needed for metallothioneins and GSH. In M roots, the increase of [Cu/Zn] superoxide dismutase suggested a better detoxification of superoxide, when Cu exposure rose. Higher Cu-tolerance of M plants would rather result from simultaneous cooperation of various processes than from a specific mechanism.

**Address:** UMR1202 BIOGECO

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## Tissue distribution, characterization and in vitro inhibition of B-esterases in the earwig *Forficula auricularia*



**Author(s):** Malagnoux, Laure; Capowiez, Yvan; Rault, Magali

**Source:** Chemosphere, 112 456-64; 2014, [10.1016/j.chemosphere.2014.05.003](http://dx.doi.org/10.1016/j.chemosphere.2014.05.003)

**Abstract:** Earwigs are important natural enemies of numerous pests in pome fruit orchards worldwide. Studying the effects of agricultural practices on these biological control agents is important for understanding its vulnerability in the field. The aim of this study was to characterize the B-esterase activities in the European earwig *Forficula auricularia* and to evaluate in vitro its sensitivity to organophosphate and carbamate pesticides. Acetylcholinesterase (AChE) activity was mainly measured with 1.5mM acetylthiocholine as the substrate in the microsomal fraction of earwig heads (70% of total AChE activity). Carboxylesterase (CbE) activities were measured with three substrates [5mM 4-nitrophenyl acetate (4-NPA), 1mM 4-nitrophenyl valerate (4-NPV), and 2mM alpha-naphthyl acetate (alpha-NA)] to examine different isoenzymes, which were present mainly in the cytosolic fraction (about 70-88% of total activities) of all earwig tissues. CbE activity was higher than AChE activity, especially with alpha-NA, then 4-NPA and lastly 4-NPV. Chlorpyrifos-oxon an organophosphate, and carbaryl a carbamate pesticide, inhibited AChE and CbE activities in a concentration-dependent manner. Earwig CbE activities showed a stronger sensitivity to organophosphate than AChE, with the strongest effect for chlorpyrifos-oxon on male carboxylesterase activities. CbE and AChE showed about the same sensitivity to carbamate pesticides regardless of sex. These results suggest that B-type esterases in the European earwig *F.auricularia* are suitable biomarkers of pesticide exposure. Copyright 2014 Elsevier Ltd. All rights reserved.

**Address:** Université d'Avignon et des Pays de Vaucluse UMR 7263. E-mail Address: [laure.malagnoux@imbe.fr](mailto:laure.malagnoux@imbe.fr)

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## Considerations for test design to accommodate energy-budget models in ecotoxicology: a case study for acetone in the pond snail *Lymnaea stagnalis*

Barsi, A; Jager, T; Collinet, M; Lagadic, L; Ducrot, V

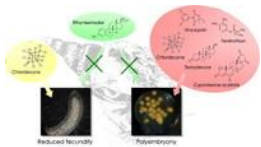
ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, 33 (7):1466-1475; [10.1002/etc.2399](http://dx.doi.org/10.1002/etc.2399) JUL 2014

Toxicokinetic-toxicodynamic (TKTD) modeling offers many advantages in the analysis of ecotoxicity test data. Calibration of TKTD models, however, places different

demands on test design compared with classical concentration-response approaches. In the present study, useful complementary information is provided regarding test design for TKTD modeling. A case study is presented for the pond snail *Lymnaea stagnalis* exposed to the narcotic compound acetone, in which the data on all endpoints were analyzed together using a relatively simple TKTD model called DEBKiss.(...) Practical and theoretical considerations for test design to accommodate TKTD modeling are discussed in the hope that this information will aid other researchers to make the best possible use of their test animals.

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### Investigating apical adverse effects of four endocrine active substances in the freshwater gastropod *Lymnaea stagnalis*



**Author(s):** Giusti, Arnaud; Lagadic, Laurent; Barsi, Alpar; Thome, Jean-Pierre; Joaquim-Justo, Celia; Ducrot, Virginie

**Source:** The Science of the total environment, 493 147-55; 2014, [10.1016/j.scitotenv.2014.05.130](https://doi.org/10.1016/j.scitotenv.2014.05.130)

**Abstract:** The hermaphroditic gastropod *Lymnaea stagnalis* is proposed as a candidate species for the development of OECD guidelines for testing of the reprotoxicity of chemicals, including endocrine active substances (EASs). Up to now, only a few putative EASs have been tested for their reproductive toxicity in this species. In this study, we investigate the effects of four EASs with different affinities to the vertebrate estrogen and androgen receptors (chlordecone as an estrogen; cyproterone acetate, fenitrothion and vinclozolin as anti-androgens) on the reproduction of *L. stagnalis* in a 21-day semi-static test. Testosterone and 17alpha-ethinylestradiol (EE2) were used as the reference compounds. The tested EASs had no significant effect on growth and survival at the tested concentration ranges (ng to mug/L). Classical reproduction endpoints (i.e., oviposition and fecundity) were not responsive to the tested chemicals, except for chlordecone and 17alpha-ethinylestradiol, which hampered reproduction from 19.6 mug/L and 17.6 mug/L, respectively. The frequency of polyembryonic eggs, used as an additional endpoint, demonstrated the effects of all compounds except EE2. The molecular pathways, which are involved in such reproduction impairments, remain unknown. Our results suggest that egg quality is a more sensitive endpoint as compared to other reproductive endpoints commonly assessed in mollusk toxicity tests. Copyright 2014 Elsevier B.V. All rights reserved

**Address:** Laboratory of Animal Ecology and Ecotoxicology, Centre of Analytical Research and Technology (CART), Liege University, 15 Allée du 6 aout, 4000 Liege, Belgium; INRA,

UMR0985 Ecologie et Sante des Ecosystemes, Equipe Ecotoxicologie et Qualite des Milieux Aquatiques, 65 rue de Saint-Brieuc, CS 84215, F-35042 Rennes Cedex, France.  
**Electronic address:** [Arnaud.Giusti@alumni.ulg.ac.be](mailto:Arnaud.Giusti@alumni.ulg.ac.be)

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### Different uranium distribution patterns in cytosolic protein pool of zebrafish gills after chronic and acute waterborne exposures

**Author(s):** Bucher, G.; Mounicou, S.; Simon, O.; Floriani, M.; Lobinski, R.; Frelon, S.

**Source:** Chemosphere, 111 412-417; 2014, [10.1016/j.chemosphere.2014.03.110](https://doi.org/10.1016/j.chemosphere.2014.03.110)

**Abstract:** The toxicity of uranium (U) to aquatic organisms depends notably on its compartmentalization in organs, tissues, cells as well as on its distribution among biomolecules. In order to contribute to the understanding of U accumulation and associated toxicity mechanisms in case of waterborne exposure, this study focused on U fate in the gills epithelia, uptake pathway, of the fish model *Danio rerio* (zebrafish). U distribution among cytosolic biomolecules was investigated after no addition (0 g L<sup>-1</sup> (c 0) for 3 and 30 d), chronic (20 g L<sup>-1</sup> (c 20) for 30 d) and acute (20 g L<sup>-1</sup> (c 20) and 250 g L<sup>-1</sup> (c 250) for 3 d) exposures to depleted U. Cytosolic U accounted for an average of 24-32% of gills burden for c 20 and c 250, respectively. Size Exclusion Chromatography (SEC) coupled with Inductively Coupled Plasma-Sector Field Mass Spectrometry (ICP-SFMS) allowed identification of ecotoxicologically relevant U-containing fractions among cytosolic biomolecules as a function of exposure conditions. In c 0 and c 20 samples, most U (ca. 80%) was found in the Low Molecular Weight fraction (LMW, <18 kDa), often considered as a detoxifying fraction. In c 250 exposed fish, U was equally distributed between LMW (40%) and High Molecular Weight (HMW, 150-670 kDa; 40%) fractions, the latter including sensitive metalloproteins. Uranium-biomolecules were co-eluted with endogenous essential metal (Fe, Cu and Zn) species, however, no major influence on their cytosolic concentration and distribution pattern among cytosolic proteins was found.

