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## Bulletin de veille du réseau d'écotoxicologie terrestre et aquatique, N°42

Colette Bertrand, Christian Mougin, Annette Bérard, Céline Pelosi, Olivier Crouzet, Pascale Karmasyn-Veyrines

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# Bulletin de veille du réseau d'écotoxicologie terrestre et aquatique

## *ECOTOX* N° 42, décembre 2019

Réalisé par l'équipe de veille sur la période du 1<sup>er</sup> novembre 2019 au 31 décembre 2019.  
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### Edito

Voici notre 42<sup>ème</sup> bulletin de veille, le dernier aux couleurs de l'INRA ! Vous y trouverez de nombreuses informations en lien avec l'écotoxicologie, la toxicologie et les activités du réseau. Le prochain bulletin sera édité dans le cadre du nouvel Institut national de recherche en agriculture, alimentation et environnement, INRAE.

Nous vous proposons dans ce bulletin une tribune libre concernant l'écotoxicologie dans les paysages agricoles... ou comment l'exposition de l'habitat aux pesticides renseigne des risques potentiels pour les organismes ? Le texte est également disponible sous forme de fiche thématique en téléchargement sur notre site ECOTOX :

<https://www6.inrae.fr/ecotox/Productions/Fiches-thematiques/Fiche-thematique-N-24-decembre-2019>

Vous pouvez rejoindre l'équipe de veille pour développer de nouveaux thèmes (il en reste !). Et n'oubliez pas de nous transmettre les informations que vous souhaitez diffuser, notamment vos publications que nous pourrions avoir oubliées.

Bonne lecture !

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## SOMMAIRE

<b>TRIBUNE LIBRE</b>	<b>7</b>
<b>ERA / PUBLICATIONS SCIENTIFIQUES</b>	<b>11</b>
Effects of pollution on marine organisms	11
Contaminant Concentrations in Sediments, Aquatic Invertebrates, and Fish in Proximity to Rail Tracks Used for Coal Transport in the Pacific Northwest (USA): A Baseline Assessment	11
<b>ERA / PUBLICATIONS SCIENTIFIQUES / ECOTOXICOLOGIE SPATIALE</b>	<b>11</b>
Mapping Geospatial Processes Affecting the Environmental Fate of Agricultural Pesticides in Africa	11
Pesticide residues in beehive matrices are dependent on collection time and matrix type but independent of proportion of foraged oilseed rape and agricultural land in foraging territory	12
A Probabilistic Co-Occurrence Approach for Estimating Likelihood of Spatial Overlap Between Listed Species Distribution and Pesticide Use Patterns	12
An Evaluation of the BEEHAVE Model Using Honey Bee Field Study Data: Insights and Recommendations	13
Assessing the vulnerability of groundwater resources in semiarid lands of central Argentina	13
Residential sources of pesticide exposure during pregnancy and the risks of hypospadias and cryptorchidism: the French ELFE birth cohort	14
Contaminant Concentrations in Sediments, Aquatic Invertebrates, and Fish in Proximity to Rail Tracks Used for Coal Transport in the Pacific Northwest (USA): A Baseline Assessment	14
<b>ERA / PUBLICATIONS SCIENTIFIQUES / MICROBIOLOGIE ET PESTICIDES</b>	<b>15</b>
Fungicide and Bactericide Effects on Carbon and Nitrogen Cycling in Soils: A Meta-Analysis	15
Complete Genome Sequence of <i>Cellulomonas</i> sp. Strain Y8, a High-GC-Content Plasmid-Free Heavy Metal-Resistant Bacterium Isolated from Farmland Soil	15
Soil organic matter prevails over heavy metal pollution and vegetation as a factor shaping soil microbial communities at historical Zn-Pb mining sites	15
A YajQ-LysR-like, cyclic di-GMP-dependent system regulating biosynthesis of an antifungal antibiotic in a crop-protecting bacterium, <i>Lysobacter enzymogenes</i>	16
Influence of chlorothalonil and carbendazim fungicides on the transformation processes of urea nitrogen and related microbial populations in soil	16
Environmental Fate of Two Organophosphorus Insecticides in Soil Microcosms under Mediterranean Conditions and Their Effect on Soil Microbial Communities	17
Investigation of the Effects of Pesticides and Wood Vinegar on Some Microbial and Physico-chemical Soil Parameters	17
Pharmaceutical exposure changed antibiotic resistance genes and bacterial communities in soil-surface- and overhead-irrigated greenhouse lettuce	18
Detection of antibiotic resistance genes in culturable bacteria isolated from soils around mines in Hamedan, Iran	18
Soil tillage and herbicide applications in pea: arbuscular mycorrhizal fungi, plant growth and nutrient concentration respond differently	19
Azoxystrobin impact on a selection of soil bacterial resistance to aminoglycoside antibiotics	19
Soil organic matter prevails over heavy metal pollution and vegetation as a factor shaping soil microbial communities at historical Zn-Pb mining sites	20
Chromium-reducing and phosphate-solubilizing <i>Achromobacter xylosoxidans</i> bacteria from the heavy metal-contaminated soil of the Brass city, Moradabad, India	20
Macrolide- and quinolone-resistant bacteria and resistance genes as indicators of antibiotic resistance gene contamination in farmland soil with manure application	21
Risk assessment for and microbial community changes in Farmland soil contaminated with heavy metals and metalloids	21

<b>ERA / PUBLICATIONS SCIENTIFIQUES / PESTICIDES ET FAUNE SAUVAGE.....</b>	<b>22</b>
Species- and organ-specific responses of agri-environmental plants to residual agricultural pollutants .....	22
Anticoagulant rodenticides in Strix owls indicate widespread exposure in west coast forests .....	22
Metal Exposure Risk Assessment for Tree Sparrows at Different Life Stages via Diet from a Polluted Area in Northwestern China .....	23
Combined anti-androgenic effects of mixtures of agricultural pesticides using in vitro and in silico methods .....	23
What do we know about lead contamination in wild vultures and condors ? A review of decades of research .....	23
Long-term impact of agricultural practices on the diversity of small mammal communities: a case study based on owl pellets .....	24
Populations Collapses in Marine Invertebrates Due to Endocrine Disruption: A Cause for Concern? .....	24
Effects of pollution on marine organisms .....	24
Contaminant Concentrations in Sediments, Aquatic Invertebrates, and Fish in Proximity to Rail Tracks Used for Coal Transport in the Pacific Northwest (USA): A Baseline Assessment.....	25
 <b>ERA / PUBLICATIONS SCIENTIFIQUES / PESTICIDES / CLIMAT ET VDT / ENCHYTREIDES</b>	 <b>25</b>
Updated peer review concerning the risk to mammals and bees for the active substance indoxacarb .....	25
Biochemical response and vermiremediation assessment of three earthworm species ( <i>Alma millsoni</i> , <i>Eudrilus eugeniae</i> and <i>Libyodrilus violaceus</i> ) in soil contaminated with a glyphosate-based herbicide.....	25
Growth, DNA damage and biochemical toxicity of cyantraniliprole in earthworms ( <i>Eisenia fetida</i> ) .....	26
Defense responses in earthworms ( <i>Eisenia fetida</i> ) exposed to low-density polyethylene microplastics in soils .....	26
Is there a way to rate insecticides that is less detrimental to human and environmental health? .....	26
Microplastic particles reduce reproduction in the terrestrial worm <i>Enchytraeus crypticus</i> in a soil exposure.....	26
Evaluation of gene expression of different molecular biomarkers of stress response as an effect of copper exposure on the earthworm <i>Eisenia andrei</i> .....	26
Effects of Microplastics in Soil Ecosystems: Above and Below Ground .....	26
A novel method for real-time monitoring of soil ecological toxicity - Detection of earthworm motion using a vibration sensor.....	27
Biological and physiological responses of <i>Perionyx excavatus</i> to abamectin .....	27
 <b>DROIT ET POLITIQUE DE L'ENVIRONNEMENT .....</b>	 <b>27</b>
Produits phytosanitaires : le Gouvernement renforce les mesures de protection des riverains.....	27
Lettre actualités phyto Ile-de-France n°119 - novembre 2019.....	27
Lettre actualités phyto Ile-de-France - décembre 2019.....	28
Bees: MEPs call for reduction in use of pesticides to save Europe's bees.....	28
Cultiver et Protéger Autrement – Appel à projets.....	28
Endocrine disruptors – Have your say on the EU legislation .....	29
La réglementation des produits phytosanitaires.....	29
Sortie du glyphosate : les députés demandent des précisions .....	29
Programme national de recherche Environnement-Santé-Travail : lancement des appels à projets de recherche 2020 .....	30
Changes in soil carbon, biodiversity and ecotoxicity should be considered when assessing environmental impact of dairy products .....	30
Mycophyto : L'agriculture métamorphosée par la science .....	30
Déforestation agricole et minière en Guyane : impacts sur les concentrations en mercure dans les eaux .....	31
La création d'un fonds d'indemnisation des victimes de pesticides est actée .....	31
 <b>REGLEMENTATION / DROIT .....</b>	 <b>31</b>
Substances actives des produits phytopharmaceutiques et présentant des modes d'action identiques à ceux de la famille des néonicotinoïdes.....	31
Mesures de protection des personnes lors de l'utilisation de produits phyto-pharmaceutiques à proximité des zones d'habitation.....	31
Utilisation de produits phytopharmaceutiques : mesures de protection des personnes.....	32

Méthodologie de calcul et la valeur des doses unités de référence des substances actives phytopharmaceutiques	.32
Conditions d'introduction dans l'Union européenne de terre contaminée par des pesticides ou des polluants organiques persistants	.....32
Report de la date d'expiration de l'approbation du K-HDO en vue de son utilisation dans les produits biocides du type 8	.....32
Report de la date d'expiration de l'approbation du tébuconazole en vue de son utilisation dans les produits biocides du type 8	.....32
Report de la date d'expiration de l'approbation de l'IPBC en vue de son utilisation dans les produits biocides du type 8	.....33
Mesures de protection contre les organismes nuisibles aux végétaux	..... Erreur ! Signet non défini.
Substances actives «benfluraline», «dimoxystrobine», «fluazinam», «flutolanil», «mancozèbe», «mécoprop-P», «mépiquat», «métirame», «oxamyl» et «pyraclostrobine» : prolongation de la période d'approbation	.....33
Mise à disposition sur le marché des fertilisants : rectificatif au règlement (UE) 2019/1009	.....33
CEPP : les objectifs pour 2020 sont connus	.....33
Adaptation des règles relatives aux certificats d'économie de produits phytopharmaceutiques	.....34
Mise sur le marché des produits phyto-pharmaceutiques :	.....34
Liste des produits phytopharmaceutiques de biocontrôle, au titre des articles L.253-5 et L.253-7 du code rural et de la pêche maritime	.....34
<b>AVIS / EXPERTISES / NORMES</b>	<b>..... 34</b>
Protection des riverains en cas d'épandage de produits phytosanitaires	.....34
Annual report of the Scientific Network on Microbiological Risk Assessment 2019	.....35
Standard Test Method for Determination of Particles Resulting from the Attrition of Granular Pesticides	.....35
Standard Guide for Preparing Granular Pesticide Ground Applicator Calibration Procedures	.....36
Rapid risk assessment on the possible risk for public health due to the contamination of infant formula and follow-on formula by mineral oil aromatic hydrocarbons (MOAH)	.....36
Glyphosate dans les écosystèmes : pas de dépassement des seuils réglementaires	.....36
<b>PUBLICATIONS DU RESEAU ECOTOX</b>	<b>..... 37</b>
Trace elements and persistent organic pollutants in chicks of 13 seabird species from Antarctica to the subtropics	.....37
The effect of natural radioactivity on diatom communities in mineral springs	.....37
Transfer and degradation of the common pesticide atrazine through the unsaturated zone of the Chalk aquifer (Northern France)	.....38
Reliability evaluation of biomarker reference ranges for mesocosm and field conditions: Cellular innate immunomarkers in <i>Gasterosteus aculeatus</i>	.....38
Quantifying the impact of no-tillage on soil redistribution in a cultivated catchment of Southern Brazil (1964-2016) with Cs-137 inventory measurements	.....39
Poplar rotation coppice at a trace element-contaminated phytomanagement site : A 10-year study revealing biomass production, element export and impact on extractable elements	.....39
Towards the optimization of botanical insecticides research : <i>Aedes aegypti</i> larvicidal natural products in French Guiana	.....40
Environmental transcriptomes of invasive dreissena, a model species in ecotoxicology and invasion biology	.....40
Long-term phytomanagement with compost and a sunflower - Tobacco rotation influences the structural microbial diversity of a Cu-contaminated soil	.....41
Biomagnification of perfluoroalkyl acids (PFAAs) in the food web of an urban river : assessment of the trophic transfer of targeted and unknown precursors and implications	.....41
Transgenerational effects from single larval exposure to azadirachtin on life history and behavior traits of <i>Drosophila melanogaster</i>	.....42
Trace-level determination of two neonicotinoid insecticide residues in honey bee royal jelly using ultra-sound assisted salting-out liquid liquid extraction followed by ultra-high-performance liquid chromatography-tandem mass spectrometry	.....42
Tracking sources and transfer of contamination according to pollutants variety at the sediment-biota interface using a clam as bioindicator in peri-alpine lakes	.....43

Discovery of High Abundances of Aster-Like Nanoparticles in Pelagic Environments : Characterization and Dynamics .....	43
A glyphosate-based herbicide induces sub-lethal effects in early life stages and liver cell line of rainbow trout, <i>Oncorhynchus mykiss</i> .....	44
Tolerance of free-living nematode species to imidacloprid and diuron.....	44
Coupling caging and proteomics on the European flounder ( <i>Platichthys flesus</i> ) to assess the estuarine water quality at micro scale .....	45
Applications of chitosan in food, pharmaceuticals, medicine, cosmetics, agriculture, textiles, pulp and paper, biotechnology, and environmental chemistry .....	45
Biotic formation of methylmercury: A bio-physico-chemical conundrum .....	46
Telomere dynamic in humans and animals: Review and perspectives in environmental toxicology .....	46
Evidence for Bisphenol B Endocrine Properties : Scientific and Regulatory Perspectives .....	47
What are the effective solutions to control the dissemination of antibiotic resistance in the environment ? A systematic review protocol.....	47
Global distribution of earthworm diversity .....	48
Environmental geochemistry and bioaccumulation/bioavailability of uranium in a post-mining context - The Bois-Noirs Limouzat mine (France) .....	48
Copper phytoavailability in vineyard topsoils as affected by pyoverdine supply .....	49
Environmental transcriptomes of invasive dreissena, a model species in ecotoxicology and invasion biology .....	49
Action-orientated research and framework: insights from the French long-term social-ecological research network .....	50
A global synthesis reveals biodiversity-mediated benefits for crop production .....	50
Toward the protection of bees and pollination under global change : present and future perspectives in a challenging applied science .....	51
Bee pollination outperforms pesticides for oilseed crop production and profitability .....	51
Monitoring and Origin of Polycyclic Aromatic Hydrocarbons (PAHs) in Effluents from a Surface Treatment Industry	51
A dual mixture of persistent organic pollutants modifies carbohydrate metabolism in the human hepatic cell line HepaRG .....	52
Application of the European Water Framework Directive : Identification of reference sites and bioindicator fish species for mercury in tropical freshwater ecosystems (French Guiana).....	52
<b>COLLOQUES .....</b>	<b>53</b>
Colloque de la SEFA : 2-3 juillet 2020 à Versailles .....	53
<b>OUVRAGES / RAPPORTS / ACTES DE CONGRES .....</b>	<b>53</b>
The Exposome - 2 <sup>nd</sup> Edition .....	53
Physical Chemistry of Atmospheric Pollution .....	54
Dépolluer la planète .....	54
De la modélisation des techniques aux OAD, l'apport du numérique pour optimiser la pulvérisation des produits phytosanitaires.....	55
Du conseil à la mise en oeuvre, retour d'expérience sur l'apport d'un outil d'aide à la décision pour la réduction des traitements fongicides en blé tendre.....	55
Pollution of Water Bodies in Latin America .....	55
Le numérique au service de la réduction des intrants.....	55
Le livre noir des boues rouges .....	56
Pesticides : Comment ignorer ce que l'on sait.....	56
La fin du monde pour tous.....	57
<b>REVUE DE PRESSE .....</b>	<b>57</b>
Persistent organic pollutants in mother's blood linked to smaller fetal size .....	57
Publication officielle des textes encadrant les pesticides : le compte n'y est pas !.....	57
SDHI Une commission indépendante alerte plusieurs ministères .....	58

<b>Glyphosate : les usages dérogatoires, ultime champ de bataille ? .....</b>	<b>58</b>
<b>Glyphosate, les urines de la discorde.....</b>	<b>58</b>
<b>Biggest ever human screening for toxic chemicals in Europe .....</b>	<b>58</b>
<b>SDHI : Rustin en voie de séralinisation ? .....</b>	<b>59</b>
<b>Mortalité des abeilles : les phytos dans l'agriculture accusés à tort.....</b>	<b>59</b>
<b>Companies that Claim Sustainable Sourcing Lack Criteria, Virtually None Includes Pesticide Use .....</b>	<b>59</b>

## Tribune libre

### **L'écotoxicologie dans les paysages agricoles... ou comment l'exposition de l'habitat aux pesticides renseigne des risques potentiels pour les organismes ?**

Les pratiques liées à l'intensification agricole d'après-guerre se sont traduites par une diminution de la diversité et de la connectivité paysagère, une perte des surfaces semi-naturelles (bois, haies, prairies), des changements dans la gestion des cultures et un recours important aux intrants chimiques comme les pesticides. Malgré les précautions prises par les agriculteurs pour limiter les « fuites » de pesticides, les applications entraînent des transferts dans l'atmosphère par dérive de pulvérisation et par volatilisation post-application depuis la surface traitée, et des transferts dans les sols par entraînement avec l'eau d'infiltration et de ruissellement. Ces modifications du paysage et le recours important aux pesticides peuvent affecter négativement la biodiversité et conduire à un déclin des fonctions assurées par les organismes vivants (Benton et al., 2003 ; Firbank et al., 2008).

Pour concilier une production alimentaire en quantité et de qualité et la protection des écosystèmes agricoles et naturels, plusieurs études s'accordent à dire que les mesures de gestion doivent être mises en œuvre à l'échelle du paysage agricole. En effet, pour le cas des pesticides, l'organisation spatiale et temporelle des usages des sols et des activités agricoles influence les transferts de pesticides dans l'atmosphère, mais aussi dans les sols. De plus, le paysage joue sur la dynamique des organismes, conditionnant ainsi l'exposition aux pesticides et les impacts, et donc la résistance potentielle des systèmes cultivés aux bioagresseurs (Tschardt et al., 2007).

Le champ disciplinaire de l'écotoxicologie du paysage, introduit dans les années 90 (Cairns, 1993), s'appuie sur les cadres conceptuels de l'écologie du paysage et de l'écotoxicologie. Cette discipline, jusque-là peu explorée, est basée sur le fait que le paysage peut modifier le devenir, les patrons d'exposition et les effets des polluants à travers son influence sur la distribution spatiale des polluants, des habitats, des ressources et des organismes et sur de nombreux processus écologiques (ex. dynamiques de populations et de communautés, relations proies-prédateurs, trajectoires évolutives). L'écotoxicologie du paysage peut donc être utilisée pour améliorer notre connaissance fondamentale des processus de transferts et des effets des polluants à l'échelle des paysages agricoles. De plus, la manipulation des caractéristiques du paysage pourrait représenter un levier d'action pour maintenir ou améliorer la résistance des agrosystèmes à diverses perturbations naturelles et favoriser la durabilité des agrosystèmes.

Le projet RESCAPE (2015-2019) s'inscrit dans le cadre de l'écotoxicologie du paysage et avait pour objectif de déterminer les effets de l'usage des terres et de la gestion agricole (composition et configuration du paysage, pratiques culturales) sur la résistance des paysages aux transferts de pesticides dans les sols et dans les organismes vivants. Ce projet a permis d'améliorer les connaissances sur la manière dont les éléments du paysage affectent la répartition spatiale des pesticides, l'exposition des organismes non-cibles et les impacts sur ceux-ci.

Au niveau méthodologique, des prélèvements ont été réalisés en 2016 au sein de la Zone Atelier (ZA) « Plaine & Val de Sèvre » en France, dans des fenêtres paysagères (1km de côté) sélectionnées le long de gradients indépendants de caractéristiques du paysage, en étudiant 3 habitats par fenêtre : une parcelle en céréales (blé), une haie, et une prairie. La session de terrain a permis d'acquérir les données et échantillons de sols et faune non-cible pour analyser les résidus pesticides dans les différents éléments du paysage ainsi que dans les vers de terre, les carabes et les petits mammifères.



## Des avancées méthodologiques en chimie analytique

L'exposition des sols et des organismes non-cibles aux pesticides a nécessité la mise au point de méthodes en chimie analytique permettant de mesurer les pesticides dans des matrices complexes. 31 molécules organiques (12 herbicides, 10 fongicides et 9 insecticides, Tableau 1) ont été retenues sur les critères suivants : fréquence et quantité d'utilisation sur la zone d'étude, potentiel d'émission vers l'atmosphère et persistance dans le sol, compatibilité dans une analyse multi-résidu. Des méthodes d'analyses multi-résidus ont été mises au point, avec des limites de quantification basses (<1,5 ng g<sup>-1</sup>) et sur de faibles prises d'essai (2,5 g à 50 mg).

HERBICIDES	FONGICIDES	INSECTICIDES
Acetochlor	Boscalid	Bifenthrin
Aclonifen	Cyproconazole	Cypermethrin
Clomazone	Epoxiconazole	Deltamethrin
Cloquintocet-mexyl	Fenpropidin	Imidacloprid
Cycloxydim	Fluoxastrobin	Lambda-cyhalothrin
Diflufenican	Metconazole	Pirimicarb
Dimethachlor	Metrafenone	Tau-fluvalinate
Metazachlor	Prochloraz	Thiacloprid
Napropamide	Propiconazole	Thiamethoxam
Pendimethalin	Pyraclostrobin	
Pyroxsulam		
S-metolachlor		

Tableau 1 : Liste des 31 pesticides mesurés dans le projet RESCAPE, en fonction de leur usage.

## Exposition aux pesticides des sols et des organismes non-cibles

Les analyses de résidus de pesticides nous ont permis de relever trois résultats majeurs :

- 1) Une ubiquité de l'exposition des sols et de la faune, puisque des échantillons positifs avec au moins une molécule détectée ont été trouvés dans tous les types d'habitats (céréales mais aussi prairies et haies) en agriculture conventionnelle et en agriculture biologique (Figure 1).
- 2) Une exposition à des cocktails de molécules impliquant au moins un insecticide, un fongicide et un herbicide. En effet, les analyses réalisées sur les sols et sur l'ensemble des organismes vivants étudiés dans ce projet s'accordent à montrer une contamination quasi-systématique par l'insecticide imidaclopride, l'herbicide diflufenican et le fongicide époxiconazole (Figure 1).

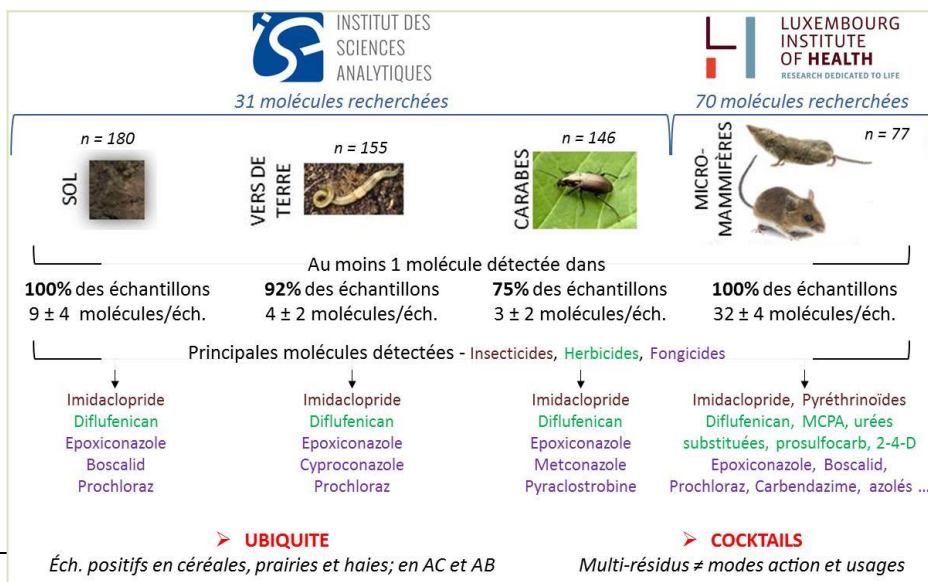


Figure 1 : Synthèse des résultats sur les résidus de pesticides dans les sols et la faune.

3) Les sols et les organismes dans zones traitées par les pesticides (ex. cultures céréalières et prairies temporaires conduites en agriculture conventionnelle) sont les plus contaminés (plus grand nombre de molécules et de plus fortes concentrations). Même si les zones non traitées ne sont pas exemptes de pesticides, les parcelles en AB et les habitats semi-naturels (ex. prairies et haies) sont dans la plupart des cas moins contaminés que les parcelles « cibles » des pesticides. Ainsi, ces zones pourraient servir de refuges aux organismes dans les paysages agricoles.

### De l'exposition aux effets : risques potentiels pour la faune non-cible

Puisque les liens entre concentrations internes et effets sont mal connus en raison du manque de données, nous avons cherché ici à évaluer les risques potentiels pour les organismes sur la base des concentrations dans les sols. Les concentrations environnementales prédites dans les sols (Predicted Environmental Concentrations; PEC) sont dépassées pour 5 à 11 molécules (ce qui concerne entre 8% et 94% échantillons) en fonction du type de PEC considérées (par exemple initiale après traitement, long terme ou plateau). Les principales molécules atteignant des valeurs supérieures aux PEC sont le boscalid, le cyproconazole, l'époxiconazole, le prochloraz (fongicides), le diflufenican, et le pyroxsulam (herbicides). Les valeurs mesurées dans les sols sont au-dessus des seuils toxiques pour la reproduction des vers de terre (espèce *Eisenia fetida*) pour le boscalid ou l'époxiconazole pour 11% des échantillons de sol. Il est à noter que les valeurs de PEC ou de seuils toxiques ne sont pas disponibles pour l'ensemble des molécules étudiées, ce qui peut minimiser l'évaluation du risque pour un certain nombre de composés. De plus, les seuils toxiques concernent des tests pour une molécule seule, alors que les organismes sont exposés à des molécules en mélange qui pourraient avoir des effets additifs ou synergétiques. Cela implique une sous-estimation de l'évaluation du risque basée sur les seuils fournis dans les documents d'homologation. Ainsi, sur la base des concentrations mesurées dans les sols et des données disponibles dans la littérature ou les documents d'homologation, les résultats mettent en lumière un risque potentiel lié aux pesticides pour l'environnement.

### Contacts

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Projet financé par le Ministère de l'Agriculture et de l'Alimentation et le Ministère de la Transition Écologique et Solidaire, avec le soutien financier de l'appel à projets de l'Agence Française pour la Biodiversité « Résistance et Pesticides », avec les redevances de pollution diffuse issues du Plan Ecophyto à travers l'agence nationale ONEMA. Le projet a également bénéficié du soutien de l'initiative RECOTOX (<https://www.recotox.eu/>).

**Pour en savoir plus**

Daniele, G., Lafay, F., Pelosi, C., Fritsch, C. & Vulliet, E. Development of a method for the simultaneous determination of multi-class pesticides in earthworms by liquid chromatography coupled to tandem electrospray mass spectrometry. *Analytical and Bioanalytical Chemistry* 410, 5009–5018 (2018).

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-

## ERA / PUBLICATIONS SCIENTIFIQUES

### Effects of pollution on marine organisms

**Authors:** Mearns AJ, Bissell M, Morrison AM, Rempel-Hester MA, Arthur C, Rutherford N

**Source:** WATER ENVIRONMENT RESEARCH 2019, DOI: [10.1002/wer.1218](https://doi.org/10.1002/wer.1218)

**Abstract:** This review covers selected 2018 articles on the biological effects of pollutants, including human physical disturbances, on marine and estuarine plants, animals, ecosystems, and habitats. The review, based largely on journal articles, covers field and laboratory measurement activities (bioaccumulation of contaminants, field assessment surveys, toxicity testing, and biomarkers) as well as pollution issues of current interest including endocrine disrupters, emerging contaminants, wastewater discharges, marine debris, dredging, and disposal. Special emphasis is placed on effects of oil spills and marine debris due largely to the 2010 Deepwater Horizon oil blowout in the Gulf of Mexico and proliferation of data on the assimilation and effects of marine debris. (...) The focus of this review is on effects, not on pollutant sources, chemistry, fate, or transport.

[Accès au document](#)

### Contaminant Concentrations in Sediments, Aquatic Invertebrates, and Fish in Proximity to Rail Tracks Used for Coal Transport in the Pacific Northwest (USA): A Baseline Assessment

**Authors:** Hapke WB, Black RW, Eagles-Smith CA, Smith CD, Johnson L, Ylitalo GM, Boyd D, Davis JW, Eldridge SLC, Nilsen EB

**Source:** ARCHIVES OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY 2019, DOI: [10.1007/s00244-019-00667-0](https://doi.org/10.1007/s00244-019-00667-0)

**Abstract:** Railway transport of coal poses an environmental risk, because coal dust contains polycyclic aromatic hydrocarbons (PAHs), mercury, and other trace metals. (...) Baseline information is needed on current distributions, levels, and spatial patterns of coal dust-derived contaminants in habitats and organisms adjacent to existing coal transport lines. To that end, we collected aquatic surface sediments, aquatic insects, and juvenile fish in 2014 and 2015 from Horsethief Lake State Park and Steigerwald National Wildlife Refuge, both located in Washington state close to the rail line and within the Columbia River Gorge National Scenic Area. Two subsites in each area were selected: one close to the rail line and one far from the rail line. Detected PAH concentrations were relatively low compared with those measured at more urbanized areas(...) Trace metal concentrations were only slightly higher than background concentrations, but a few of the more sensitive benchmarks were exceeded, (...) Chinook salmon and yellow perch showed lower total mercury body burdens than other species, but PAH body burdens did not differ significantly among species. (...).