**Addresses:** IRSN/PRP-ENV/SERIS. **E-mail Address:** [sandrine.frelon@irsn.fr](mailto:sandrine.frelon@irsn.fr)

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## ECOBEE: a tool for long-term honey bee colony monitoring at the landscape scale in West European intensive agroecosystems



**Author(s):** Odoux, J. F.; Aupinel, P.; Gateff, S.; Requier, F.; Henry, M.; Bretagnolle, V.

**Source:** Journal of Apicultural Research, 53 (1):57-66; 2014

**Abstract:** In Central Western France, as in many other areas, traditional apiculture has been replaced by more intensive practices to compensate for colony losses and current decreasing honey yields. One neglected aspect concerns the choice by professional beekeepers of apiary sites in intensive agrosystems, with regard to landscape features, a choice which appears to be largely empirical. ECOBEE is a colony monitoring scheme specifically intended to provide beekeepers and researchers with basic ecological data on honeybees in intensive agrosystems, as well as colony population dynamics. ECOBEE was launched in 2008 as a long-term ecological project with three specific aims: 1. to monitor seasonal and inter-annual population dynamic parameters of honeybee colonies in a heterogeneous farming system; 2. to provide relevant and robust datasets to test specific hypotheses about bees such as the influence of landscape planning, agricultural inputs or human pressure; and 3. to offer opportunities for assessing the effectiveness of agro-environmental schemes or the effects of changes in agricultural policies on honey bee wellbeing. Here we present an overview of ECOBEE, the type of datasets collected over the first four years of monitoring, and their possible application and use. We found that colony dynamics were largely influenced by the phenology of the main mass-flowering crops foraged by bees, namely oilseed rape and sunflowers. Furthermore, we detected a sharp food shortage period in late spring between the flowering of oilseed rape and sunflowers, possibly temporarily constraining colony sustainability. We further discuss the research perspectives offered by ECOBEE, especially with regard to spatial ecotoxicology.

**Addresses:** INRA, UE 1255, Unite Experimentale Entomologie. E-mail [Francois.Odoux@magneraud.inra.fr](mailto:Francois.Odoux@magneraud.inra.fr) Address: [Jean-Francois.Odoux@magneraud.inra.fr](#)

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## Pesticide risk assessment in free-ranging bees is weather and landscape dependent

Henry, M; Bertrand, C; Le Feon, V; Requier, F; Odoux, JF; Aupinel, P; Bretagnolle, V; Decourtye, A

NATURE COMMUNICATIONS, 5 [10.1038/ncomms5359](https://doi.org/10.1038/ncomms5359) JUL 2014

The risk assessment of plant protection products on pollinators is currently based on the evaluation of lethal doses through repeatable lethal toxicity laboratory trials. Recent advances in honeybee toxicology have, however, raised interest on assessing sublethal effects in free-ranging individuals. Here, we show that the sublethal effects of a neonicotinoid pesticide are modified in magnitude by environmental interactions specific to the landscape and time of exposure events. (...) Although the ED framework involves trials at concentrations above the expected field exposure levels, it allows to explicitly delineating the climatic and landscape contexts that should be targeted for in-depth higher tier risk assessment.

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## Soil N<sub>2</sub>O emissions from recovered organic waste application in Versailles plain (France): a laboratory approach



**Authors:** Laville, P.; Michelin, J.; Houot, S.; Gueudet, J. C.; Rampon, J. N.; Labat, C.; Vaudour, E.

**Source:** Waste and Biomass Valorization, 5 (3):515-527; 2014, [10.1007/s12649-013-9249-4](https://doi.org/10.1007/s12649-013-9249-4)

**Conference:** Global assessment for organic resources and waste management. ORBIT2012, Rennes, France, June 2012.

**Abstract:** Within the framework of the French Gessol3 programme (Prostock) we sought to characterize the emissions of nitrous oxide (N<sub>2</sub>O) from organic wastes applied on the Versailles plain in relation with the main soil types of this area. Four different waste products used to fertilize crops were selected. N<sub>2</sub>O and CO<sub>2</sub> flux measurements were estimated during 13 days after application of the various types of Exogenous Organic Matter (EOM) by using a laboratory setup with soil columns prepared by combining the different types of soil and the EOM treatments. Soil columns were prepared by homogeneously adding the various waste products to provide an equivalent of 4 t C org ha<sup>-1</sup> of input. They were maintained at their maximum water holding capacities. Hydraulic potentials of soil-cylinder in relation to soil water contents were also characterized. Two EOMs were very labile while the other two were much more stable. Three days after treatment, N<sub>2</sub>O fluxes were negligible for the EOMs with a weak mineralization rate. Only the initial mineral nitrogen content of these two wastes contributed to the emissions. However, for the two labile products the C/N ratios were very different (6 and 38). This led to a non-



significant production of  $\text{NH}_4^+$  during the mineralization and weak  $\text{N}_2\text{O}$  fluxes for the product with a high C/N ratio. Concerning the EOM with a high mineralization rate and low C/N ratio, large  $\text{NH}_4^+$  amounts were released during the mineralization of the EOM, leading, for all four soils, to a slowing down of the nitrification rate and of  $\text{N}_2\text{O}$  emissions. These slowdowns were even more pronounced when the Cation Exchange Capacity (CEC) and pH of the soils were low. Nitrous oxide emissions were found to be greater for soils with higher clay contents. Clay soils have a higher water holding capacity and, due to the buffering effect of their CEC, they can maintain an active nitrification rate with high soil  $\text{NH}_4^+$  contents. For  $\text{CO}_2$  and  $\text{N}_2\text{O}$  flux magnitudes, soil properties were as important as the EOM characteristics.

**Addresses:** Unite Mixte de Recherche 1091 INRA-AgroParisTech Environnement et Grandes Cultures, **E-mail address:** [laville@grignon.inra.fr](mailto:laville@grignon.inra.fr)

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### Structural and biological trait responses of diatom assemblages to organic chemicals in outdoor flow-through mesocosms



**Author(s):** Bayona, Yannick; Roucaute, Marc; Cailleaud, Kevin; Lagadic, Laurent; Basseres, Anne; Caquet, Thierry

**Source:** Environmental pollution (Barking, Essex : 1987), 192 186-95; 2014, [10.1016/j.envpol.2014.05.023](https://doi.org/10.1016/j.envpol.2014.05.023)

**Abstract:** The sensitivity of diatom taxonomy and trait-based endpoints to chemicals has been poorly used so far in Environmental Risk Assessment. In this study, diatom assemblages in outdoor flow-through mesocosms were exposed to thiram (35 and 170  $\mu\text{g/L}$ ), and a hydrocarbon emulsion (HE; 0.01, 0.4, 2 and 20  $\text{mg/L}$ ). The effects of exposure were assessed for 12 weeks, including 9 weeks post-treatment, using taxonomic structure and diversity, bioindication indices, biological traits, functional diversity indices, indicator classes and ecological guilds. For both chemicals, diversity increased after the treatment period, and responses of ecological traits were roughly identical with an abundance increase of motile taxa tolerant to organic pollution and decrease of low profile taxa. Bioindication indices were not affected. Traits provided a complementary approach to biomass measurements and taxonomic descriptors, leading to a more comprehensive overview of ecological changes due to organic chemicals, including short- and long-term effects on biofilm structure and functioning.

**Address:** INRA, UMR985 Ecologie et Sante des Ecosystemes, Equipe Ecotoxicologie et Qualite des Milieux Aquatiques, **E-mail address:** [y.bayona@gmail.com](mailto:y.bayona@gmail.com)

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### Delayed and time-cumulative toxicity of imidacloprid in bees, ants and termites

Rondeau, G; Sanchez-Bayo, F; Tennekes, HA; Decourtye, A; Ramirez-Romero, R; Desneux, N

SCIENTIFIC REPORTS, 4 [10.1038/srep05566](https://doi.org/10.1038/srep05566) JUL 4 2014

Imidacloprid, one of the most commonly used insecticides, is highly toxic to bees and other beneficial insects. The regulatory challenge to determine safe levels of residual pesticides can benefit from information about the time-dependent toxicity of this chemical. Using published toxicity data for imidacloprid for several insect species, we construct time-to-lethal-effect toxicity plots and fit temporal power-law scaling curves to the data. (...) Extrapolating the toxicity scaling for honeybees to the lifespan of winter bees suggests that imidacloprid in honey at 0.25  $\text{mg/kg}$  would be lethal to a large proportion of bees nearing the end of their life.