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## ERA / PUBLICATIONS SCIENTIFIQUES / ECOTOXICOLOGIE SPATIALE

### Mapping Geospatial Processes Affecting the Environmental Fate of Agricultural Pesticides in Africa

**Authors:** Hendriks C.M., Gibson H.S., Trett A., Python A., Weiss D. J., Vrieling A... & Moyes C.L.

**Source:** International journal of environmental research and public health 16(19):3523, 2019. DOI: [10.3390/ijerph16193523](https://doi.org/10.3390/ijerph16193523)

**Abstract:** The aim of this study was to identify African environments that are vulnerable to the accumulation of pesticides by mapping geospatial processes affecting pesticide fate. The study modelled processes associated with the environmental fate of agricultural pesticides using publicly available geospatial datasets. Key geospatial processes affecting the environmental fate of agricultural pesticides were selected after a review of pesticide fate models and maps for leaching, surface runoff, sedimentation, soil storage and filtering capacity, and volatilization were created. The potential and limitations of these maps are discussed. We then compiled a database of studies that measured pesticide residues in Africa. Despite the need for more in-situ data on pesticide residues and application, this study provides a first spatial overview of key processes affecting pesticide fate that can be used to identify areas potentially vulnerable to pesticide accumulation.

[Accès au document](#)

## Pesticide residues in beehive matrices are dependent on collection time and matrix type but independent of proportion of foraged oilseed rape and agricultural land in foraging territory

**Authors:** Raimets R., Bontšutšnaja A., Bartkevics V., Pugajeva I., Kaart T., Puusepp L... & Karise R.

**Source:** Chemosphere 238:124555, 2020, DOI: [10.1016/j.chemosphere.2019.124555](https://doi.org/10.1016/j.chemosphere.2019.124555)

**Abstract:** Pesticide residues in bee products is still a major issue. However, the relations to botanical source and land use characteristics are not clear. The aim of our study was to clarify whether different beehive matrices contain similar pesticide residues, and how these are correlated with forage preferences and land use types in foraging areas. We tested bee-collected pollen, beebread, honey, nurse bees and honey

bee larvae for the presence of concurrently used agricultural pesticides in Estonia.

We saw that different beehive matrices contained various types of pesticide residues in different proportions: pollen and beebread tended to contain more insecticides and fungicides, whereas herbicides represented the primary contaminant in honey. The variations were related to collection year and time but were not related to crops as basic forage resource nor the land use type. We found few positive correlations between amount of pesticides and proportion of pollen from any particular plant family. None of these correlations were related to any land-use type. We conclude that pesticide residues in different honey bee colony components vary largely in amount and composition. The occurrence rate of pesticide residues was not linked to any particular crop.

[Accès au document](#)

## A Probabilistic Co-Occurrence Approach for Estimating Likelihood of Spatial Overlap Between Listed Species Distribution and Pesticide Use Patterns

**Authors:** Richardson L., Bang J., Katherine B., Dunne J., Winchell M., Brain R. A... & Feken M.

**Source:** Integrated environmental assessment and management 15(6):936-947, 2019, DOI: [10.1002/ieam.4191](https://doi.org/10.1002/ieam.4191)

**Abstract:** Characterizing potential spatial overlap between federally threatened and endangered ("listed") species distributions and registered pesticide use patterns is important for accurate risk assessment of threatened and endangered species. Because accurate range information for such rare species is often limited and agricultural pesticide use patterns are dynamic, simple spatial co-occurrence methods may overestimate or underestimate overlap and result in decisions that benefit neither listed species nor the regulatory process. Here, we demonstrate a new method of co-occurrence analysis that employs probability theory to estimate spatial distribution of rare species populations and areas of pesticide use to



determine the likelihood of potential exposure. Specifically, we 1) describe a probabilistic method to estimate pesticide use based on crop production patterns; 2) construct species distribution models for 2 listed insect species whose ranges were previously incompletely described, the rusty-patched bumble bee (*Bombus affinis*) and the Poweshiek skipperling (*Oarisma poweshiek*); and 3) develop a probabilistic co-occurrence methodology and assessment framework. Integrating both probabilistic assessments and focusing on USFWS priority management areas, we demonstrate that spatial overlap (i.e., potential for exposure) is not deterministic but instead a function of both species distribution and land use patterns. Our work serves as a framework to enhance the accuracy and efficiency of threatened and endangered species assessments using a data-driven likelihood analysis of species co-occurrence.

[Accès au document](#)

## An Evaluation of the BEEHAVE Model Using Honey Bee Field Study Data: Insights and Recommendations

**Authors:** Agatz A, Kuhl R, Miles M, Schad T, Preuss TG

**Source:** ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY 38(11):2535-2545, 2019, DOI: [10.1002/etc.4547](https://doi.org/10.1002/etc.4547)

**Abstract:** The BEEHAVE model, and its submodels, is the first model framework attempting to link 2 processes vital for the assessment of bee colonies: the within-hive dynamics for honey bee colonies and bee foraging in heterogeneous and dynamic landscapes. We use empirical data from a honey bee field study to conduct a model evaluation using the control data set. Simultaneously, we are testing several model setups for the interlinkage between the within-hive dynamics and the landscape foraging module. Overall, predictions of beehive dynamics fit observations made in the field. We show that starting conditions of a colony drive the simulated colony dynamics almost entirely within the first few weeks, whereas the impact is increasingly substituted by the impact of foraging activity.

Common among field studies is that data availability for hive observations and landscape characterizations is focused on the proportionally short exposure phase (i.e., the phase where colony starting conditions drive the colony dynamics) in comparison to the postexposure phase that lasts several months. It is vital to redistribute experimental efforts toward more equal data acquisition throughout the experiment to assess the suitability of using BEEHAVE for the prediction of bee colony overwintering survival.

[Accès au document](#)

## Assessing the vulnerability of groundwater resources in semiarid lands of central Argentina

**Authors:** Montoya J.C., Porfiri C., Roberto Z.E., & Viglizzo E.F

**Source:** Sustainable Water Resources Management 5(4):1419-1434, 2019. DOI: [10.1007/s40899-018-0246-4](https://doi.org/10.1007/s40899-018-0246-4)

**Abstract:** Groundwater resources in semiarid lands of central Argentina are currently threatened by contamination from agricultural pesticides. The objectives of the present work were: (a) to estimate groundwater recharge on a monthly basis to identify periods of high susceptibility of the aquifers to be polluted, (b) to assess groundwater vulnerability to pollution using the Generic and Pesticides DRASTIC GIS-based model for each recharge month previously identified, (c) to quantify the presence of atrazine, imazapyr, glyphosate, and its metabolite AMPA in groundwater, and (d) to check the application of the DRASTIC model in the semiarid lands of central Argentina. The six resultant vulnerability maps revealed that groundwater is under “high-to-moderate” risk of pollution in the study area. About 47 and 88% of the total area is highly vulnerable, according to the Generic and Pesticides DRASTIC maps, respectively. Potential pollution of groundwater was conditioned by the spatial variability of geomorphological features, and influenced by others variables (...).

[Accès au document](#)

## Residential sources of pesticide exposure during pregnancy and the risks of hypospadias and cryptorchidism: the French ELFE birth cohort

**Authors:** Cognez N., Warembourg C., Zaros C., Metten M.A., Bouvier G., Garlantézec R... & Chevrier C

**Source:** Occupational and environmental medicine 76(9):672-679, 2019, DOI: [10.1136/oemed-2019-105801](https://doi.org/10.1136/oemed-2019-105801)

**Abstract:** Objectives: Little is known about the possible impact of non-occupational pesticide exposure on fetal and child development in the general population. Using data from a nationwide birth cohort, we aimed to assess the association between residential sources of prenatal pesticide exposure and the risks of hypospadias and cryptorchidism.

**Methods:** Of the 9281 boys in ELFE (French Longitudinal Study of Children), the national French birth cohort, 53 were diagnosed with hypospadias and 137 with cryptorchidism. We assessed residential exposure sources from self-reported domestic use of eight types of pesticide products and French spatial land use data with acreage within a 1000 m radius around each family's home for 21 crop types. We used logistic regression modelling, adjusted for possible confounders that included estimated dietary pesticide intake. Multiple imputations were used to handle missing data.

**Results:** An increased risk of hypospadias was associated with domestic pesticide use against fleas and ticks; no associations were found between cryptorchidism and any domestic pesticide use. Slightly increased risks of cryptorchidism were observed in association with all crop acreages near homes during pregnancy, especially for orchards, and no association was observed for hypospadias.

**Conclusions:** Our results suggest a possible increased risk of hypospadias associated with prenatal use of some domestic pesticide products, likely to contain insecticides, and of cryptorchidism with nearby orchard acreage (crops repeatedly sprayed with pesticides).

[Accès au document](#)

## Contaminant Concentrations in Sediments, Aquatic Invertebrates, and Fish in Proximity to Rail Tracks Used for Coal Transport in the Pacific Northwest (USA): A Baseline Assessment

**Authors:** Hapke WB, Black RW, Eagles-Smith CA, Smith CD, Johnson L, Ylitalo GM, Boyd D, Davis, JW, Eldridge SLC, Nilsen EB

**Source:** ARCHIVES OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY 2019, DOI: [10.1007/s00244-019-00667-0](https://doi.org/10.1007/s00244-019-00667-0)

**Abstract:** Railway transport of coal poses an environmental risk, because coal dust contains polycyclic aromatic hydrocarbons (PAHs), mercury, and other trace metals. (...) Baseline information is needed on current distributions, levels, and spatial patterns of coal dust-derived contaminants in habitats and organisms adjacent to existing coal transport lines. To that end, we collected aquatic surface sediments, aquatic insects, and juvenile fish in 2014 and 2015 from Horsethief Lake State Park and Steigerwald National Wildlife Refuge, both located in Washington state close to the rail line and within the Columbia River Gorge National Scenic Area. Two subsites in each area were selected: one close to the rail line and one far from the rail line. Detected PAH concentrations were relatively low compared with those measured at more urbanized areas (...) Trace metal concentrations were only slightly higher than background concentrations, but a few of the more sensitive benchmarks were exceeded, (...) Chinook salmon and yellow perch showed lower total mercury body burdens than other species, but PAH body burdens did not differ significantly among species. (...).

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## ERA / PUBLICATIONS SCIENTIFIQUES / MICROBIOLOGIE ET PESTICIDES

### Fungicide and Bactericide Effects on Carbon and Nitrogen Cycling in Soils: A Meta-Analysis

**Authors:** Ullah MR, Dijkstra FA

**Source:** SOIL SYSTEMS 3(2):23, 2019, DOI: 10.3390/soilsystems3020023

**Abstract:** Fungi and bacteria play a central role in the cycling of carbon (C) and nitrogen (N), which has been frequently assessed by manipulating their abundance in soil with the application of fungicides and bactericides. We conducted a meta-analysis using 61 publications to investigate whether fungicides and bactericides have distinct effects on soil C- and N- cycling, and how they vary with land type and soil properties. Most fungicides and bactericides had significant negative effects on microbial biomass C and N. However, they had mixed effects on soil respiration, N pools, and transformation processes, varying strongly with the type of fungicide and bactericide. Available NO<sub>3</sub><sup>-</sup> was lightly affected, while N<sub>2</sub>O emission was reduced by most biocides. The application of fungicides had neutral effects on respiration, NH<sub>4</sub><sup>+</sup>, and ammonification in agro-ecosystems, but positive effects in forests. Effect sizes of available NO<sub>3</sub><sup>-</sup> and nitrification in response to bactericides were sensitive to soil pH and C content. Our results suggest that most fungicides and bactericides inhibit microbial growth, but that they have mixed effects on respiration and N cycling. Biocides need to be carefully evaluated for unintentional side effects before they are used in assessing the role of fungi and bacteria for C- and N- cycling.

[Accès au document](#)

### Complete Genome Sequence of *Cellulomonas* sp. Strain Y8, a High-GC-Content Plasmid-Free Heavy Metal-Resistant Bacterium Isolated from Farmland Soil

**Authors:** Chen JH, Xing C, Zheng X., Li XF

**Source:** MICROBIOLOGY RESOURCE ANNOUNCEMENTS 8(46):UNSP e01066-19, 2019, DOI: 10.1128/MRA.01066-19

**Abstract:** We report the complete genome sequence of cadmium-resistant *Cellulomonas* sp. strain Y8, isolated from farmland soil. The 4.5-Mbp genome contains 4,074 genes, with an approximate GC content of 75%. This work might help in understanding how strain Y8 survives under heavy metal stress.

[Accès au document](#)

### Soil organic matter prevails over heavy metal pollution and vegetation as a factor shaping soil microbial communities at historical Zn-Pb mining sites

**Authors:** Stefanowicz AM, Kapusta P, Zubek S, Stanek M, Woch MW

**Source:** CHEMOSPHERE 240:UNSP 124922, 2019, DOI: 10.1015/j.chemosphere.2019.124922

**Abstract:** This study examined the effects of soil heavy metals, macronutrients, texture and pH as well as plant species richness and composition on soil respiration, enzymatic activity, microbial biomass, metabolic quotient (qCO<sub>2</sub>) and arbuscular mycorrhizal fungi (AMF) at sites of historical Zn-Pb mining. The study was conducted both on a large scale (65 heaps scattered over the area of 750 km<sup>2</sup>) and on a small scale (25 plots along two 48 m transects extending from heaps to adjacent fallow fields). Total concentrations of metals exceeded 400 (Cd), 20,000 (Pb) and 80,000 (Zn) mg kg<sup>-1</sup> at the most polluted sites. Although they decreased along the heap-fallow direction, they still



remained above environmental standards in fallow soils. In contrast, some soluble metal forms increased with the increasing distance from heaps. Soil organic matter had the strongest positive effect on most microbial parameters. Total and/or available heavy metals exhibited significant negative effects on microbial biomass, enzymatic activity and AMF, and a positive effect on qCO<sub>2</sub>. Organic matter alleviated negative effects of heavy metals on microorganisms; they were not observed where the increase in the contamination was accompanied by the increase in organic matter content. Plant species richness affected positively enzymatic activity and mycorrhization level. Plant species composition possibly contributed to the formation of soil microbial communities, but its effect was entangled in that of heavy metals as plant communities changed along pollution gradients (from metal-tolerant grasslands dominated by *Festuca ovina* to calcareous grasslands and ruderal communities at less polluted sites). (C) 2019 Elsevier Ltd. All rights reserved.