[Accès au document](#)

### Effects of pesticides on soil enzymes: a review



**Author(s):** Riah, W.; Laval, K.; Laroche-Ajzenberg, E.; Mougín, C.; Latour, X.; Trinsoutrot-Gattin, I.

**Source:** [Environmental Chemistry Letters](#), 12 (2):257-273; 2014

**Abstract:** The use of pesticides in agriculture has highly increased during the last 40 years to increase crop yields. However, today most pesticides are polluting water, soil, atmosphere and food. Pesticides are also impact soil enzymes, which are essential catalysts ruling the quality of soil life. In particular, the activity of soil enzymes control nutrient cycles, and, in turn, fertilization. Here, we review the effects of pesticides on the activity of soil enzymes in terrestrial ecosystems. Enzymes include dehydrogenase, fluorescein diacetate hydrolase, acid phosphatase, alkaline phosphatase, phosphatase, beta-glucosidase, cellulase, urease and aryl-sulfatase. Those enzymes are involved in the cycles of carbon, nitrogen, sulfur and phosphorus. The main points of our analysis are (1) the common inhibition of dehydrogenase in 61% of studies, stimulation of cellulase in 56% of studies and no response of aryl-sulfatase in 67% of studies. (2) Fungicides have mainly negative effects on enzymatic activities. (3) Insecticides can be classified into two groups, the first group represented by endosulfan having an overall positive impact while the second group

having a negative effect. (4) Herbicides can be classified into two groups, one group with few positive effect and another group with negative effect.

**Addresses:** Unite AgriTerr, Esitpa. **E-mail address:** [wriah@esitpa.fr](mailto:wriah@esitpa.fr)

[Accès au document](#)

## Earthworm bioturbation influences the phytoavailability of metals released by particles in cultivated soils



**Author(s):** Leveque, T.; Capowiez, Y.; Schreck, E.; Xiong TianTian; Foucault, Y.; Dumat, C.

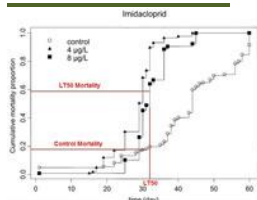
**Source:** [Environmental Pollution](#), 191 199-206; 2014

**Abstract:** The influence of earthworm activity on soil-to-plant metal transfer was studied by carrying out six weeks mesocosms experiments with or without lettuce and/or earthworms in soil with a gradient of metal concentrations due to particles fallouts. Soil characteristics, metal concentrations in lettuce and earthworms were measured and soil porosity in the mesocosms was determined. Earthworms increased the soil pH, macroporosity and soil organic matter content due to the burying of wheat straw provided as food. Earthworm activities increased the metals concentrations in lettuce leaves. Pb and Cd concentrations in lettuce leaves can increase up to 46% with earthworm activities... These results and the low correlation between estimated by CaCl<sub>2</sub> and EDTA and measured pollutant phytoavailability suggest that earthworm bioturbation was the main cause of the increase. Bioturbation could affect the proximity of pollutants to the roots and soil organic matter.

**Addresses:** Universite de Toulouse, INP-ENSAT, **E-mail Address:** [camille.dumat@ensat.fr](mailto:camille.dumat@ensat.fr)

[Accès au document](#)

## Delayed and time-cumulative toxicity of imidacloprid in bees, ants and termites



**Author(s):** Rondeau, Gary; Sanchez-Bayo, Francisco; Tennekes, Henk A; Decourtye, Axel; Ramirez-Romero, Ricardo; Desneux, Nicolas

**Source:** Scientific reports, 4 5566; 2014, [10.1038/srep05566](https://doi.org/10.1038/srep05566)

**Abstract:** Imidacloprid, one of the most commonly used insecticides, is highly toxic to bees and other beneficial insects. The regulatory challenge to determine safe levels of residual pesticides can benefit from information about the time-dependent toxicity of this chemical. Using published toxicity data for imidacloprid for several insect species, we construct time-to-lethal-effect toxicity plots and fit temporal power-law scaling curves to the data. The level of toxic exposure that results in 50% mortality after time  $t$  is found to scale as  $t^{(1.7)}$  for ants, from  $t^{(1.6)}$  to  $t^{(5)}$  for honeybees, and from  $t^{(1.46)}$  to  $t^{(2.9)}$  for termites. We present a simple toxicological model that can explain  $t^{(2)}$  scaling. Extrapolating the toxicity scaling for honeybees to the lifespan of winter bees suggests that imidacloprid in honey at 0.25  $\mu\text{g}/\text{kg}$  would be lethal to a large proportion of bees nearing the end of their life.

**Address:** Applied Scientific Instrumentation, 1025 Elkay Drive, Eugene, Oregon 97405, USA.

[Accès au document](#)

## Mitochondrial gene expression, antioxidant responses, and histopathology after cadmium exposure

**Author(s):** Al Kaddissi, Simone; Legeay, Alexia; Elia, Antonia Concetta; Gonzalez, Patrice; Floriani, Magali; Cavalie, Isabelle; Massabuau, Jean-Charles; Gilbin, Rodolphe; Simon, Olivier

**Source:** Environmental toxicology, 29 (8):893-907; 2014, [10.1002/tox.21817](https://doi.org/10.1002/tox.21817)

**Abstract:** The present study investigates cadmium effects on the transcription of mitochondrial genes of *Procambarus clarkii* after acute (0.05, 0.5, and 5 mg Cd/L; 4-10 days) and chronic exposures (10  $\mu\text{g}$  Cd/L; 30-60 days). Transcriptional responses of *cox1*, *atp6*, and *12S* using quantitative real-time RT-PCR were assessed in gills and hepatopancreas. Additionally, the expression levels of genes involved in detoxification and/or oxidative stress responses [*mt*, *sod(Mn)*] and enzymatic activities of antioxidants (SOD, CAT, GPX, and GST) were analyzed. The histopathological effects in hepatopancreas of crayfish were evaluated by light microscopy. Relationships between endpoints at different levels of biological organization and Cd bioaccumulation were also examined. Cd induced high levels of bioaccumulation, which was followed by mitochondrial dysfunction and histological alterations in both experiments. Moreover, perturbations in the defence mechanisms against oxidative stress tended to increase with time. Results also showed that molecular responses can vary depending on the intensity and duration of the chemical stress applied to the organisms and that the study of *mt* gene expression levels seemed to be the best tool to assess Cd intoxication. 2012 Wiley Periodicals, Inc. Environ

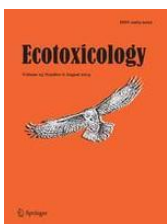


Toxicol 29: 893-907, 2014. Copyright 2012 Wiley Periodicals, Inc., a Wiley company.

**Address:** Laboratory of Radioecology and Ecotoxicology (LRE), Laboratory of Aquatic Ecotoxicology (EA)

[Accès au document](#)

### Seasonal shift in the sensitivity of a natural benthic microalgal community to a herbicide mixture: impact on the protective level of thresholds derived from species sensitivity distributions



**Author(s):** Larras, Floriane; Montuelle, Bernard; Rimet, Frederic; Chevre, Nathalie; Bouchez, Agnes

**Source:** Ecotoxicology (London, England), 23 (6):1109-23; 2014, [10.1007/s10646-014-1254-2](https://doi.org/10.1007/s10646-014-1254-2)

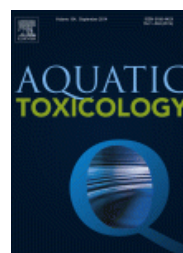
**Abstract:** Seasonal changes in the structure and composition of a benthic microalgal community may lead to different responses to herbicide contamination during different seasons. Consequently, the thresholds derived from risk assessment tools such as species sensitivity distributions (SSDs) must allow for these changes. We built a single-substance SSD for each of four herbicides (atrazine, terbuthryn, diuron and isoproturon), which was specific to the sensitivity of the benthic diatoms found in Lake Geneva, in order to derive protective thresholds for a mixture of these four herbicides using the concentration addition model. We then investigated (1) the structural parameters of a Lake Geneva benthic microalgal community during two contrasting seasons (summer 2012 and winter 2013), (2) the response of these communities to a herbicide mixture, and (3) the protective levels of the thresholds derived. The winter community was characterized by having greater biomass, diatom species richness, and diversity metrics, and lower non-diatom species richness than the summer community. The differences in the diatom communities composition in these seasons appeared to be primarily driven by the environmental nitrate concentrations and the temperature. Moreover, the species in the winter community were more resistant to herbicides than those found in the summer community. Consequently, the protective threshold for this herbicide mixture obtained in this study was in fact protective for the winter community, but not for the summer community based on their structural parameters. Thus, the protective level against herbicides of the threshold for the benthic microalgal community should take into account changes in the environmental physico-chemical conditions that strongly influence the structure and composition of the community. The fact that the succession of species over

time (i.e., over the seasons) is difficult to predict introduces uncertainties into the estimation of protective thresholds and questions their applicability year round.

**Address:** UMR CARTEL

[Accès au document](#)

### Bioaccumulation of polybrominated diphenyl ethers (PBDEs) in *Gammarus pulex*: Relative importance of different exposure routes and multipathway modeling



**Author(s):** Lebrun, Jeremie D; Leroy, Delphine; Giusti, Arnaud; Gourlay-France, Catherine; Thome, Jean-Pierre

**Source:** Aquatic toxicology (Amsterdam, Netherlands), 154 107-13; 2014, [10.1016/j.aquatox.2014.05.015](https://doi.org/10.1016/j.aquatox.2014.05.015)

**Abstract:** Characterizing the exposure routes of an organism and its ability to regulate accumulated contaminants is a crucial step toward developing a biomonitor. To date, very little data are available on the bioaccumulation kinetics of PBDEs in freshwater biota. This study aims at investigating the potential use of a litter-degrader widely distributed in European freshwaters, *Gammarus pulex*, as an indicator of exposure to PBDEs. In aquatic microcosms, gammarids were exposed to a mixture of brominated congeners (BDE-28, 47, 66, 85, 99, 100, 153, 154 and 183) to assess their ability to bioconcentrate PBDEs. Results show that all tested congeners are highly internalized by *G. pulex* and uptake rates of PBDEs are closely related to their partition coefficients (Kow). The determination of the elimination rate of BDE-47, the congener most readily accumulated by gammarids, indicated that metabolism and excretion of this congener are low in *G. pulex*, which argues in favor of its use as a quantitative biomonitor. Finally, bioaccumulation experiments were performed using contaminated leaves to determine the relative importance of dietary uptake in the contamination of gammarids. Even though water is the preeminent exposure route, a significant uptake of BDE-47 through food was observed (27%). We propose a biodynamic model that takes into account both exposure routes to describe BDE-47 bioaccumulation. This study supports the use of this ubiquitous amphipod as an early warning monitor of the bioavailable contamination of freshwaters by PBDEs. Copyright 2014 Elsevier B.V. All rights reserved.

**Address:** Irstea, UR HBAN - FIRE FR-3020. **E-mail Address:** [jeremie.lebrun@irstea.fr](mailto:jeremie.lebrun@irstea.fr)

[Accès au document](#)

## TyPol - A new methodology for organic compounds clustering based on their molecular characteristics and environmental behavior



**Author(s):** Servien, Remi; Mamy, Laure; Li, Ziang; Rossard, Virginie; Latrille, Eric; Bessac, Fabienne; Patureau, Dominique; Benoit, Pierre

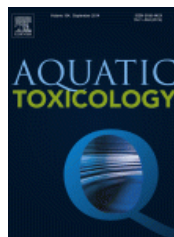
**Source:** Chemosphere, 111 613-22; 2014, [10.1016/j.chemosphere.2014.05.020](https://doi.org/10.1016/j.chemosphere.2014.05.020)

**Abstract:** Following legislation, the assessment of the environmental risks of 30000-100000 chemical substances is required for their registration dossiers. However, their behavior in the environment and their transfer to environmental components such as water or atmosphere are studied for only a very small proportion of the chemical in laboratory tests or monitoring studies because it is time-consuming and/or cost prohibitive. Therefore, the objective of this work was to develop a new methodology, TyPol, to classify organic compounds, and their degradation products, according to both their behavior in the environment and their molecular properties. The strategy relies on partial least squares analysis and hierarchical clustering. The calculation of molecular descriptors is based on an in silico approach, and the environmental endpoints (i.e. environmental parameters) are extracted from several available databases and literature. The classification of 215 organic compounds inputted in TyPol for this proof-of-concept study showed that the combination of some specific molecular descriptors could be related to a particular behavior in the environment. TyPol also provided an analysis of similarities (or dissimilarities) between organic compounds and their degradation products. ... TyPol could help to predict the environmental behavior of a "new" compound (parent compound or degradation product) from its affiliation to one cluster, but also to select representative substances from a large data set in order to answer some specific questions regarding their behavior in the environment. Copyright 2014 Elsevier Ltd. All rights reserved.

**Address:** INRA, Université de Toulouse, UMR 1331 Toxalim, INRA, UR 050, Laboratoire de Biotechnologie de l'Environnement. **E-mail:** [remi.servien@toulouse.inra.fr](mailto:remi.servien@toulouse.inra.fr) **Address:**

[Accès au document](#)

## Effects of depleted uranium on the reproductive success and F1 generation survival of zebrafish (*Danio rerio*)



**Author(s):** Bourrachot, Stephanie; Brion, Francois; Pereira, Sandrine; Floriani, Magali; Camilleri, Virginie; Cavalie, Isabelle; Palluel, Olivier; Adam-Guillermin, Christelle

**Source:** Aquatic toxicology (Amsterdam, Netherlands), 154 1-11; 2014, [10.1016/j.aquatox.2014.04.018](https://doi.org/10.1016/j.aquatox.2014.04.018)

**Abstract:** Despite the well-characterized occurrence of uranium (U) in the aquatic environment, very little is known about the chronic exposure of fish to low levels of U and its potential effect on reproduction. Therefore, this study was undertaken to investigate the effects of environmental concentrations of depleted U on the reproductive output of zebrafish (*Danio rerio*) and on survival and development of the F1 embryo-larvae following parental exposure to U. For that purpose, sexually mature male and female zebrafish were exposed to 20 and 250µg/L of U for 14 days and allowed to reproduce in clean water during a further 14-day period. At all sampling times, whole-body vitellogenin concentrations and gonad histology were analyzed to investigate the effects of U exposure on these reproductive endpoints. In addition, accumulation of U in the gonads and its genotoxic effect on male and female gonad cells were quantified. The results showed that U strongly affected the capability of fish to reproduce and to generate viable individuals as evidenced by the inhibition of egg production and the increased rate of mortality of the F1 embryos. Interestingly, U exposure resulted in decreased circulating concentrations of vitellogenin in females. Increased concentrations of U were observed in gonads and eggs, which were most likely responsible for the genotoxic effects seen in fish gonads and in embryos exposed maternally to U. Altogether, these findings highlight the negative effect of environmentally relevant concentrations of U which alter the reproductive capability of fish and impair the genetic integrity of F1 embryos raising further concern regarding its effect at the population level. Copyright 2014 Elsevier B.V. All rights reserved.

**Address:** Institut de Radioprotection et de Sûreté Nucléaire (IRSN), PRP-ENV/SERIS/LECO, Cadarache, Saint-Paul-lez-Durance 13115, France.

[Accès au document](#)

## Vie du réseau Ecotox

### Ecological modeller / ecotoxicologist

Mail à la liste [ecotox] : Ecological modeller / ecotoxicologist, 3 year PostDoc at Unilever / University of York Wed, 6 Aug 2014 roman.ashauer@york.ac.uk

Dear colleagues,

We have an open position for an Ecological Modeller / Ecotoxicologist. This is a 3 year PostDoc position which is located 80% at Unilever (UK) and 20% at the University of York (UK). The project aim is to develop a modelling framework for environmental risk assessment of down-the-drain chemicals that integrates toxicokinetics, toxicodynamics and population dynamics with environmental stress. This includes also the development of ecological scenarios and is a fantastic opportunity to get ecology used for decision-making at Unilever.

### Recrutement Rovaltain Research Company

Mail à la liste [ecotox]

Bonsoir, la plateforme de Rovaltain, devenue Rovaltain Research Company en avril 2014, recrute un technicien en écotox et un ingénieur en écotox.

Voici le lien vers les annonces : <http://www.kuribay.fr/espace-candidats/nos-offres-emploi/> A noter que le recrutement s'effectue via le cabinet Kuribay.

### EFSA Procurement: Call for tender - Generating, collecting, collating, synthesising and analysing evidence supporting preparatory work for evidence-based scientific assessment in EFSA



Deadline: 30 September 2014

Published in the Official Journal of the European Union of 21/06/2014 - 2014/S 118-208536- the call for tender is open until 30.09.2014.

Pour en savoir plus : Tender specifications (Updated: 06 August 2014).

[Accès au document](#)

### Proposition au réseau Ecotox pour le développement de l'Ecotoxicologie dans le réseau ANTIOPES

Auteurs : Jeanne Garric, Thierry Caquet, Patrick Flammarion, Fabrice Martin-Laurent, Christian Mougin, Eric Thybaud

Suite aux échanges qui ont eu lieu lors du colloque de la SEFA à Besançon les 1 et 2 juillet 2014, vous trouverez via le lien figurant dans l'édito un texte de cadrage pour la structuration d'un volet écotoxicologie plus for au sein du réseau ANTIOPES.

En effet, la publication du rapport IFRES, le renouvellement en cours du réseau ANTIOPES, l'élaboration du nouveau plan national Santé-Environnement, les réflexions et attentes des Alliances (ALLENVI, AVIESAN, ATHENA) pour répondre à la feuille de route de l'IFRES dans les champs santé et environnement et contribuer à l'établissement de la feuille de route de l'ANR, nous paraissent des opportunités à saisir pour soutenir la structuration d'un réseau d'équipes autour de thématiques scientifiques et d'objectifs opérationnels partagés dans les domaines de la toxicologie et de l'écotoxicologie.