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## A YajQ-LysR-like, cyclic di-GMP-dependent system regulating biosynthesis of an antifungal antibiotic in a crop-protecting bacterium, *Lysobacter enzymogenes*

**Authors:** Han S, Shen DY, Wang YC, Chou SH, Gomelsky M, Gao YG, Qian GL

**Source:** MOLECULAR PLANT PATHOLOGY 2019,

DOI: 10.1111/mp.12890 Abstract

**Abstract:** YajQ, a binding protein of the universal bacterial second messenger cyclic di-GMP (c-di-GMP), affects virulence in several bacterial pathogens, including *Xanthomonas campestris*. In this bacterium, YajQ interacts with the transcription factor LysR. Upon c-di-GMP binding, the whole c-di-GMP-YajQ-LysR complex is found to dissociate from DNA, resulting in virulence gene regulation. Here, we identify a YajQ-LysR-like system in the bacterial biocontrol agent *Lysobacter enzymogenes* OH11 that secretes an antifungal antibiotic, heat-

stable antifungal factor (HSAF) against crop fungal pathogens. We show that the YajQ homologue, CdgL (c-di-GMP receptor interacting with LysR) affects expression of the HSAF biosynthesis operon by interacting with the transcription activator LysR. The CdgL-LysR interaction enhances the apparent affinity of LysR to the promoter region upstream of the HSAF biosynthesis operon, which increases operon expression. Unlike the homologues CdgL (YajQ)-LysR system in *X. campestris*, we show that c-di-GMP binding to CdgL seems to weaken CdgL-LysR interactions and promote the release of CdgL from the LysR-DNA complex, which leads to decreased expression. Together, this study takes the YajQ-LysR-like system from bacterial pathogens to a crop-protecting bacterium that is able to regulate antifungal HSAF biosynthesis via disassembly of the c-di-GMP receptor-transcription activator complex.

[Accès au document](#)

## Influence of chlorothalonil and carbendazim fungicides on the transformation processes of urea nitrogen and related microbial populations in soil

**Authors:** Ding H, Zheng XZ, Zhang J, Zhang YS, Yu JH, Chen DL

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH 26(30):31133-31141, 2019, DOI: 10.1007/s11356-019-06213-8

**Abstract:** To improve crop yielding, a large amount of fungicides is continuously applied during the agricultural management, while the effects of fungicides residues on microbial processing of N in soil need further study. In the present study, two broad spectrum fungicides, chlorothalonil and carbendazim, were applied at the rates of 5, 10, and 50 mg of active ingredient (A.I.) per kg of dry soil combined with urea with 200 mg of N per kg of dry soil under laboratory conditions. The results showed that chlorothalonil obviously retarded the hydrolysis of urea, whereas carbendazim accelerated it in 4 days after the treatments ( $P \leq 0.05$ ). Chlorothalonil reduced denitrification, nitrification, and N<sub>2</sub>O production ( $P \leq 0.05$ ),

but not for carbendazim. Further analysis on N-associated microbial communities showed chlorothalonil reduced nitrosomonas populations at the rates of 10 and 50 mg of A.I. per kg and autotrophic nitrifying bacterial populations at three application rates ( $P \leq 0.05$ ), but Carbendazim decreased nitrosomonas populations only at the rate of 50 mg of A.I. per kg and also autotrophic nitrifying bacterial populations at three rates and heterotrophic nitrifying bacterial populations at the rates of 10 and 50 mg of A.I. per kg. The reasons for this difference were ascribed to arrest urea hydrolysis and impediment of denitrification and nitrification processes by chlorothalonil. In conclusion, to improve crop yielding, chlorothalonil might be more beneficial to conserve soil N by improving soil N fertility, compared with carbendazim.

[Accès au document](#)

## Environmental Fate of Two Organophosphorus Insecticides in Soil Microcosms under Mediterranean Conditions and Their Effect on Soil Microbial Communities

**Authors:** Ben Salem A, Chaabane H, Caboni P, Angioni A, Salghi R, Fattouch S

**Source:** SOIL & SEDIMENT CONTAMINATION 28(3):285-303, 2019, DOI: 10.1080/15320383.2018.1564733

**Abstract:** Assessing dissipation is an integral part of determining pesticide risk. The adsorption and dissipation characteristics of two model insecticides, chlorpyrifos (CHP) and dimethoate (DMT), in a Mediterranean soil were investigated in order to evaluate soil microbial toxicity and to study their soil bioavailability for the purpose of managing pesticide residue with potential bioremediation of contaminated soil. The aim of this study was also to define novel methods for assessing the ecotoxicity of CHP and DMT on microorganisms in the soil. Koc values ranged between 33420-91601 cm<sup>3</sup>/g and 129-184 cm<sup>3</sup>/g for CHP and DMT, respectively, indicating that the former is characterized by a strong adsorption affinity, whereas, the latter

has a weaker one. In the dissipation study, the half-life ( $T_{1/2}$ ) of CHP in top soil was 11.55 days; whereas, when dissipation was studied in the same soil sterilized, the half-life was 13.86 days, showing a relatively important abiotic degradation effect. For DMT, however,  $T_{1/2}$  was 17.32 days and 13.86 days in sterilized soil and non-sterilized soil, respectively, illustrating partial biotic degradation. In terms of leaching behavior, the groundwater ubiquity scores calculated for CHP and DMT were 0.85 and 1.95, respectively, indicating that CHP is a non-leacher, while DMT can be considered a transition insecticide.

[Accès au document](#)

## Investigation of the Effects of Pesticides and Wood Vinegar on Some Microbial and Physico-chemical Soil Parameters

**Authors:** Koc I, Yardim RN

**Source:** KSU TARIM VE DOGA DERGISI-KSU JOURNAL OF AGRICULTURE AND NATURE 22(6) :896-904, 2019, DOI: 10.18016/ksutarimdog.vi.550376

**Abstract:** This study was conducted to determine the effects of pesticides and wood vinegar on microorganisms including fungi and bacteria. Soil pH and EC values in wheat agroecosystem. The study was designed as a randomized block field trial with four repetitions in 2014-2015 and 2015-2016. Wood vinegar and pesticides were applied via a backpack sprayer. The treatments consisted of pesticide, wood vinegar (0.5, 1, 2, 3, 4 and 5% ml) which equate to pesticide treatment, and the control (only tap water) treatments. *Aspergillus niger*, *Penicillium digitatum* and *Penicillium italicum* microfungi species were isolated from experimental soil samples. Repeated measurement variance analysis was performed to determine the effect of pesticide and wood vinegar treatments on the parameters investigated. Results of the analyses indicated that the treatments did not significantly affect the determined properties ( $P > 0.612$ ), whereas the differences between the pre and post treatment were significant ( $P = 0.000$ ). It can be concluded that the pesticide and wood vinegar

used did not have a negative effect on the determined parameters.

[Accès au document](#)

## Pharmaceutical exposure changed antibiotic resistance genes and bacterial communities in soil-surface- and overhead-irrigated greenhouse lettuce

**Authors:** Shen Y, Stedtfeld R, Guo X, Bhalsod G, Jeon S, Tiedje J, Li H, Zhang W

**Source:** ENVIRONMENT INTERNATIONAL 131, UNSP 105031, 2019, DOI: 10.1016/j.envint.2019.105031

**Abstract:** New classes of emerging contaminants such as pharmaceuticals, antibiotic resistant bacteria (ARB), and antibiotic resistance genes (ARGs) have received increasing attention due to rapid increases of their abundance in agroecosystems. As food consumption is a direct exposure pathway of pharmaceuticals, ARB, and ARGs to humans, it is important to understand changes of bacterial communities and ARG profiles in food crops produced with contaminated soils and waters. This study examined the level and type of ARGs and bacterial community composition in soil, and lettuce shoots and roots under soil-surface or overhead irrigation with pharmaceuticals-contaminated water, using high throughput qPCR and 16S rRNA amplicon sequencing techniques, respectively. In total 52 ARG subtypes were detected in the soil, lettuce shoot and root samples, with mobile genetic elements (MGEs), and macrolide-lincosamide-streptogramin B (MLSB) and multidrug resistance (MDR) genes as dominant types. The overall abundance and diversity of ARGs and bacteria associated with lettuce shoots under soilsurface irrigation were lower than those under overhead irrigation, indicating soil-surface irrigation may have lower risks of producing food crops with high abundance of ARGs. ARG profiles and bacterial communities were sensitive to pharmaceutical exposure, but no consistent patterns of changes were observed. MGE intl1 was consistently more abundant with pharmaceutical exposure than in the absence of pharmaceuticals. Pharmaceutical

exposure enriched Proteobacteria (specifically Methylophilaceae) and decreased bacterial alpha diversity. Finally, there were significant interplays among bacteria community, antibiotic concentrations, and ARG abundance possibly involving hotspots including Sphingomonadaceae, Pirellulaceae, and Chitinophagaceae, MGEs (intl1 and tnpA\_1) and MDR genes (mexF and oprJ).

[Accès au document](#)

## Detection of antibiotic resistance genes in culturable bacteria isolated from soils around mines in Hamedan, Iran

**Authors:** Younessi N, Sinemani AAS, Khodakaramian G

**Source:** INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY 16(12):7643-7652, 2019, DOI: 10.1007/s13762-018-02178-2

**Abstract:** Antibiotic resistance genes are considered to be emerging contaminants. Considering the limited number of papers on detection of antibiotic resistance genes in metal-polluted soils of Iran and due to the fact that nonclinical strains carrying resistance determinants can be the origin of resistance genes in clinical isolates, the present study was conducted to detect some resistance genes (i.e., bla(TEM), vanA, tetB, strA, and aac(3)-II) in the most prevalent culturable bacteria isolated from soils around mines. A total of 70 species of Pseudomonas, Azotobacter, Enterobacter, and Bacillus were isolated from soils under different land uses. Polymerase chain reaction was used to detect resistance genes in the isolates. The bla(TEM) gene was the most abundant gene detected in the isolates (45.71%). The number of Azotobacter, Pseudomonas, and Enterobacter isolates containing bla(TEM) was higher in the agricultural and pasture soils than in the mining waste soils (28.57%, 57.14%, and 20%, respectively), but the pasture and mining waste soils proved to harbor more Bacillus species containing bla(TEM) compared to the agricultural soils (64.28%, 50%, and 42.86%, respectively). The vanA gene was found in 5.71% of all the strains, and only one Pseudomonas isolates harbored aac(3)-II. The tetB and strA genes were

not detected in any of the isolates. More than 77% of the isolates were phenotypically resistant to beta-lactams, and 28.57%, 40%, and 31.43% of them were resistant to streptomycin, vancomycin, and tetracyclines, respectively. Overall, the high number of bacteria containing at least one resistance gene isolated from the samples indicated the persistence of environmental reservoirs of resistance genes in the metal-polluted soils.

[Accès au document](#)

## Soil tillage and herbicide applications in pea: arbuscular mycorrhizal fungi, plant growth and nutrient concentration respond differently

**Authors:** Rosner K, Hage-Ahmed K, Bodner G, Steinkellner S

**Source:** ARCHIVES OF AGRONOMY AND SOIL SCIENCE 2019, DOI: 10.1080/03650340.2019.1688788

**Abstract:** We conducted a field- and pot experiment with peas to investigate the impact of soil tillage and herbicide applications on arbuscular mycorrhizal fungi (AMF), plant growth, phosphorus concentrations, C:N ratio in plants and yield. The field study was carried out in a long-term soil tillage experiment where four tillage treatments have been compared. Field soil from the experimental plots were used for the pot experiment. AMF were not affected by herbicide (MCPB) application, neither in the field nor in the pot experiments. However, AMF root colonization was enhanced by reduced tillage, minimum tillage and no-tillage practices, compared to conventional tillage. In the pot experiment, plant growth and nodulation of pea roots was negatively affected by the high herbicide dosage. In the field experiment neither tillage nor herbicide treatment exert specific effects on root growth parameters, phosphorus concentrations, C:N ratio and plant dry matter. This work demonstrates that an appropriate herbicide usage coupled with conservation soil tillage techniques can favour AMF root colonization and benefit plant growth.

[Accès au document](#)

## Azoxystrobin impact on a selection of soil bacterial resistance to aminoglycoside antibiotics

**Authors:** Aleksova M, Kenarova A, Boteva S, Radeva G

**Source:** COMPTES RENDUS DE L ACADEMIE BULGARE DES SCIENCES, 2019, DOI:10.7546/CRABS.2019.10.08

**Abstract:** Fungicides have application in agriculture and still effectively eliminate fungal pathogens of crops. However, fungicides may dissipate to various elements of the environment, such as a soil, and may exert a selective pressure on soil microorganisms, leading to an increase in the prevalence of resistant to antibiotics forms. Considering this problem, the aim of this study was to investigate the power of fungicide azoxystrobin (Az) to select resistant to aminoglycosides (streptomycin, kanamycin and gentamycin) soil bacterial communities. The investigation was performed in soil mesocosms (loamy sand (LS) and clay loam (CL) soils) contaminated with increasing Az doses (0.28-28.93 mg/kg). The selective power of fungicide was evaluated by short-term growing test of soil bacteria in the presence of single aminoglycoside antibiotic (AmGA), and calculating the effective dose, which reduces bacterial growth by 50% (EC50). The results demonstrated Az selection of resistant to AmGAs bacteria even at the lowest (field recommended) fungicide dose. The rate of antibiotic resistance selection was dependent on soil properties, Az dose and time of exposure. The selective power of Az was more effective in LSs than CLs, where the stimulated antibiotic resistance to streptomycin was four times higher than the background one. The results of the study demonstrated that application of Az for crop protection might be a possible route for antibiotic resistance transmission to humans.

[Accès au document](#)



## Remediation of metalliferous soils through the heavy metal resistant plant growth promoting bacteria: Paradigms and prospects

**Author:** Ahemad M

**Source:** ARABIAN JOURNAL OF CHEMISTRY, 2019, DOI:10.1016/j.arabjc.2014.11.020

**Abstract:** Various industrial, agricultural and military operations have released huge amounts of toxic heavy metals into the environment with deleterious effects on soils, water and air. Under metal stress, soil microorganisms including plant growth promoting bacteria (PGPB) have developed many strategies to evade the toxicity generated by the various heavy metals. Such metal resistant PGPB, when used as bioinoculant or biofertilizers, significantly improved the growth of plants in heavy metal contaminated/stressed soils. Application of bacteria possessing metal detoxifying traits along with plant-beneficial properties is a cost effective and environmental friendly metal bioremediation approach. This review highlights the different mechanisms of metal resistance and plant growth promotion of metal resistant PGPB as well as the recent development in exploitation of these bacteria in bioremediation of heavy metals in different agroecosystems. (C) 2014 The Author. Production and hosting by Elsevier B.V. on behalf of King Saud University.

[Accès au document](#)

## Soil organic matter prevails over heavy metal pollution and vegetation as a factor shaping soil microbial communities at historical Zn-Pb mining sites

**Authors:** Stefanowicz A.M., Kapusta P., Zubek S., Stanek M., Woch M.W.

**Source:** Chemosphere 240:124-922, 2019, DOI <https://doi.org/10.1016/j.chemosphere.2019.124922>.

This study examined the effects of soil heavy metals, macronutrients, texture and pH as well as plant species richness and composition on soil respiration, enzymatic activity, microbial biomass, metabolic quotient (qCO<sub>2</sub>) and arbuscular mycorrhizal fungi (AMF) at sites of historical Zn-Pb mining. (...) Total concentrations of metals exceeded 400 (Cd), 20,000 (Pb) and 80,000 (Zn) mg kg<sup>-1</sup> at the most polluted sites. (...) Soil organic matter had the strongest positive effect on most microbial parameters. Total and/or available heavy metals exhibited significant negative effects on microbial biomass, enzymatic activity and AMF, and a positive effect on qCO<sub>2</sub>. Organic matter alleviated negative effects of heavy metals on microorganisms (...). Plant species composition possibly contributed (...) but its effect was entangled in that of heavy metals as plant communities changed along pollution gradients.