Ce texte est destiné à être diffusé le plus largement possible au sein de notre communauté, afin de recueillir vos avis et déclaration d'intérêt sur les enjeux et objectifs scientifiques proposés, pour le développement de l'axe écotoxicologie dans le cadre du réseau ANTIOPES.

Dans un souci de pragmatisme, cette proposition n'a pas l'ambition d'aborder la totalité des thématiques scientifiques relevant de l'écotoxicologie, ni de doubler des réseaux existants ou émergents en écotoxicologie. Mais nous pensons qu'elle pourrait être un élément moteur pour dégager des synergies entre les différentes initiatives.

Vos avis et déclaration d'intérêt à participer à cette initiative nationale sont attendus avant le 15 septembre 2015 à l'adresse : [jeanne.garric@irstea.fr](mailto:jeanne.garric@irstea.fr)

### Décision du 19 mars 2014 relative à la mise en oeuvre d'un programme de recherche

Décision parue au Bulletin officiel du Ministère du développement durable. DEVD1406867.

Extraits : Le programme nommé « évaluation et réduction des risques liés à l'utilisation des pesticides » a pour objectif le développement des connaissances qui permettront une meilleure prévision de la dispersion des pesticides dans l'environnement et des effets non intentionnels sur les composantes du milieu. En outre, il vise à comprendre les déterminants des changements de pratiques d'usage des pesticides afin de limiter les risques liés à leur utilisation. Il est doté d'un comité d'orientation et d'un conseil scientifique.

La composition du conseil scientifique est la suivante :

Enrique BARRIUSO, INRA-AgroParis Tech.

Carole BARTHELEMY, université de Provence.

Yvan CAPOWIEZ, INRA Avignon.  
Thierry CAQUET, INRA Rennes.  
Marc CHEVREUIL, EPHE - université Paris-VI.  
Luiz Felipe DE ALENCASTRO, EPFL Lausanne.  
James DEVILLERS, CTIS.  
Igor DUBUS, Footways.  
Fabien GIRANDOLA, université de Provence.  
Véronique GOUY, IRSTEA Lyon.  
Laurence GUICHARD, INRA Grignon.  
Alexandra LANGLAIS-HESSÉ, université de Rennes.  
Charles-René MANCEAU, ANSES.  
Jean-François MASFARAUD, université de Metz.  
Marielle MONTGINOUL, IRSTEA Montpellier.  
Alexandre PERY, INERIS.  
Sabine STACHOWSKI-HABERKORN, IFREMER.  
Sophie THOYER, Montpellier Supagro.  
Éric THYBAUD, INERIS.  
André YEBAKIMA, CG 972.  
M. Charles-René MANCEAU, directeur de la santé végétale à l'ANSES, est nommé président du conseil scientifique

### Proposition de sujet de thèse

Proposition de thèse sur la bioremédiation ouverte au LIEC à l'automne 2014. La personne contact est Sonia Henry : [sonia.henry@univ-lorraine.fr](mailto:sonia.henry@univ-lorraine.fr)

### Séminaire « Expositions environnementales et santé : évaluations, attentes et incertitudes » - 17 octobre à Lyon

Le Collège Internationale des Sciences du Territoire et la plateforme Santé Environnement EnvitéRA, organisent le 17 octobre 2014 à Lyon un séminaire sur la thématique « Expositions environnementales et santé : évaluations, attentes et incertitudes. Applications à la présence des pesticides dans l'environnement et à la pollution de l'air urbain. »

### INRA - L'écotoxicologie du sol, un concept en pleine évolution

Dossier mis en ligne sur le site de l'INRA le 03/07/2014 réalisé par Catherine Foucaud-Scheunemann

Sommaire : [Introduction](#)

1 [L'écotoxicologie du sol, un concept en pleine évolution](#)  
Contact(s) scientifique(s) : [Christian Mougin UR](#)

[Physicochimie et écotoxicologie des sols d'agrosystèmes contaminés](#)

2 [Vers de nouveaux indicateurs biologiques en écotoxicologie du sol](#) Contact(s) scientifique(s) : [Mickaël Hedde UR Physicochimie et écotoxicologie des sols d'agrosystèmes contaminés](#) / [Isabelle Lamy](#)

3 [Utiliser les vers de terre les plus appropriés pour homologuer des pesticides](#) Contact(s) scientifique(s) : [Céline Pelosi UR Physicochimie et écotoxicologie des sols d'agrosystèmes contaminés](#)

4 [Des outils et des structures renouvelés autour de l'écotoxicologie](#)  
[Accès au document](#)

### Jobs - EURAXESS -Professor in Department of Animal Toxicology, Faculty of Biology and Environment Protection

Offre postée sur le site [ec.europa.eu/euraxess](http://ec.europa.eu/euraxess) le 11/06/2014. Professor in Department of Animal Toxicology, Faculty of Biology and Environment Protection Nicolaus Copernicus University in Torun (Pologne).

Description : Lectures on: toxicology, chronotoxicology, environmental protection, plant protection agents, synergists, pesticide-related diseases, biology of dependencies, light smog and blue light-induced disruption of circadian rhythms.

Supervision of PhD studies. Reviews of PhD and habilitation dissertations, and grant projects.

Interdepartmental scientific cooperation.

[Accès au document](#)

### Jobs -PhD student "Investigation of modulatory toxicity effects of metal mixtures

Offre postée sur le site [ec.europa.eu/euraxess](http://ec.europa.eu/euraxess) le 25/05/2014. Entrée en fonction prévue : 01/10/2014 à Antwerp en Belgique.

PhD student: Investigation of modulatory toxicity effects of metal mixtures on chemosensation in the nematode *Caenorhabditis elegans* using proteomics analysis and behavioral assays.

This full-time PhD position has been created at Systemic Physiological and Ecotoxicological Research (SPHERE) group, Department of Biology, University of Antwerp (Groenenborgerlaan 171/U7, B-2020 Antwerp, Belgium). The student will be working in a multi-disciplinary environment, in close collaboration with the Centre For Proteome Analysis and Mass Spectrometry (University of Antwerp/VITO).

[Accès au document](#)



## Pourquoi les abeilles sont-elles stressées ?

Extrait du site (Echoplanete.com Provence 12/05/2014)



Cinq postes supplémentaires en quatre ans. « L'Inra a décidé d'investir dans les abeilles » constate Yves le Conte, qui dirige à Avignon une structure unique en France : l'unité de recherche « Abeilles et environnement ». Ils sont désormais vingt-quatre à étudier les causes du déclin de ce peuple animal qui perd chaque année 20 à 30 % de ses ressortissants, soit du double au triple de la mortalité naturelle.

Trois équipes sont constituées. La première étudie « les services rendus » à la planète « en termes de pollinisation » : en butinant comme elle le fait, l'abeille domestique et ses copines, réparties entre un millier de variétés sauvages, participent au développement de... 30 % de notre alimentation. Premiers bénéficiaires : melons, concombres et autres cucurbitacées. Huit plantes sur dix dépendent directement de leur contribution pollinisatrice. La deuxième équipe mesure l'effet des pesticides sur les abeilles. Ces produits apparaissent de plus en plus dans le nectar et le pollen des fleurs sauvages.

La troisième s'intéresse plus particulièrement aux parasites comme le varroa ou au nosema, un champignon microscopique. L'INRA se penche aussi sur les modifications du paysage. Plus les zones d'agriculture intensive progressent, plus la ville et le béton avancent, moins les abeilles ont d'espace. Et elles stressent. Or, c'est du stress que naissent la plupart de leurs problèmes.

Voir aussi : <http://www.franceinter.fr/emission-le-zoom-de-la-redaction-les-abeilles-au-coeur-des-recherches-scientifiques-de-linra>

[Accès au document](#)

## **Ecotox / Colloques**

**Vous trouverez la liste des colloques à venir [sur le site ECOTOX](#)**

Voici la liste des congrès signalés sur le site, vous y trouvez le programme. Merci de nous indiquer d'éventuels oublis.

[2014/09/30 : BCPC Congress 2014: Precaution or Innovation?](#)

[2014/09/7-10 : Edinburgh : 50th Congress of the European Societies of Toxicology - Eurotox 2014](#)

[2014/09/9-10 : Agchem Forum à Barcelone](#)

[2014/10/03 : INRA- journée recyclage et impact des PRO produits résiduels organiques au champ](#)

[2014/10/14-15 : SETAC Europe 10th Special Science Symposium - Brussels -](#)

[2014/10/15-17 : Short course on toxicologic pathology in fish](#)

[2014/10/15-17 : Short course on toxicologic pathology in fish](#)

[2014/10/16 : Paris : Séminaire de Toxicologie Nucléaire Humaine et Environnementale 2014](#)

[2014/10/16-17 : Annecy : Congrès annuel de la SFT](#)

[2014/10/27-30 : Colloque IALE : les 7 èmes Journées françaises de l'Ecologie du Paysage](#)

[2014/10/28-29 Expositions professionnelles aux pesticides - Enjeux pour la recherche, l'évaluation et la prévention](#)

[2014/10/8-9 Alixan 1er colloque scientifique FCS ROVALTAIN](#)

[2014/11/12-13 : 2nd International Conference on Environment Pollution and Prevention \(ICEPP 2014\)](#)

[2014/11/17 : BelTox course Introduction to Toxicology and Ecotoxicology as the Scientific Basis for Management of Chemical Risk 2014](#)

[2014/11/18-19 : ADEME 3èmes Rencontres nationales de la recherche sur les sites et sols pollués](#)

[2014/11/18-20 Nanosafe - NANOSAFE 2014](#)

[2014/11/25-27 : Séminaire du réseau ECOTOX](#)

[2014/11/4-5 : Journées industrielles méthanisation Chambéry, France](#)

[2014/11/4-6 : Pesticides : des impacts aux changements de pratiques Angers](#)

## **Ouvrages / rapports**

### Soil and water in a changing environment rapport pour la Commission européenne (DG ENV)

Rapport publié le 27 Juin 2014. Auteur : BIO Intelligence Service, HydroLogic 140 pages. L'accent est mis sur la capacité de rétention d'eau du sol.

Présentation : The study [Soil and water in a changing environment](#), carried out on behalf of the Environment Directorate-General of the European Commission, gathers information on the dynamics between soil and water, focusing particularly on soil water retention (SWR).

Soil water retention can be defined as the capacity of the soil to capture, store and/or release water. It is a key soil property and significant component of the water cycle that greatly affects soil functioning and therefore its capability to deliver a range of ecosystem goods and services that are vital both for human activities (e.g. agriculture) and to nature (e.g. providing habitat for different species). It is



defined to great extent by soil types, depending on its texture, organic matter content, structure or depth, for example. Moreover, also the type of land use and management practices significantly influence that capacity.

A brief analysis of current major threats to European soils is enough to see that those soil threats will usually have a close link with water retention. Erosion, for example, is much more likely to occur in dry soils. And higher compaction, or sealing, prevents water from infiltrating the soil and therefore decreases its retention capacity. Consequences of changing retention capacities of soils together with the impact of changing weather patterns are already presently felt at European level, with some regions being particularly affected. In particular, the catastrophic flooding that recently occurred in 2002 and 2013 in Central and Eastern Europe, and in 2007 and 2014 in Western Europe, highlight the urgency to better consider the impacts of our economic development on soil water retention capacity and the resilience of natural ecosystems.

The study shows that several opportunities exist in land use planning, urban design and in the agriculture and forestry sectors to preserve or even enhance soil water retention and reduce the costs of associated damages. This is especially important in Mediterranean countries, which are particularly vulnerable, and in areas subject to high soil sealing (e.g. densely populated and industrial areas) or rapid urban sprawl, such as coastal areas. The agricultural sector in particular, through wide variety of agricultural practices that can be implemented within a same land use type, represent a key opportunity and many beneficial practices still show an untapped potential for development across the EU.

[Accès au document](#)

## Thèse : Évaluation de l'impact des rejets urbains de temps de pluie sur le compartiment algal des écosystèmes aquatiques : Mise au point d'outils pour la surveillance des milieux récepteurs

Auteur : [Yannis Ferro](#) Thèse Présentée devant L'institut national des sciences appliquées de Lyon Pour obtenir le grade de docteur et Soutenue le 23 septembre 2013.

École doctorale : Chimie de Lyon (Chimie, Procédés et Environnement) Spécialité : Sciences de l'Environnement Industriel et Urbain

.... Parmi les problèmes posés par les eaux pluviales, notre étude se focalise sur les rejets urbains de temps de pluie (RUTP). ....

Notre travail a consisté à étudier l'impact environnemental de différents échantillons de RUTP collectés sur 3 sites d'assainissement pluvial de l'agglomération lyonnaise. Pour cela nous avons sélectionné des **bioindicateurs** pertinents, les microalgues d'eau douce, organismes unicellulaires à la base des chaînes trophiques et très sensibles aux polluants présents dans les RUTP. Nous avons réalisé des **bioessais écotoxicologiques** connus de la littérature et contribué au

développement de nouveaux indicateurs de toxicité complémentaires.

De plus nous avons cherché à adapter ces bioessais pour permettre leur utilisation sur le terrain. En parallèle nous avons travaillé à l'amélioration d'un **biocapteur enzymatique à cellules algales**. Ses performances ont été évaluées sur des échantillons de RUTP avant d'œuvrer à la construction d'une station automatisée qui nous a permis de réaliser des mesures directement sur les sites d'assainissement (on line monitoring). Ce travail contribue à mettre en évidence l'impact important des RUTP sur le milieu récepteur tout en confirmant le caractère hétérogène de ce type d'effluent et l'intérêt des dispositifs de surveillance in situ.

[Accès au document](#)

## Écologie des zones humides : Concepts, méthodes et démarches

Auteur : BOUZILLÉ Jan-Bernard

Editeur : Librairie Lavoisier, 2014 -41 pages



Écologie des zones humides offre un vaste tour d'horizon des démarches scientifiques et des procédures utiles à la conduite de suivis et d'études. L'orientation opérationnelle retenue ici s'appuie sur des concepts et des notions de biologie des populations et d'écologie des communautés, exposés de manière à aider les praticiens dans l'exercice de leur mission, à travers trois grands axes :

- la délimitation et la caractérisation des zones humides, en prenant en compte l'arrêté du 24 juin 2008 et ses versions suivantes et en présentant les outils de télédétection qui offrent des possibilités d'améliorer les approches spatiales descriptives et fonctionnelles ;
- la dynamique de la biodiversité en relation avec la gestion de l'eau, un objectif étant de proposer des méthodes et des outils utiles à la gestion durable des zones humides en considérant divers résultats d'expériences de recherche appliquée ;
- la présentation de procédures d'évaluation des fonctions écologiques des zones humides

Écologie des zones humides développe particulièrement la dimension biodiversité et de groupes bio-indicateurs et s'attache à établir des liens entre les questions de gestion concrète qui se posent dans les zones humides et les mécanismes biologiques et écologiques impliqués.

[Accès au document](#)

## These : Etude des effets de mélanges d'herbicides employés sur le maïs, sur les communautés microbiennes édaphiques : approche en microcosmes

Thèse de doctorat en Ecologie Microbienne soutenue par Pierre Joly le 25-02-2014 Sous la direction de Clarisse Mallet. à [Clermont-Ferrand 2](#), dans le cadre de [École doctorale des Sciences de la Vie, Santé, Agronomie, Environnement](#), en partenariat avec [Laboratoire "Microorganismes : Génome et environnement"](#)

Ces travaux s'inscrivent dans une problématique actuelle de compréhension des effets, encore peu connus, des mélanges de pesticides dans le sol. Les formulations d'herbicides S-métolachlore (Dual Gold Safeneur®), mésotrione (Callisto®) et nicosulfuron (Milagro®) ont été appliquées en mélanges et à la dose agronomique recommandée. Les molécules formulées sont plus toxiques que les molécules actives seules (Microtox®) et aucun effet synergique ou antagoniste des mélanges n'a été observé. Cependant, ces mélanges impactent transitoirement et à court terme les communautés microbiennes du sol de Limagne, sans modifier les paramètres généraux de structure et d'abondance. Toutefois, des effets ont été mis en évidence sur des communautés sensibles telles que les phototrophes ou celles impliquées dans les processus de nitrification et de dénitrification. De plus, une comparaison des effets des mélanges sur les communautés phototrophes de deux sols souligne l'importante toxicité du Dual Gold Safeneur® et remet en cause son utilisation d'un point de vue écotoxicologique.

## USA et Canada: EPA Pollinator Risk Assessment Guidance

Ce guide de 59 pages est co-signé par trois administrations :

- Office of Pesticide Programs United States Environmental Protection Agency
- Health Canada Pest Management Regulatory Agency Ottawa, ON, Canada
- California Department of Pesticide Regulation, Sacramento, CA

This document provides guidance to risk assessors for evaluating the potential risk of pesticides to bees, particularly honey bees (*Apis mellifera*). This guidance is not limited to identifying the **risk assessment process** but includes consideration of the underlying **data** on which the process is based.