[Accès au document](#)

## Chromium-reducing and phosphate-solubilizing *Achromobacter xylosoxidans* bacteria from the heavy metal-contaminated soil of the Brass city, Moradabad, India

**Authors:** Oves M, Khan MS, Qari HA

**Source:** INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY 16(11):6967-6984, 2019, DOI: [10.1007/s13762-019-02300-y](https://doi.org/10.1007/s13762-019-02300-y)

**Abstract:** Chromium contamination in soil and water bodies is increasing predominantly due to inappropriate discharge from industries, and it is causing severe environmental problems and soil infertility. To improve soil quality, the sustainable approach needs to identify specific microbes capable of reducing chromium toxicity, enhancing soil P pool and expressing multiple plant growth-promoting activities. In the current investigation, a microbial strain OS2 was recuperated from polluted soil and was characterized by employing biochemical and molecular methods. Bacterial strain OS2 was identified as *Achromobacter xylosoxidans* by 16S

rRNA quality sequencing, BLASTn, and phylogenetic examination. Strain OS2 survived well at high doses of heavy metals: Cr, Ni, Cu and Zn. *A. xylosoxidans* could solubilize up to 363  $\mu\text{g mL}^{-1}$  tricalcium phosphate and reduced 100  $\mu\text{g mL}^{-1}$  chromium after 24-h incubation. SEM and EDX analyses showed the highest accumulation of phosphate and binding with chromium up to 10.22 and 1.09 weight percent of total weight, respectively. *A. xylosoxidans* significantly produced IAA (26  $\mu\text{g mL}^{-1}$ ) when grown up within 100  $\mu\text{g mL}^{-1}$  chromium, as detected by HPLC. Further, strain OS2, when used as a microbial inoculant, decontaminated the chromium and concurrently improved the growth of mung bean plants while growing under metal stress conditions significantly in a sustainable manner.

[Accès au document](#)

## Macrolide- and quinolone-resistant bacteria and resistance genes as indicators of antibiotic resistance gene contamination in farmland soil with manure application

**Authors:** Wang LJ, Zhao X, Wang JH, Wang J, Zhu LS, Ge WL

**Source:** ECOLOGICAL INDICATORS 106, 2019, DOI: [10.1016/j.ecolind.2019.105456](https://doi.org/10.1016/j.ecolind.2019.105456)

**Abstract:** The appearance of antibiotic resistance bacteria and genes (ARGs) poses a great threat to agricultural ecosystems. Here, to analyze the contamination of ARGs in the farmland soil with long-term manure application, quinolone- and macrolide-resistant bacteria, eight typical ARGs and two mobile gene elements (MGEs) were assessed as indicators. Compared with soil without manure, a large number of macrolide- and quinolone-resistant bacteria and resistance genes were found in the soil fertilized with manure. The resistant bacteria rates were decreased greatly with increasing doses of antibiotics, which showed a significant dose-effect. In addition, the bacterial resistance rates of tylosin (TYL) were higher than those of enrofloxacin (ENR). Further testing of the distribution characteristics of ARGs showed that the relative concentration of *ermC* was the

highest. Moreover, significant correlations were found between the abundance of *intI1* and *qnrS*, *intI2* and *ermB*, respectively. The total contents of *ermB* and *qnrA* were positively correlated with the concentration of roxithromycin (ROX) residues, the total content of Cu and Zn as well as the cation exchange capacity (CEC) and moisture content (MC) of soil samples. Also, the abundance of *ermC* and *qnrS* was positively correlated with total and available contents of Cu and Zn, ROX residues dose and MC, OM in soils. The results of this study highlight the potential risks of antibiotics and ARGs in farmland soils.

[Accès au document](#)

## Risk assessment for and microbial community changes in Farmland soil contaminated with heavy metals and metalloids

**Authors:** Wang X, Gao P, Li DP, Liu J, Yang N, Gu WZ, He XH, Tang WZ

**Source:** ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY 185, 2019, DOI: [10.1016/j.ecoenv.2019.109685](https://doi.org/10.1016/j.ecoenv.2019.109685)

**Abstract:** Food security and human health can be seriously affected by heavy metal and metalloid (HM) pollution of soil. In this study, the risks posed by HMs and microbial community responses to HM pollution of agricultural soil in southwestern China were investigated. The C, N, P, and S (nutrients) concentrations were 12040.7-15912.7, 1298.06-1832.01, 750.91-2050.35, and 269.17-2115.52 mg/kg, respectively. The As, Cd, Cr, Cu, Hg, Ni, Pb, and Zn concentrations were 3.11-8.20, 1.85-6.56, 22.83-43.96, 11.21-23.30, 0.08-0.81, 11.02-22.97, 24.07-42.96, and 193.63-698.39 mg/kg, respectively. Interpolation analysis indicated that the nutrient and HM concentrations varied spatially rather strongly. The concentrations of all of the elements were higher in soil from the northern sampling sites than in soil from the other sites. HMs in soil were found to pose high levels of risk (RI 898.85, i.e.,  $\geq 600$ ). Cd contributed more than the other HMs to the risk assessment values (Er-Cd 293.72-1031.94), so was the most serious contaminant. Microbial

diversity decreased over time in soil with high HM concentrations (plot S2) and was lower than in soil with low HM concentrations (plot S8). The nutrient and HM concentrations correlated with the microbial community characteristics. Proteobacteria, Acidobacteria, and Chloroflexi were (in decreasing order) the dominant bacterial phyla. We speculate that these phyla may be strongly resistant to HMs. The fourth most common phylum was Actinobacteria. Bacteria in this phylum could be used as biological indicators of the HM pollution status. Soil micro-ecosystems can self-regulate. HM stress will affect the evolution of soil microorganisms and relevant functional genes. The spatiotemporal variability in the microbial community responses to HMs and the spatial analysis and ecological risk assessment results will be useful reference data for the remediation of HM-polluted soil.

[Accès au document](#)

## ERA / PUBLICATIONS SCIENTIFIQUES / PESTICIDES ET FAUNE SAUVAGE

### Species- and organ-specific responses of agri-environmental plants to residual agricultural pollutants

**Authors:** Serra A.A., Miqueau A., Ramel F., Couée I., Sulmon C., Gouesbet G.

**Source:** Science of The Total Environment 694:133-661, 2019, DOI <https://doi.org/10.1016/j.scitotenv.2019.133661>.

**Abstract:** (...) Plant communities of field margins, vegetative filter strips or rotational fallows are confronted with agricultural pollutants through residual soil contamination and/or through drift, run-off and leaching events that result from chemical applications. (...). Understanding these complex plant-pollutant interactions cannot directly rely on toxicological or agronomical approaches that focus on the effects of field-rate pesticide applications. (...) The present study deals with agri-environmental

plant species of field margins, vegetative filter strips or rotational fallows in European agricultural landscapes. Root and shoot physiological and growth responses were compared under controlled conditions that were optimally adjusted for each plant species. Contrasted responses of growth inhibition, no adverse effect or growth enhancement depended on species, organ and nature of contaminant. (...) These complex effects are discussed in terms of dynamics of agri-environmental plants (...).

[Accès au document](#)

### Anticoagulant rodenticides in Strix owls indicate widespread exposure in west coast forests

**Authors:** Wiens J.D., Dilione K.E., Eagles-Smith C.A., Herring G., Lesmeister D.B...

**Source:** Biological Conservation 238 :108-238, 2019, DOI <https://doi.org/10.1016/j.biocon.2019.108238>

**Abstract:** Exposure of nontarget wildlife to anticoagulant rodenticides (AR) is a global conservation concern (...). We used congeneric barred owls (*S. varia*) as a sentinel species to investigate whether ARs pose a threat to spotted owls and other old-forest wildlife in northern regions of the Pacific Northwest. We analyzed the liver tissue from 40 barred owls collected in Oregon and Washington and confirmed exposure to  $\geq 1$  AR compounds in 48% of the owls examined. Brodifacoum, an extremely toxic second-generation AR, was the most common compound detected (89% of positive cases), followed by bromadiolone (11%), difethialone (11%), and warfarin (5%). (...). Rather, exposure was ubiquitous, and the rates we observed in our study (38-64%) were similar or greater than that reported previously for barred owls in California (40%). Together these studies indicate widespread contamination in forested landscapes (...).

[Accès au document](#)

## Metal Exposure Risk Assessment for Tree Sparrows at Different Life Stages via Diet from a Polluted Area in Northwestern China

**Authors:** Ai S, Yang Y, Ding J, Yang W, Bai X, Bao X, Ji W, Zhang Y

**Source:** Environ Toxicol Chem 38(12):2785-2796, 2019, DOI 10.1002/etc.4576.

**Abstract:** To estimate the risk of metal (Cu, Zn, Pb, and Cd) exposure of tree sparrows through food (...), metal daily intake (MDI), metal daily intake per unit of body weight (MDIBW), and exposure risks (hazard quotient and hazard index) of tree sparrows at different life stages (...), were assessed. MDI and MDIBW s of tree sparrows from Baiyin were higher than those from Liujiaxia (control), which can be attributed to higher metal concentrations of food sources in Baiyin than those in Liujiaxia. (...) This difference is observed probably because nonphytophagous invertebrates, the predominant food fed to nestlings, possessed the highest metal concentrations. (...) In addition, the biomagnification of 4 metals through the food chain increased the health risks of tree sparrows. Exposure risks of tree sparrows to metals were comparable to those of waterfowl and raptors, even when soil metals were below threshold. Environ Toxicol Chem 2019;38:2785-2796.

[Accès au document](#)

## Combined anti-androgenic effects of mixtures of agricultural pesticides using in vitro and in silico methods

**Authors:** Ma M, Chen C, Yang G, Wang et al.

**Source:** Ecotoxicol Environ Saf 30(186):109652 2019, DOI 10.1016/j.ecoenv.2019.109652.

**Abstract:** Humans and wildlife are continuously and simultaneously exposed to various pesticides (...). Low-dose effects of combined exposure from mixtures of pesticides have been extensively reported and need to be addressed

(...). The objective of the study is to assess the individual and combined anti-androgenic effects of twelve widely used pesticides in MDA-kb2 cells. (...). The combined effects were essentially close to the predicted of concentration addition (CA) at realistically low concentrations. In addition, molecular docking simulation indicated that hydrophobic interaction and polar functional groups of the pesticides contributed to the binding energy, which might be responsible for the AR antagonism. Our findings provide a basis for defining similarly acting antagonists in the context of cumulative risk assessment for pesticides in foods.

[Accès au document](#)

## What do we know about lead contamination in wild vultures and condors ? A review of decades of research

**Authors:** Plaza P.I. & Lambertucci S.A.

**Source:** Science of The Total Environment 654(1):409-417, 2019, DOI 10.1016/j.scitotenv.2018.11.099

**Abstract:** Vultures and condors (hereafter vultures) make up one the most threatened avian guilds in the world due to a variety of human-mediated impacts and disturbances. (...) lead contamination in vulture species remains poorly studied in many regions of the world. We reviewed the existing scientific knowledge about this threat to vultures. We found 62 scientific articles studying lead contamination in vultures. 72% of these articles were from North America and Europe, (...). Most (92%) were published recently (2001-2018). Published articles included information on 13 vulture species out of a total of 23 from both the Old (9) and New World (4). Eighty-eight percent of the articles showed individuals with lead concentrations above threshold levels in some tissues sampled, with New World (Cathartidae) vultures more affected than Old World vultures (Accipitridae). The most suspected but rarely probed source of lead was lead ammunition, but other sources such as pollution or industry were also reported. (...) The effect of this contaminant on vulture demography is not well known but merits



particular attention since it may be leading to population declines in several species.

[Accès au document](#)

## Long-term impact of agricultural practices on the diversity of small mammal communities: a case study based on owl pellets

**Authors:** Balestrieri A, Gazzola A, Formenton G, Canova L

**Source:** Environ Monit Assess 191(12):725, 2019, doi: 10.1007/s10661-019-7910-5.

**Abstract:** Small mammals have been seldom used as indicators of biodiversity responses to environmental changes, probably because their long-term population trend in a given area is not easy to monitor. To assess the impact of agricultural intensification in a protected area of northern Italy, we compared the composition of its small mammal communities, as assessed in 1994-1995 and 2015-2016 by the analysis of owl pellets (...). We recorded a sharp reduction in the frequency of occurrence of shrews (...), which were replaced by generalist/anthropophilic rats (...) and house mice (...). Overall richness and diversity of the community varied only slightly, while trophic level and functional diversity indices clearly reflected the decline of the predator-level fraction of the community. (...) Our results are consistent with the general opinion that crop specialization and increasing chemical inputs reduce the diversity and abundance of invertebrate prey, with bottom-up effects on higher trophic levels.

[Accès au document](#)

## Populations Collapses in Marine Invertebrates Due to Endocrine Disruption: A Cause for Concern?

**Authors:** Fernandez MA

**Source:** Front Endocrinol 10:721, 2019, DOI 10.3389/fendo.2019.00721.

**Abstract:** In the beginning of the twenty first century, the International Program on Chemical Safety published a document entitled *Global Assessment of the State-Of-The-Science of Endocrine Disruptors*. The work indicated only weak evidence of endocrine-related effects in human populations, and in wild animal populations. This document was revised in 2012 (*State of the Science of Endocrine Disrupting Chemicals-2012*) (1). The new document and the extensive scientific evidence it provided showed clearly that ED effects could be a risk to human and wildlife health. These works, however, were focused in human health and related animal models, mainly vertebrates and particularly mammals. (...) Thus, this work is aimed to show some observations on important marine invertebrate taxa, from an ecological point of view. (...) Effects derived from endocrine disruptors in these species indicate that consumption could bring these compounds to human populations in an almost direct way, sometimes without any form of cooking or preparation. While discussing these questions, this work is also aimed to stimulate research on endocrine disruption among the invertebrate taxa that inhabited our oceans (...).

[Accès au document](#)

## Effects of pollution on marine organisms

**Authors:** Mearns, AJ; Bissell, M; Morrison, AM; Rempel-Hester, MA; Arthur, C; Rutherford, N. 2019.

**Source:** WATER ENVIRONMENT RESEARCH 2019, DOI: [10.1002/wer.1218](#)

**Abstract:** This review covers selected 2018 articles on the biological effects of pollutants, including human physical disturbances, on marine and estuarine plants, animals, ecosystems, and habitats. The review, based largely on journal articles, covers field and laboratory measurement activities (bioaccumulation of contaminants, field assessment surveys, toxicity testing, and biomarkers) as well as pollution issues of current interest including endocrine disruptors, emerging contaminants, wastewater discharges, marine debris, dredging, and disposal. Special emphasis

is placed on effects of oil spills and marine debris due largely to the 2010 Deepwater Horizon oil blowout in the Gulf of Mexico and proliferation of data on the assimilation and effects of marine debris. (...) The focus of this review is on effects, not on pollutant sources, chemistry, fate, or transport.