For purposes of brevity, this guidance refers to the White Paper in Support of the Proposed Risk Assessment Process for Bees1 submitted to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP) for review and comment in September 2012. ....

Additional recommendations from the FIFRA SAP that cannot be implemented at this time, because the science

supporting such efforts has not been sufficiently vetted, will be considered as the science evolves

[Accès au document](#)

## Des vers de terre et des hommes



Ouvrage paru à Actes Sud en Avril 2014. Consultable à la bibliothèque de Pessac.

Auteurs : Marcel BOUCHÉ , Alain CANET - Bruno SIRVEN

Cet ouvrage novateur propose une synthèse des connaissances relatives aux vers de terre et aux écosystèmes. Soulignant la perception très limitée que nous avons de notre environnement et les carences des technosciences actuelles, il nous montre comment ces animaux rustiques mais si sophistiqués pourraient nous aider à mieux évaluer et valoriser tout ce que la nature met à notre disposition.

[Accès au document](#)

## Les abeilles dans l'UE : un bilan de santé inquiétant Briefing du European Parliamentary Research Service

Briefing de 8 pages publié le 31/03/2014 par le EPRS European Parliamentary Research Service. Cette note très documentée comporte de très nombreux liens vers les documents cités. Elle fait le point sur les prises de position de l'EFSA, les décisions communautaires et les projets de recherche.

Auteur: Jean Weissenberger, Service de recherche pour les députés

Résumé : Ces deux dernières décennies, les apiculteurs européens voient mourir un nombre anormalement élevé de leurs ruches. Au-delà des conséquences sur le secteur apicole lui-même, les enjeux agricoles et écologiques de la disparition des abeilles sont considérables.

Ce phénomène de mortalités excessives n'a pas d'explication unique identifiée, mais il serait lié aux effets combinés et accrus de plusieurs causes: **pesticides**, pratiques agricoles, modifications de l'environnement, maladies...

L'Union européenne s'est saisie de cette problématique et la préservation des insectes pollinisateurs est abordée dans diverses politiques, qu'il s'agisse de la santé animale, de

l'autorisation des produits phytosanitaires, de la politique agricole, de la protection de la biodiversité ou encore de la recherche.....

#### Extrait : L'autorisation des pesticides

L'autorisation des pesticides exige au préalable une évaluation des risques sur la santé des abeilles.

Après que l'EFSA a réévalué en 2012 les bases scientifiques de l'évaluation des risques des

produits de traitement des plantes à cet égard, la Commission a également revu les exigences de

données minimales de toxicologie (dont les études sur les abeilles) pour les substances actives (à partir de 2014) et pour les produits phytopharmaceutiques (à partir de 2016). L'EFSA a également publié en juillet 2013 de nouvelles lignes directrices à ces fins.

[Accès au document](#)

## En Bref / Focus

### L'Anses publie son évaluation des risques d'émergence d'antibiorésistances liés aux modes d'utilisation des antibiotiques en santé animale

**Communiqué de presse de l'ANSES du 20/06/2014** : ... L'Anses s'est autosaisie afin de conduire une évaluation des risques d'émergence d'antibiorésistances liés aux modes d'utilisation des antibiotiques dans le domaine vétérinaire. Son objectif est de préciser les mesures les plus appropriées à mettre en œuvre, dans le domaine de la santé animale, pour une politique efficace de lutte contre l'antibiorésistance.

L'avis et le rapport d'expertise publiés ce jour apportent des recommandations pour chaque filière ou espèce animale, complémentaires des actions actuellement prévues dans le projet de Loi d'Avenir pour l'agriculture et dans le plan Ecoantibio 2017. Il s'agit notamment d'abandonner l'usage des antibiotiques en prévention, de réserver l'usage d'antibiotiques de dernière génération à des situations à bien identifier et à strictement encadrer, et de privilégier l'usage d'antibiotiques à spectre étroit.....

#### Outils de surveillance

La prise de conscience des filières et leur volonté de s'engager dans un usage prudent des antibiotiques conduisent l'Anses à recommander la mise en place d'outils de suivi pérennes des pratiques, au plus près de l'administration des antibiotiques dans les élevages, par espèce animale, par filière et type de production, en complément des outils déjà existants.

Pour en savoir plus :

[AVIS et rapport de l'Anses relatifs aux "Risques d'émergence d'antibiorésistance liés aux modes d'utilisation des antibiotiques dans le domaine de la santé animale"](#)

[Accès au document](#)

### Etude des effets des néonicotinoïdes sur les oiseaux

Information du site terre-net.fr qui commente l'article paru online dans la revue Nature : le 09/07

Declines in insectivorous birds are associated with high neonicotinoid concentrations: [Caspar A. Hallmann](#)

Extraits des commentaires de Terre net :

Pour leur part, les chercheurs néerlandais ont constaté une baisse des populations de 15 espèces d'oiseaux différentes de 3,5 % par an, entre 2003 à 2010, dans des régions des Pays-Bas où l'eau de surface contenait des concentrations importantes de l'un de ces produits, l'imidaclopride. Cette baisse coïncide avec l'utilisation croissante d'imidaclopride, substance chimique très utilisée dans le pays, souligne l'étude conduite par Caspar Hallmann, chercheur à l'université de Radboud à Nijmegen. Les quantités utilisées de ce néonicotinoïde, autorisé en 1994 aux Pays-Bas, ont été quasiment multipliées par dix jusqu'en 2004, rapporte l'étude. Les chercheurs estiment que cet insecticide aurait pu avoir un effet négatif sur les oiseaux en les privant de nourriture.

...Dans un commentaire publié dans Nature, Dave Goulson, biologiste à l'université britannique du Sussex, juge l'étude convaincante bien qu'elle ne se base que sur un lien de corrélation entre concentrations de produits phytosanitaires et baisse des populations d'oiseaux sans établir formellement le lien de cause à effet entre les deux. ....

Voir l'article sur le site de Nature <http://www.nature.com/nature/journal/vaop/ncurrent/full/nature13531.html>

[Accès au document](#)

## En Bref / presse

### Le bisphénol A plus dangereux à faible qu'à forte dose

Article du journal les echos 05/08/2014 qui cite une [étude de l'INRA](#) de l'équipe [Toxicologie alimentaire \(NeuroGastroenterologie et Nutrition\)](#).

Une étude, parue récemment dans la revue de biologie expérimentale Faseb, indique que le bisphénol A aurait des effets plus puissants sur le système immunitaire à la dose quotidienne de 5 microgrammes (µg) par kilos, c'est-à-dire le seuil considéré comme sans risque par l'Autorité Européenne de sécurité des aliments, qu'à une dose quotidienne dix fois supérieure (50 microgrammes par kilos).

Testé sur des groupes de rates enceintes ayant reçu des doses différentes du composé, c'est la première fois qu'un lien entre intolérance alimentaire et BPA est établi chez l'animal, d'après le directeur de recherche à l'Institut national de la recherche agronomique (INRA) qui a coordonné l'étude. Les résultats témoignent donc du coup de la difficulté de fixer une dose quotidienne sans risque pour l'homme. Connue pour être dangereuse chez les femmes enceintes et pour les futurs bébés, plusieurs autres études et avis (à l'instar de celui de l'Anses) démontrent que le bisphénol A pourrait avoir des effets sur les systèmes reproductif, nerveux, immunitaire, métabolique et cardiovasculaire, tout en pouvant être à l'origine de certains cancers.

Menard, S., Guzylack-Piriou, L., Leveque, M., Braniste, V., Lencina, C., Naturel, M., Moussa, L., Sekkal, S., Harkat, C., Gaultier, E., Theodorou, V., Houdeau, E. **Food intolerance at adulthood after perinatal exposure to the endocrine disruptor bisphenol A.** *The FASEB Journal*, August 2014. [doi:10.1096/fj.14-255380](https://doi.org/10.1096/fj.14-255380)

[Accès au document](#)

## EFSA : Appel à la création d'un réseau de recherche européen pour endiguer les pertes d'abeilles

Call for European research network to address bee losses ... Une coopération renforcée entre les agences de l'UE, les États membres et les chercheurs s'impose d'urgence pour améliorer notre compréhension de la manière dont les facteurs de stress multiples nuisent à la santé des abeilles. C'est l'une des conclusions du rapport publié aujourd'hui par l'EFSA, qui propose également la création d'une base de données de recherche centralisée et libre d'accès, afin de développer une approche globale en matière d'évaluation des facteurs de stress chez les abeilles.