[Accès au document](#)

## Contaminant Concentrations in Sediments, Aquatic Invertebrates, and Fish in Proximity to Rail Tracks Used for Coal Transport in the Pacific Northwest (USA): A Baseline Assessment

**Authors:** Hapke WB, Black RW, Eagles-Smith CA, Smith CD, Johnson L, Ylitalo GM, Boyd D, Davis JW, Eldridge SLC, Nilsen EB

**Source:** ARCHIVES OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY 2019, DOI: [10.1007/s00244-019-00667-0](https://doi.org/10.1007/s00244-019-00667-0)

**Abstract:** Railway transport of coal poses an environmental risk, because coal dust contains polycyclic aromatic hydrocarbons (PAHs), mercury, and other trace metals. (...) Baseline information is needed on current distributions, levels, and spatial patterns of coal dust-derived contaminants in habitats and organisms adjacent to existing coal transport lines. To that end, we collected aquatic surface sediments, aquatic insects, and juvenile fish in 2014 and 2015 from Horsethief Lake State Park and Steigerwald National Wildlife Refuge, both located in Washington state close to the rail line and within the Columbia River Gorge National Scenic Area. Two subsites in each area were selected: one close to the rail line and one far from the rail line. Detected PAH concentrations were relatively low compared with those measured at more urbanized areas (...) Trace metal concentrations were only slightly higher than background concentrations, but a few of the more sensitive benchmarks were exceeded, (...) Chinook salmon and yellow perch showed lower total mercury body burdens than other species, but PAH body burdens did not differ significantly among species. (...).

[Accès au document](#)

## ERA / PUBLICATIONS SCIENTIFIQUES / PESTICIDES / CLIMAT et VdT / ENCHYTREIDES

Updated peer review concerning the risk to mammals and bees for the active substance indoxacarb

Following the completion of the pesticides peer review process in the context of the renewal of the approval of indoxacarb in accordance with Commission Implementing Regulation (EU) No 844/2012, EFSA identified critical areas of concern...

[Accès au document](#)

Biochemical response and vermiremediation assessment of three earthworm species (*Alma millsoni*, *Eudrilus eugeniae* and *Libyodrilus violaceus*) in soil contaminated with a glyphosate-based herbicide

The global use of glyphosate-based herbicides (GBHs) and release of glyphosate residues in soil environment have over the years been a major concern. In this study, we aim to evaluate the biochemical response and vermiremediation potenti...

[Accès au document](#)

## Growth, DNA damage and biochemical toxicity of cyantraniliprole in earthworms (*Eisenia fetida*)

Cyantraniliprole is a second-generation diamide insecticide that exhibited excellent biological efficacy against a variety of pests. To assess the toxic impact of cyantraniliprole on earthworms, the levels of reactive oxygen species (ROS...).

[Accès au document](#)

## Defense responses in earthworms (*Eisenia fetida*) exposed to low-density polyethylene microplastics in soils

The potential threats of microplastics to global health are a new problem. However, little is known about the influence of microplastics on soil organisms. Here, we investigated the effects of low-density polyethylene (LDPE, &#60; 400 mu m)...

[Accès au document](#)

## Is there a way to rate insecticides that is less detrimental to human and environmental health?

Plant protection is essential for providing high-quality food in adequate quantities. However, the use of insecticides often induces adverse effects on environment and human health. The Agency for the Environmental Protection of Tuscany...

[Accès au document](#)

## Microplastic particles reduce reproduction in the terrestrial worm *Enchytraeus crypticus* in a soil exposure

Terrestrial environments are subject to extensive pollution by plastics and, based on the slow degradation of plastics, are likely to act as long term sinks for microplastic debris. Currently the hazards of microplastics in soil...

[Accès au document](#)

## Evaluation of gene expression of different molecular biomarkers of stress response as an effect of copper exposure on the earthworm *Eisenia andrei*

The paper reports the results of a laboratory test on the bioaccumulation and toxicological effects of sub-lethal soil concentration of copper, a widely used fungicide in organic farming, on DNA damage, a critical marker increasingly use...

[Accès au document](#)

## Effects of Microplastics in Soil Ecosystems: Above and Below Ground

**Authors:** Boots B, Russell CW, Green DS

**Source:** ENVIRONMENTAL SCIENCE & TECHNOLOGY 53(19):11496-11506, 2019, DOI 10.1021/acs.est.9b03304

**Abstract:** Environmental contamination by microplastics is now considered an emerging threat to biodiversity and ecosystem functioning. (...) This study provides evidence that microplastics manufactured of HDPE and PLA, and synthetic fibers can affect the development of *L. perenne*, health of *A. rosea* and basic, but crucial soil properties, with potential further impacts on soil ecosystem functioning.

[Accès au document](#)

## A novel method for real-time monitoring of soil ecological toxicity - Detection of earthworm motion using a vibration sensor

**Authors:** Lee WC, Lee SW, Jeon JH, Jung H, Kim SO

**Source:** ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY 185, 2019, DOI 10.1016/j.ecoenv.2019.109677

**Abstract:** The aim of this study was to develop a new method, using a vibration sensor, to address the drawbacks of preexisting methods for monitoring soil ecological toxicity. (...) Based on the results, it is concluded that the proposed method cannot only overcome the shortcomings of traditional test methods using earthworms, but also enable real-time ecotoxicity in soil environments.

[Accès au document](#)

## Biological and physiological responses of *Perionyx excavatus* to abamectin

**Authors:** Ng B, Chanabun R, Panha S

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH, 26(27):28309-28318, 2019, DOI 10.1007/s11356-019-06013-0

**Abstract:** Biological and behavioral responses of the tropical earthworm *Perionyx excavatus* towards different concentrations of abamectin were evaluated. Abamectin significantly reduced the biomass and reproduction (...). Histopathological alterations can be used as a biomarker to evaluate the toxicological impact of exposure to abamectin.

[Accès au document](#)

## DROIT ET POLITIQUE DE L'ENVIRONNEMENT

### Produits phytosanitaires : le Gouvernement renforce les mesures de protection des riverains

[agriculture.gouv.fr](http://agriculture.gouv.fr) du 20/12/2019

Suite à la consultation publique lancée en septembre dernier, le Gouvernement a annoncé aujourd'hui le nouveau dispositif qui sera mis en œuvre à partir du 1er janvier 2020 pour renforcer la protection des riverains lors de l'utilisation des produits phytosanitaires : les utilisateurs sont encouragés à déployer des chartes d'engagements en concertation avec les riverains et des mesures de protection devront être mises en place, incluant des distances minimales à proximité des lieux d'habitation, en fonction des cultures et des matériels. Ces mesures seront adaptables dans le cadre des chartes.

« Nous sommes déterminés à renforcer la protection de la santé des populations riveraines de zones de traitement des cultures par des produits phytopharmaceutiques, ainsi que celle des exploitants agricoles. Le Gouvernement entend aussi faciliter le dialogue entre agriculteurs, riverains et élus locaux. Avec ce dispositif, la France se dote d'un cadre national pour la protection des riverains et devient un des premiers pays européens à instaurer de telles mesures » a déclaré Elisabeth Borne. (...)

[Accès au document](#)

### Lettre actualités phyto Ile-de-France n° 119 - novembre 2019

La lettre d'actualités phyto de novembre publiée par la DRIAAF.



[Accès au document](#)

## Lettre actualités phyto Ile-de-France - décembre 2019

La Lettre d'Information phytoSanitaire Île-de-France n° 120 est publié sur le site de la Driaaf.

[Accès au document](#)

## Bees: MEPs call for reduction in use of pesticides to save Europe's bees

[europarl.europa.eu/news](http://europarl.europa.eu/news) du 18/12/2019

MEPs call on the Commission to beef up its Pollinators Initiative and to come up with new measures to protect bees and other pollinators.

In a resolution adopted on Wednesday, Parliament welcomes the EU Pollinators Initiative, but highlights that, as it stands, it fails to protect bees and other pollinators from some of the many causes of their decline, including intensive farming, pesticides, climate change, land-use changes, loss of habitat and invasive species.

As pollinators are essential for biodiversity, agriculture and reproduction in many plant species, MEPs urge the Commission to present a full-scale action programme with sufficient resources. [...]

[Accès au document](#)

## Cultiver et Protéger Autrement - Appel à projets

La France est le premier pays producteur de produits agricoles en Europe, le premier exportateur européen et le 4e exportateur mondial de produits agricoles et

agroalimentaires. Mais la France est aussi aujourd'hui un gros consommateur de produits phytosanitaires, le deuxième en Europe, après l'Espagne. L'utilisation de ces produits est à l'origine d'une contamination des différents compartiments de l'environnement et d'impacts sur la santé humaine et celle des écosystèmes. Pour remédier à cette situation, l'Etat a lancé en 2008, suite au Grenelle de l'Environnement, le plan Ecophyto qui visait à réduire de moitié, si possible, l'usage des produits phytosanitaires, à échéance de 10 ans, objectif réaffirmé dans le cadre du nouveau plan Ecophyto II+. Le Gouvernement souhaite renforcer les moyens investis dans la Recherche pour concevoir de nouveaux systèmes de production agricole permettant de réduire significativement l'usage des pesticides et leurs effets néfastes sur l'environnement et la santé humaine.

Le Programme Prioritaire de Recherche (PPR) « Cultiver et protéger autrement » s'inscrit dans une dynamique de rupture, afin de permettre l'émergence, à l'horizon 2030-2040, d'une agriculture sans pesticides, mobilisant intensément les principes de prophylaxie et d'agroécologie. Ce PPR, doté d'une enveloppe de 30 millions d'euros, vise à financer des projets de recherche collaborative ambitieux et de longue durée (jusqu'à 6 ans), qui doivent permettre des avancées décisives en matière de développement de nouvelles pratiques et de nouveaux systèmes de production agricole n'utilisant pas de pesticides. Le programme concerne l'ensemble de l'agriculture française, de métropole et d'outremer, et l'ensemble des productions végétales, annuelles et pérennes. L'Institut national de la recherche agronomique (INRA) est chargé du pilotage scientifique de ce programme et notamment de son animation. L'Agence nationale de la recherche (ANR) a la responsabilité de la sélection, du conventionnement et du suivi des projets qui seront proposés au financement.

Un premier volet concerne des projets intégratifs de grande ampleur (jusqu'à 3 M€ d'aide), regroupant de larges consortiums et visant un objectif global de conception de nouveaux systèmes de production. L'étude des interactions plante/plante et microorganismes/plante au sein de couverts végétaux complexes, la sélection de nouvelles variétés résistantes, les méthodes de biocontrôle et leur mise en œuvre effective et durable, l'identification des leviers socioéconomiques du changement sont les thématiques constitutives des projets attendus.



Le second volet vise à renforcer les dispositifs d'épidémiologie, en les orientant vers la prophylaxie et en les renouvelant grâce aux nouvelles technologies de l'information. Il s'agit de prendre en compte, en temps réel, l'état épidémiologique des cultures, de prévoir les trajectoires d'évolution du risque et de permettre un meilleur échange de l'information entre acteurs. Les projets retenus bénéficieront d'une aide financière maximale de 1,5 M€. [...]

[Accès au document](#)

## Endocrine disruptors - Have your say on the EU legislation

[europa.eu/jrc/](http://europa.eu/jrc/) du 16/12/2019

Today the Commission launches a citizens' consultation on endocrine disruptors. How much do you know about these chemical substances? Do you have any particular concerns?

[Share your views with us by answering our survey in your own language.](#)

Cosmetics, packaging, toys, food, pesticides... EU legislation protects us from exposure to harmful substances in the products we use in our daily life, and which may also end up in the environment.

Some of these chemical substances have the potential to interfere with our hormonal (endocrine) system.

They are called endocrine disruptors.

The endocrine system is complex and includes many organs in our body.

Its disruption can contribute to a wide variety of health effects, including hormone-related cancers.

What is the EU doing to protect its citizens? [...]

[Accès au document](#)

## La réglementation des produits phytosanitaires

[agriculture.gouv.fr/](http://agriculture.gouv.fr/) du 21/11/2019

**Tout usage non autorisé est interdit !**

À chaque spécialité commerciale correspond un numéro d'autorisation de mise sur le marché

(AMM), qui figure en bonne place sur l'emballage. La réglementation limite l'application des produits phytosanitaires aux seuls usages pour lesquels ils sont homologués.

**Chaque spécialité commerciale est autorisée pour :**

- un type de culture (céréales...);
- un type de parasite (puceron...), de maladie (mildiou) ou d'adventice;
- une dose d'emploi;
- des conditions d'application.

Ces indications figurent sur l'étiquette du produit.

L'importation des produits est autorisée mais très réglementée :

Les produits phytosanitaires autorisés dans d'autres États membres de l'Union Européenne peuvent être introduits sur le territoire national pour être mis sur le marché ou utilisés. Mais à plusieurs conditions et sous réserve d'un permis de commerce parallèle délivré par l'Anses qui équivaut à une autorisation d'introduction.

[Registre des AMM de produits phyto et MFSC](#)

Les achats de produits phytosanitaires à l'étranger sont aussi concernés par la redevance pour pollutions diffuses. Les agriculteurs doivent dans ce cas transmettre chaque année à l'agence de l'eau le bilan de leurs achats à l'étranger et s'acquitter de la redevance.

**Soyez vigilants**

Parce que les phytos ne sont pas des produits comme les autres, soyez vigilants quand vous vous approvisionnez. Lorsque vous achetez des produits phytos, assurez-vous d'être dans les règles.

[Accès au document](#)

## Sortie du glyphosate : les députés demandent des précisions

[uipp.org](http://uipp.org)

Le 13 novembre, la mission d'information commune sur le suivi de la stratégie de sortie du

glyphosate a présenté un rapport d'étape. Si pour le Gouvernement, l'objectif est clair « sortir du glyphosate en 2021 », les députés insistent sur la nécessité de clarifier le message, notamment sur les situations dérogatoires, avant le mois de juin 2020. Un délai supplémentaire de deux ans devrait en effet être accordé pour les situations d'impasse technique. L'enjeu est de taille : permettre aux agriculteurs de se préparer à la transition. Il est donc important qu'ils connaissent précisément les contours, les délais prévus pour les dérogations, les alternatives envisageables ainsi que les moyens humains et financiers proposés. [...]

[Accès au document](#)

## Programme national de recherche Environnement-Santé-Travail : lancement des appels à projets de recherche 2020

**anses.fr**

L'Anses lance ce jour ses appels à projets de recherche annuels dans le cadre du programme national de recherche Environnement-Santé-Travail (PNR EST). L'édition 2020 de ce programme comprend deux appels à projets pour un montant total de l'ordre de 7 millions d'euros : un appel à projets général sur les thèmes santé-environnement et santé-travail qui inclut une enveloppe de 2 millions d'euros dédiée au sujet des perturbateurs endocriniens, et un deuxième appel spécifique sur le thème « radiofréquences et santé ».

Le programme national de recherche Environnement-Santé-Travail (PNR EST), piloté par l'Anses, soutient des travaux de recherche pour développer les connaissances scientifiques indispensables à l'évaluation des risques et l'expertise sanitaire en appui aux politiques publiques. [...]