..Ce réseau est l'une des recommandations proposées dans la synthèse des travaux réalisée par l'EFSA sur les travaux d'évaluation des risques pour les abeilles menés actuellement dans l'ensemble de l'UE. Le but du rapport, rédigé en coopération avec la Commission européenne et certains États membres, est de mettre en lumière les lacunes observées dans les connaissances disponibles actuellement et de suggérer des recherches qui contribueraient à développer un programme harmonisé d'évaluation des risques environnementaux pour les abeilles.

[Accès au document](#)

## EFSA : Indépendance : règles peaufinées, révision de la politique prévue en 2015

Une mise à jour des règles solides de mise en œuvre de la politique d'indépendance en matière de déclarations d'intérêts de l'EFSA permettra de mieux les comprendre et de clarifier leurs modalités d'application en ce qui concerne l'examen des déclarations lors de la sélection des experts scientifiques et du personnel de l'EFSA. Le document publié

aujourd'hui s'appuie sur toute une série de règles effectivement introduites en 2012 ; le texte a été revu et modifié afin d'en faciliter son utilisation, et certains passages reformulés par souci de clarté.

L'EFSA s'emploie à réviser ses politiques et procédures pour s'assurer qu'elles restent adaptées à l'utilisation pour laquelle elles ont été prévues. Cet examen technique des modalités de mise en œuvre relatives aux déclarations d'intérêts s'inscrit dans le cadre de ces efforts continus. La prochaine étape importante en ce sens sera, à compter de 2015, la révision plus stratégique de la politique de l'EFSA en matière d'indépendance et de processus décisionnels scientifiques.

Les modalités mises à jour entreront en vigueur en septembre 2014 et seront appliquées dans le cadre de la sélection d'experts en vue du renouvellement, en 2015, du comité scientifique de l'Autorité et de neuf de ses groupes scientifiques.

[Accès au document](#)

## OPECST Audition publique

L'office parlementaire d'évaluation des choix scientifiques et technologiques (OPECST) a organisé le 3 Juillet, avec ALLENNVI une audition publique sur le thème « **Construire une société nouvelle : améliorer notre compétitivité grâce à la recherche environnementale** »

Les vidéos et le programme sont accessibles en ligne.

Nota : Extrait du programme :

### **LA CONTRIBUTION A LA PRÉSERVATION DE L'ENVIRONNEMENT**

#### **14h15 : PREMIÈRE TABLE RONDE : BIODIVERSITÉ ET ÉCOSYSTÈMES**

**Première illustration : Restauration des populations d'esturgeons** - M. Thierry Mazet, directeur de l'agriculture de la région Aquitaine - M. Eric Rochard, directeur de recherche à l'Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture (IRSTEA)

#### **Deuxième illustration : Extraction des principes actifs des végétaux, plantes à traire**

- M. Jean-Paul Fèvre, président directeur général de Plant Advanced Technologies (PAT)

- M. Frédéric Bourgaud, professeur à l'Université de Lorraine

Mise en perspective :

- Mme Stéphanie Thiébault, directrice de l'Institut écologie et environnement du Centre national de la recherche scientifique (CNRS-INEE)

#### **15h30 : SECONDE TABLE RONDE : DÉVELOPPEMENT DURABLE**

#### **17h00 : L'ÉVALUATION ENVIRONNEMENTALE : UNE RECHERCHE TRANSVERSALE**

- Mme Véronique Bellon, directrice du département Ecotechnologies de l'Institut national de recherche en



sciences et technologies pour l'environnement et l'agriculture (IRSTEA)

- M. François Moisan, directeur exécutif de la stratégie, de la recherche et de l'international à

l'Agence de l'environnement et de la maîtrise d'énergie (ADEME)

[Accès au document](#)

## INRA : Biodiversité : les vers de terre affectés par les pesticides - La France Agricole

Article de la France Agricole 23/07/2014 Des chercheurs de l'Inra Versailles-Grignon ont mis en évidence qu'une réduction de moitié des pesticides conduit à une nette augmentation des populations de vers de terre vivant plus particulièrement au contact de la surface du sol.

Les scientifiques se sont intéressés à trois espèces de vers de terre présents dans les sols cultivés. *Lumbricus castaneus* affectionne tout particulièrement les couches superficielles des sols. *Allolobophora chlorotica* vit dans les premiers centimètres de sol où il se nourrit. Quant à *Lumbricus terrestris*, il fréquente les profondeurs du sol et se nourrit en surface.

Le suivi des populations a été mené dans 30 parcelles agricoles, entre 2005 et 2012. La moitié était exploitée de façon conventionnelle, l'autre était gérée en agriculture biologique. Toutes étaient labourées régulièrement et de la même manière....

[Accès au document](#)

## Global pesticides market to grow by 7% to \$75.9 billion by 2019-global pesticide, market



According to "Global Pesticides Market - Segmented By Type, Application Area, Geography - Trends and Forecasts (2014-2020) - Sustainability, Regulation & Competition", the global volume market for pesticides is projected to reach 3.2 million tons by 2019 from 2.3 million tons in 2013.....

The global value market for pesticides stood at \$51.9 billion in 2013 and is projected to reach \$75.9 billion by 2019, expected to register a CAGR of 6.9% between 2014 and 2020. Despite being the largest market for Pesticides, demand growth in North America is likely to be the slowest, while **Asia-Pacific is expected to emerge as the fastest growing market.**

By application area, crop-based end-uses of pesticides are likely to maintain the fastest growth in terms of volume consumed and value demand during the similar period, and retain the leading ranking in terms of largest application rea....

**Biopesticides**,... Governments in several countries have come up with initiatives aimed at promoting the development and use of biopesticides because of their low toxicity, greater safety and higher effectiveness in controlling pests. However, growth in the market has also been hampered due to the entrenched pesticides market, inconsistent efficiency of biopesticides and lack of awareness among consumers about the availability of these products.

[Accès au document](#)

## US phases out neonicotinoid use on refuges



The U.S. Fish and Wildlife Service has decided to eliminate the use of neonicotinoids by 2016 on roughly 8,700 acres of refuge land where farmers grow crops in Oregon, Washington and Idaho.

The U.S. Fish and Wildlife Service plans to "exhaust all alternatives" before allowing neonicotinoids on refuge land in 2015 and then discontinue the pesticides altogether in 2016.

The agency made this decision because neonicotinoids can harm "non-target insects" and persist in the environment, which contradicts its "integrated pest management" policy, according to a letter sent to refuge managers by a USFWS official.....

[Accès au document](#)

## New Zealand EPA demands higher standard of pesticide science-New Zealand, EPA, requirements, approval, safety



New Zealand's Environmental Protection Authority is stepping up its requirements for a higher level of scientific evidence regarding the safety and effects of new pesticides before considering them for approval.

The decision follows an International Union for Conservation of Nature (IUCN) review of research into systemic pesticides that concluded a group known as neonicotinoids posed a serious risk to birds, honey bees and other pollinators, and a wide range of invertebrates, including earthworms. The international analysis of 800 peer-reviewed scientific reports has confirmed fears of beekeepers throughout the world that long-term exposure to systemic pesticides at low, non-lethal levels could be harmful to bees and a factor in declining bee populations overseas.

[Accès au document](#)

## Prendre en compte l'environnement de l'abeille pour mieux évaluer le risque lié aux insecticides

Communiqué de presse CNRS-INRA présentant l'article.  
Pesticide risk assessment in free-ranging bees is weather  
and landscape dependent

Une étude coordonnée par l'Inra et associant l'ACTA, le CNRS et l'ITSAP-Institut de l'abeille montre que le degré de sensibilité des abeilles face aux effets indésirables des pesticides varie selon les conditions environnementales. Les chercheurs ont observé qu'un insecticide de la famille des néonicotinoïdes perturbe leur capacité à se repérer, en particulier dans un paysage complexe et sous des conditions météorologiques défavorables. Ces résultats ont été publiés dans la revue Nature Communications le 10 juillet 2014.

Références : Mickaël Henry, Colette Bertrand, Violette Le Féon, Fabrice Requier, Jean-François Odoux, Pierrick Aupinel, Vincent Bretagnolle, Axel Decourtye, Pesticide risk assessment in free-ranging bees is weather and landscape dependent, Nature Communications, paru le 10 juillet 2014.

[Mickael.Henry@avignon.inra.fr](mailto:Mickael.Henry@avignon.inra.fr), [axel.decourtye@acta.asso.fr](mailto:axel.decourtye@acta.asso.fr),

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