[Accès au document](#)

## Changes in soil carbon, biodiversity and ecotoxicity should be considered when assessing environmental impact of dairy products

**europa.eu**

Considering the impact on soil carbon, biodiversity and ecotoxicity is important when assessing the environmental footprint of dairy products, suggests a new study, which explored the impacts of organic and conventional milk production in three types of system established in Western Europe. The study found that organic milk production had a significantly lower impact on ecotoxicity and biodiversity than conventional milk production, and suggests that including soil carbon changes in the assessment would result in greater reductions in the carbon footprint of organic, rather than conventional, milk - in some cases by up to 18%.

[Accès au document](#)

## Mycophyto : L'agriculture métamorphosée par la science

**bpifrance.fr**

La jeune chercheuse a mis au point une technique inédite qui permet de se passer de pesticides et d'engrais dans l'agriculture. Pour la commercialiser, elle a lancé Mycophyto, une start-up deeptech basée à Sophia Antipolis. Sa première cible : la zone méditerranéenne.

« Il faut sortir de la chimie, qui ne consiste qu'à tuer ! ». Le constat tiré par Justine Lipuma est limpide. La fondatrice de la start-up [deeptech](#) Mycophyto souhaite proposer une alternative aux produits chimiques utilisés depuis des années qui visent à protéger les plantes, mais sont parfois jugés inefficaces. [...]

[Accès au document](#)

## Déforestation agricole et minière en Guyane : impacts sur les concentrations en mercure dans les eaux

**brgm.fr**

Cette étude renforce les connaissances sur les quantités de mercure et méthylmercure (MMHg) présentes dans les eaux et les matières en suspension dans différents contextes de perturbation des sols guyanais. [...]

### L'utilisation

Au vu de ces résultats, il semble important d'ajouter le HgT mais aussi le MMHg sur la liste des substances à suivre spécifiquement en Guyane dans le cadre de la DCE. Cela permettrait déterminer la « ligne de base de ces teneurs en Hg » et ainsi pouvoir facilement repérer une anomalie.

[Accès au document](#)

## La création d'un fonds d'indemnisation des victimes de pesticides est actée

**uipp.org**

Les députés ont, le 25 octobre 2019, approuvé la création d'un fonds d'indemnisation des victimes de pesticides. Agnès Buzyn, ministre des Solidarités et de la Santé, s'était engagée, en janvier 2019 à inscrire cette création dans le projet de loi de financement de la Sécurité sociale (PLFSS) pour 2020.

L'instruction de l'ensemble des demandes de reconnaissance des maladies professionnelles concernées sera ainsi centralisée, afin de rendre les procédures plus simples et plus homogènes sur le territoire.

[Accès au document](#)

## REGLEMENTATION / DROIT

### Substances actives des produits phytopharmaceutiques et présentant des modes d'action identiques à ceux de la famille des néonicotinoïdes

**Décret n° 2019-1519 du 30 décembre 2019** listant les substances actives contenues dans les produits phytopharmaceutiques et présentant des modes d'action identiques à ceux de la famille des néonicotinoïdes

Numéro officiel : 2019-1519 / TREP1820289D

Date de signature : 30/12/2019

Liens juridiques : Modification Code rural et de la pêche maritime

[Accès au document](#)

### Mesures de protection des personnes lors de l'utilisation de produits phytopharmaceutiques à proximité des zones d'habitation

**Décret n° 2019-1500 du 27 décembre 2019** relatif aux mesures de protection des personnes lors de l'utilisation de produits phytopharmaceutiques à proximité des zones d'habitation

Numéro officiel : 2019-1500 / AGRG1937168D

Date de signature : 27/12/2019

Liens juridiques : Modification Code rural et de la pêche maritime

[Accès au document](#)



## Utilisation de produits phytopharmaceutiques : mesures de protection des personnes

**Arrêté du 27 décembre 2019** relatif aux mesures de protection des personnes lors de l'utilisation de produits phytopharmaceutiques et modifiant l'arrêté du 4 mai 2017 relatif à la mise sur le marché et à l'utilisation des produits phytopharmaceutiques et de leurs adjuvants visés à l'article L. 253-1 du code rural et de la pêche maritime

Numéro officiel : AGRG1937165A

Date de signature : 27/12/2019

Liens juridiques : Modification Arrêté 04/05/2017  
NOR AGRG1632554A

[Accès au document](#)

## Méthodologie de calcul et la valeur des doses unités de référence des substances actives phytopharmaceutiques

**Arrêté du 27 avril 2017** définissant la méthodologie de calcul et la valeur des doses unités de référence des substances actives phytopharmaceutiques

Numéro officiel : AGRG1711522A

Date de signature : 27/04/2017

Historique : Modification par Arrêté du 18/12/2019 NOR manquant

[Accès au document](#)

## Conditions d'introduction dans l'Union européenne de terre contaminée par des pesticides ou des polluants organiques persistants

**DÉCISION D'EXÉCUTION (UE) 2019/1999 DE LA COMMISSION du 28 novembre 2019** modifiant la décision 2005/51/CE en ce qui concerne la période pendant laquelle de la terre contaminée par des pesticides ou des polluants organiques persistants peut être introduite dans l'Union européenne à des fins de décontamination

Numéro officiel : UE/2019/1999

Date de signature : 28/11/2019

Liens juridiques : Modification Décision 2005/51/CE 21/01/2005

[Accès au document](#)

## Report de la date d'expiration de l'approbation du K-HDO en vue de son utilisation dans les produits biocides du type 8

**DÉCISION D'EXÉCUTION (UE) 2019/1950 DE LA COMMISSION du 25 novembre 2019** reportant la date d'expiration de l'approbation du K-HDO en vue de son utilisation dans les produits biocides du type 8

Numéro officiel : UE/2019/1950

Date de signature : 25/11/2019

[Accès au document](#)

## Report de la date d'expiration de l'approbation du tébuconazole en vue de son utilisation dans les produits biocides du type 8

**DÉCISION D'EXÉCUTION (UE) 2019/1951 DE LA COMMISSION du 25 novembre 2019** reportant la date d'expiration de l'approbation du tébuconazole en vue de son utilisation dans les produits biocides du type 8

Numéro officiel : UE/2019/1951

Date de signature : 25/11/2019

[Accès au document](#)

## Report de la date d'expiration de l'approbation de l'IPBC en vue de son utilisation dans les produits biocides du type 8

**DÉCISION D'EXÉCUTION (UE) 2019/1969 DE LA COMMISSION du 26 novembre 2019** reportant la date d'expiration de l'approbation de l'IPBC en vue de son utilisation dans les produits biocides du type 8

[Accès au document](#)

## Mesures de protection contre les organismes nuisibles aux végétaux

**RÈGLEMENT D'EXÉCUTION (UE) 2019/2072 DE LA COMMISSION du 28 novembre 2019** établissant des conditions uniformes pour la mise en oeuvre du règlement (UE) 2016/2031 du Parlement européen et du Conseil, en ce qui concerne les mesures de protection contre les organismes nuisibles aux végétaux, abrogeant le règlement (CE) n° 690/2008 de la Commission et modifiant le règlement d'exécution (UE) 2018/2019 de la Commission

Numéro officiel : UE/2019/2072

Date de signature : 28/11/2019

Liens juridiques : Abrogation le 14/12/2019 CE/690/2008 04/07/2008

Modification le 14/12/2019 Règlement d'exécution UE/2018/2019 18/12/2018

[Accès au document](#)

## Substances actives

«benfluraline»,  
«dimoxystrobine»,  
«fluazinam», «flutolanil»,  
«mancozèbe», «mécoprop-P»,  
«mépiquat»,  
«métirame», «oxamyl» et

## «pyraclostrobine» : prolongation de la période d'approbation

**RÈGLEMENT D'EXÉCUTION (UE) 2019/2094 DE LA COMMISSION du 29 novembre 2019** modifiant le règlement d'exécution (UE) n° 540/2011 en ce qui concerne la prolongation de la période d'approbation des substances actives «benfluraline», «dimoxystrobine», «fluazinam», «flutolanil», «mancozèbe», «mécoprop-P», «mépiquat», «métirame», «oxamyl» et «pyraclostrobine»

Numéro officiel : UE/2019/2094

Date de signature : 29/11/2019

Liens juridiques : Modification Règlement d'exécution UE/540/2011 25/05/2011

[Accès au document](#)

## Mise à disposition sur le marché des fertilisants : rectificatif au règlement (UE) 2019/1009

**Rectificatif au règlement (UE) 2019/1009 DU PARLEMENT EUROPÉEN ET DU CONSEIL du 5 juin 2019** établissant les règles relatives à la mise à disposition sur le marché des fertilisants UE, modifiant les règlements (CE) n° 1069/2009 et (CE) n° 1107/2009 et abrogeant le règlement (CE) n° 2003/2003

Numéro officiel : UE/2019/1009

Date de signature : 22/11/2019

Liens juridiques : Rectification Règlement UE/2019/1009 05/06/2019

[Accès au document](#)

## CEPP : les objectifs pour 2020 sont connus

[uipp.org](http://uipp.org)

Le décret détaillant les modalités du dispositif de certificats d'économie de produits phytopharmaceutiques (CEPP) pour l'année 2020 est paru au Journal Officiel du 9 novembre 2019.

Les distributeurs de produits phytosanitaires devront, pour 2020, réaliser 60 % de leur objectif CEPP fixés pour 2021. Pour rappel, ce dernier est fixé à 20 % de la référence des ventes de chaque structure, exprimée en équivalent Nodu (Nombre de doses unités). En 2018, le taux de recouvrement de l'objectif de 2021 n'était que de 10 %, loin derrière l'ambition du décret. Ce dernier limite également la période de déclaration des actions réalisées pour éviter toute confusion sur les campagnes concernées : les demandes de délivrance de certificats doivent désormais être faites du 1er juin de l'année de mise en œuvre de l'action jusqu'au 31 mars de l'année suivante.

[Accès au document](#)

## Adaptation des règles relatives aux certificats d'économie de produits phytopharmaceutiques

Décret n° 2019-1157 du 7 novembre 2019 portant diverses dispositions d'adaptation des règles relatives aux certificats d'économie de produits phytopharmaceutiques

Numéro officiel : AGRG1923882D

Date de signature : 07/11/2019

Liens juridiques : Modification Code rural et de la pêche maritime

[Accès au document](#)

## Mise sur le marché des produits phyto-pharmaceutiques :

Rectificatif au règlement (CE) n° 1107/2009 du Parlement européen et du Conseil du 21 octobre 2009 concernant la mise sur le marché des produits phytopharmaceutiques et abrogeant les directives 79/117/CEE et 91/414/CEE du Conseil

Numéro officiel : CE/1107/2009

Date de signature : 14/11/2019

Liens juridiques : Rectification Règlement CE/1107/2009 21/10/2009

[Accès au document](#)

## Liste des produits phytopharmaceutiques de biocontrôle, au titre des articles L.253-5 et L.253-7 du code rural et de la pêche maritime

Cette note établit la liste des produits phytopharmaceutiques de biocontrôle, au titre des articles L.253-5 et L.253-7 du code rural et de la pêche maritime. Elle définit également la méthodologie d'élaboration de la liste, et notamment les critères généraux de définition des produits concernés.

[\(Télécharger le PDF \(819ko\)\)](#)

Bureau des intrants et du biocontrôle

Note de service - DGAL/SDQSPV/2019-722

[Accès au document](#)

## AVIS / EXPERTISES / NORMES

### Protection des riverains en cas d'épandage de produits phytosanitaires

anses.fr

La protection des populations lors de l'utilisation de produits phytosanitaires fait partie des missions premières de l'Anses. L'Agence estime l'exposition et évalue les risques pour la santé des travailleurs et des riverains dans le cadre des autorisations de mise sur le marché. Elle a aussi comme priorité d'améliorer les connaissances sur l'impact des pesticides sur la santé humaine et environnementale. A ce titre, elle promeut et s'implique elle-même dans plusieurs études scientifiques d'envergure.

L'évaluation scientifique des demandes d'autorisations de mise sur le marché des produits phytosanitaires, réalisée par l'Anses, prend en compte l'exposition des personnes

présentes à proximité des zones d'épandage et des riverains, sur la base d'une méthodologie harmonisée au niveau européen par l'EFSA, l'autorité européenne en charge de la sécurité sanitaire de l'alimentation. [...]

[Accès au document](#)

## Annual report of the Scientific Network on Microbiological Risk Assessment 2019

[efsa.europa.eu](http://efsa.europa.eu)



Among the tasks of EFSA, according to its founding regulation (Regulation (EC) No 178/2002), there is the establishment of a system of Networks of organisations operating in the fields within EFSA's mission, the objective being to facilitate a scientific cooperation framework by the coordination of activities, the exchange of information, the development and implementation of joint projects, the exchange of expertise and best practices. The Scientific Network on Microbiological Risk Assessment (MRA Network) had its first meeting in 2007. Currently, 25 European Union Member States and two observer countries (Switzerland and Norway) are members of the MRA Network. The annual meeting was held on 21-22 May 2019 in Parma. A wide range of topics related to microbial risk assessment were discussed, including risk assessments on pathogens in raw milk, Salmonella, Listeria monocytogenes, quantitative risk assessments, and antimicrobial resistance.

<https://doi.org/10.2903/sp.efsa.2019.EN-1770>

[Accès au document](#)

## Standard Test Method for Determination of Particles Resulting from the Attrition of Granular Pesticides

[astm.org](http://astm.org)

### Significance and Use

5.2 This test method helps provide information on health hazards likely to arise from exposures by the inhalation route. It can be of use in selecting dose levels for chronic studies and for establishing safety criteria for human exposure.

5.3 The amount of fines determined by this method is a measure of potential inhalation and respiration toxicity because the hazards of inhaled solid substances are influenced by physical factors such as particle size.

### 1. Scope

1.1 This test method is used to determine the amount and particle size distribution curve of particles with diameter 106 micrometers or smaller resulting from the attrition of granular pesticides.

1.3 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use. For specific hazard statement, see Section 8.

1.4 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents (purchase separately) [The documents listed below are referenced within the subject standard but are not provided as part of the standard.](#)

DOI: 10.1520/E2316-14R19E01

### Citation Format

ASTM E2316-14(2019)e1, Standard Test Method for Determination of Particles Resulting from the Attrition of Granular Pesticides, ASTM

International, West Conshohocken, PA, 2019,  
[www.astm.org](http://www.astm.org)

[Accès au document](#)

## Standard Guide for Preparing Granular Pesticide Ground Applicator Calibration Procedures

[astm.org](http://astm.org)

### Significance and use

2.1 This guide covers the calibration of row, band, and broadcast applicators. Attainment of accurate and more uniform application can reduce the quantity of active ingredient required for a given degree of control, thus improving environmental quality and safety at a more economical cost. A single-calibration procedure applicable in all situations is not feasible because of the nature of the variables involved in chemical applications.

### 1. Scope

1.1 This guide is for those who prepare granular pesticide ground applicator calibration procedures. The purpose is to encourage methods that will improve uniformity and accuracy of application with granular applicators.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.3 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use. For specific hazard statements see Section 4.

1.4 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade

Organization Technical Barriers to Trade (TBT) Committee.

DOI: 10.1520/E0550-87R19

Citation Format

ASTM E550-87(2019), Standard Guide for Preparing Granular Pesticide Ground Applicator Calibration Procedures, ASTM International, West Conshohocken, PA, 2019, [www.astm.org](http://www.astm.org)

[Accès au document](#)

## Rapid risk assessment on the possible risk for public health due to the contamination of infant formula and follow-on formula by mineral oil aromatic hydrocarbons (MOAH)

[efsa.onlinelibrary.wiley.com](http://efsa.onlinelibrary.wiley.com)

Following the detection of mineral oil aromatic hydrocarbons (MOAH) in batches of infant and follow-on formula in France, Germany and the Netherlands reported by foodwatch, the European Commission (EC) asked Member States (MS) to analyse the concerned batches and to investigate possible contamination sources; and mandated EFSA to perform a rapid assessment on the health risks related to the presence of MOAH in infant and follow-on formula. MOAH may include the presence of genotoxic and carcinogenic 3-7 ring polycyclic aromatic compounds (3-7 PAC). [...]

[Accès au document](#)

## Glyphosate dans les écosystèmes : pas de dépassement des seuils réglementaires

[uipp.org](http://uipp.org)

L'Anses a, le 29 octobre, présenté le bilan de son dispositif de phytopharmacovigilance. L'objectif : suivre la présence de molécules dans les écosystèmes. Ce dernier document est dédié au glyphosate et à son métabolite principal, l'acide aminométhylphosphonique (AMPA). Les informations publiées concernent l'utilisation de



la substance active, sa présence dans les milieux (eau, alimentation, air ambiant, imprégnation humaine), les risques pour les populations associées à son exposition, les impacts observés et les liens potentiels avec cette substance active. Ces données révèlent que la présence du glyphosate et de l'AMPA dans les écosystèmes et l'alimentation demeure à un niveau inférieur aux valeurs seuils réglementaires. [...]

[Accès au document](#)

## PUBLICATIONS DU RESEAU ECOTOX

### Trace elements and persistent organic pollutants in chicks of 13 seabird species from Antarctica to the subtropics

**Authors:** Carravieri A., Bustamante P., Labadie P., Budzinski H., Chastel O., Cherel Y.

**Source:** ENVIRONMENT INTERNATIONAL 134, 105225, 2020, DOI: 10.1016/j.envint.2019.105225

**Abstract:** Seabirds from remote regions are mainly exposed to environmental contaminants from non-point contamination of their food webs. Pre-fledging seabird chicks are fed by their parents with marine prey captured in the vicinity of breeding colonies. Contaminant concentrations in tissues of pre-fledging chicks can thus be mostly related to local dietary sources, and have the potential to unravel spatial patterns of environmental contamination in marine ecosystems. Here, mercury (Hg), 13 other trace elements, and 18 persistent organic pollutants (POPs) were quantified in blood of chicks across four breeding locations that encompass a large latitudinal range in the southern Indian Ocean (from Antarctica, through subantarctic areas, to the subtropics), over a single breeding season. Thirteen species of penguins, albatrosses and petrels were studied, including endangered and near-threatened species, such as Amsterdam albatrosses and emperor penguins. Blood Hg burdens varied widely between species, with a factor of similar to 50 between the lowest and highest

concentrations (mean +/- SD, 0.05 +/- 0.01 and 2.66 +/- 0.81  $\mu\text{g g}^{-1}$  dry weight, in thin-billed prions and Amsterdam albatrosses, respectively). Species relying on Antarctic waters for feeding had low Hg exposure. Concentrations of POPs were low in chicks, with the exception of hexachlorobenzene. Contaminant concentrations were mainly explained by species differences, but feeding habitat (inferred from delta C-13 values) and chicks' body mass also contributed to explain variation. Collectively, our findings call for further toxicological investigations in Amsterdam albatrosses and small petrel species, because they were exposed to high and diverse sources of contaminants, and in macaroni penguins, which specifically showed very high selenium concentrations.

[Accès au document](#)

### The effect of natural radioactivity on diatom communities in mineral springs

**Authors:** Millan F., Izere C., Breton V., Voldoire O., Biron D.G., Wetzel C.E., Miallier D., Allain E., Ector L., Beauger A.

**Source:** BOTANY LETTERS, Early Access, 2019, DOI: 10.1080/23818107.2019.1691051

**Abstract:** Diatoms are good indicators of water quality because of their great diversity and wide ecological range. They are also interesting in assessing the impact of radioactivity on ecosystems because of their capacity to absorb radioelements. They also show radio-induced deformities, observed in many species. In order to assess more precisely the impact of natural radioactivity, diatom communities were monitored during a 9-month survey in two mineral springs characterized by radioactivity levels ranging within two orders of magnitude. The experimental data obtained were analyzed using different multivariate and clustering analyses. The richness was high with the dominance of *Planorbulina freudentzenii* and *Crenosira angustior*. In the most radioactive spring known in Auvergne (above 4000 Bq L<sup>-1</sup> radon activity), the average deformation was 24.7%, in contrast with lower teratological rates observed in the less radioactive spring. In the absence of heavy metals, this result confirmed

that radioactivity is an environmental stress for the diatoms living in these particular ecosystems. This conclusion was reinforced by the selection of springs from a database of 126 ecosystems comparable to our studied sites except the lower level of radioactivity. In these "mirror" springs, few deformations were observed.

[Accès au document](#)

## Transfer and degradation of the common pesticide atrazine through the unsaturated zone of the Chalk aquifer (Northern France)

**Authors:** Chen N.X., Valdes D., Marlin C., Ribstein P., Alliot F., Aubry E., Blanchoud H.

**Source:** ENVIRONMENTAL POLLUTION 255(1):113125, 2019, DOI: 10.1016/j.envpol.2019.113125

**Abstract:** Groundwater in the Chalk aquifer is an important water resource whose quality has degraded due to fertilizer and pesticide use. Atrazine, classified as a priority substance, has been one of the most applied pesticides and also one of the most frequently detected pesticides in groundwater. The present study investigated the transfer and degradation of atrazine in the unsaturated zone of the Chalk aquifer in Northern France. The study was conducted in an underground quarry (Saint-Martin-le-Noeud), which provides a direct access to the water table and intercepts the unsaturated zone at different depths. The lake and the ceiling percolation of 16 sites throughout the quarry were followed. For 16 sites, the percolating flow rate and lake level were measured and the lake water was sampled for nitrate, atrazine and deethylatrazine (DEA, main degradation product of atrazine) analysis over 2.5 years. High spatial variations in hydrodynamics (percolating flow rate and lake level) and in lake water quality (atrazine between 55 +/- 11 and 202 +/- 40 ng L-1 and DEA between 269 +/- 53 and 1727 +/- 345 ng L-1) indicate that the properties of the unsaturated zone influence the transfer and the degradation of atrazine. A counter-clockwise hysteresis characterizes the relationship between

the lake level and atrazine concentration. Temporal variation shows that the atrazine is transferred through the matrix and fractures with a delay caused by the sorption process that differs in atrazine and DEA. The layer of clay-with-flints is shown to favor the degradation of atrazine near the surface. Preferential pathways may be created below clay-with-flints, through which the transfer of atrazine is quicker. (C) 2019 Elsevier Ltd. All rights reserved.

[Accès au document](#)

## Reliability evaluation of biomarker reference ranges for mesocosm and field conditions: Cellular innate immunomarkers in *Gasterosteus aculeatus*

**Authors:** Marchand A., Tebby C., Beaudouin R., Catteau A., Porcher J.M., Turies C., Bado-Nilles A.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 698:134333, 2020, DOI: 10.1016/j.scitotenv.2019.134333

**Abstract:** Due to their sensitivity to environmental contamination and their link with fish health status, innate immunomarkers are of great interest for environmental risk assessment studies. Nevertheless, the lack of knowledge about the effect of confounding factors can lead to data misinterpretation and false diagnostics. So, the determination of reference values was of huge interest for the integration of biomarkers in biomonitoring programs. Laboratory immunomarker reference ranges (including cellular mortality, leucocyte distribution, phagocytosis activity, respiratory burst and lysosomal presence) that consider three confounding factors (season, sex and body size) were previously developed in three-spined stickleback. *Gasterosteus aculeatus*, from our husbandry. Usefulness of these reference ranges in biomonitoring programs depends on how they can be transposed to various experimental levels, such as mesocosm (outdoor artificial pond) and field conditions. Immunomarkers were therefore measured every 2 months over 1 year in one mesocosm and in one site assumed to uncontaminated (Houdancourt,field). Differences

between immunomarker seasonal variations in mesocosm and field fish on one side and laboratory fish on the other side were quantified : in some cases, seasonal trends were not significant or did not differ between mesocosm and laboratory conditions, but overall, models developed based on data obtained in laboratory conditions were poorly predictive of data obtained in mesocosm or field conditions. To propose valuable field reference ranges, mesocosm and field data were integrated in innate immunomarker modelling in order to strengthen the knowledge on the effect of confounding factors. As in laboratory conditions, sex was overall a confounding factor only for necrotic cell percentage and granulocyte-macrophage distribution and size was a confounding factor only for cellular mortality, leucocyte distribution and phagocytosis activity. Confounding factors explained a large proportion of immunomarker variability in particular for phagocytosis activity and lysosomal presence. Further research is needed to test the field models in a biomonitoring program to compare the sensitivity of immunomarkers to the confounding factors identified in this study and the sensitivity to various levels of pollution. (C) 2019 Elsevier B.V. All rights reserved.

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## Quantifying the impact of no-tillage on soil redistribution in a cultivated catchment of Southern Brazil (1964-2016) with Cs-137 inventory measurements

**Authors:** Didone E.J., Minella J.P.G., Schneider F.J.A., Londero A.L., Lefevre I., Evrard O.

**Source:** AGRICULTURE ECOSYSTEMS & ENVIRONMENT 284:106588, 2019, DOI: 10.1016/j.agee.2019.106588

**Abstract:** No-tillage is a soil management practice that results in reduced soil losses when compared to conventional tillage systems. However, when this practice is overly simplified, it may lead, over the years, to higher levels of soil loss than expected. In this context, this study sought to compare the rates of long-term soil redistribution on three hillslopes used for

grain production under different soil management on deep weathered soils (Ferralsols) in southern Brazil. Soil samples were collected along three transects in different hillslopes characterized by either no-tillage or conventional tillage. Cs-137 inventories were used to estimate the soil redistribution rates based on Mass Balance Model - 2. The results indicate that along the three slopes and during the last five decades, changes in soil management impacted the patterns of soil erosion in the landscape, showing the occurrence of significant soil loss in the upper and backslope segments, and deposition in the lower parts of the three hillslopes studied. Even with no-tillage, erosion has continued to occur, although at lower rates when compared to conventional tillage. The use of the Cs-137 marker associated with the Mass Balance Model - 2 (MBM - 2) conversion model provided an effective tool for estimating soil redistribution rates under different management systems. Although the introduction of no-tillage in the last 28 years has reduced erosion rates, these processes remain significant and the implementation of additional runoff and/or erosion control practices is recommended in order to keep erosion rates at sustainable levels.

[Accès au document](#)

## Poplar rotation coppice at a trace element-contaminated phytomanagement site : A 10-year study revealing biomass production, element export and impact on extractable elements

**Authors:** Chalot M., Girardclos O., Ciadamidaro L., Zappelini C., Yung L., Durand A., Pfendler S., Lamy I., Driget V., Blaudez D.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 699:134260, 2020, DOI: 10.1016/j.scitotenv.2019.134260

**Abstract:** Growing lignocellulosic crops on marginal lands could compose a substantial proportion of future energy resources. The potential of poplar was explored, by devising a field trial of two hectares in 2007 in a metal-contaminated site to quantify the genotypic



variation in the growth traits of 14 poplar genotypes grown in short-rotation coppice and to assess element transfer and export by individual genotypes. Our data led us to conclusions about the genotypic variations in poplar growth on a moderately contaminated site, with the Vesten genotype being the most productive. This genotype also accumulated the least amounts of trace elements, whereas the Trichobel genotype accumulated up to 170 mg Zn kg<sup>-1</sup> DW in the branches, with large variation being exhibited among the genotypes for trace element (TE) accumulation. Soil element depletion occurred for a range of TEs, whereas the soil content of major nutrients and the pH remained unchanged or slightly increased after 10 years of poplar growth. The higher TE content of bark tissues compared with the wood and the higher proportion of bark in branches compared with the wood led us to recommend that only stem wood be harvested, instead of the whole tree, which will enable a reduction in the risks encountered with TE-enriched biomass in the valorization process. (C) 2019 Elsevier B.V. All rights reserved.

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## Towards the optimization of botanical insecticides research : *Aedes aegypti* larvicidal natural products in French Guiana

**Authors:** Falkowski M., Jahn-Oyac A., Odonne G., Flora C., Estevez Y., Toure S., Boulogne I., Robinson J.C., Bereau D., Petit P., Azam D., Coke M., Issaly J., Gaborit P., Stien D., Eparvier V., Dusfour I., Houel E.,

**Source:** ACTA TROPICA 201, 105179, 2020, DOI: 10.1016/j.actatropica.2019.105179

**Abstract:** Natural products have proven to be an immeasurable source of bioactive compounds. The exceptional biodiversity encountered in Amazonia, alongside a rich entomofauna and frequent interactions with various herbivores is the crucible of a promising chemodiversity. This prompted us to search for novel botanical insecticides in French Guiana. As this French overseas department faces severe issues linked to insects, notably the strong incidence of vector-borne infectious diseases, we decided to

focus our research on products able to control the mosquito *Aedes aegypti*. We tested 452 extracts obtained from 85 species originating from 36 botanical families and collected in contrasted environments against an *Ae. aegypti* laboratory strain susceptible to all insecticides, and a natural population resistant to both pyrethroid and organophosphate insecticides collected in Cayenne for the most active of them. Eight species (*Maytenus oblongata* Reissek, Celastraceae; *Costus erythrothyrus* Loes., Costaceae; *Humiria balsamifera* Aubl., Humiriaceae; *Sextonia rubra* (Mez) van der Werff, Lauraceae; *Piper hispidum* Sw., Piperaceae; *Laetia procera* (Poepp.) Eichl., Salicaceae; *Matayba arborescens* (Aubl.) Radlk., Sapindaceae; and *Cupania scrobiculata* Rich., Sapindaceae) led to extracts exhibiting more than 50% larval mortality after 48 h of exposition at 100 µg/mL against the natural population and were considered active. Selectivity and phytochemistry of these extracts were therefore investigated and discussed, and some active compounds highlighted. Multivariate analysis highlighted that solvents, plant tissues, plant family and location had a significant effect on mortality while light, available resources and vegetation type did not. Through this case study we highlighted that plant defensive chemistry mechanisms are crucial while searching for novel insecticidal products.

[Accès au document](#)

## Environmental transcriptomes of invasive dreissena, a model species in ecotoxicology and invasion biology

**Authors:** Peden R., Poupin P., Sohm B., Flayac J., Giamberini L., Klopp C., Louis F., Pain-Devin S., Potet M., Serre R.-F., Devin S.

**Source:** SCIENTIFIC DATA 6:234, 2019, DOI 10.1038/s41597-019-0252-x

**Abstract:** Dreissenids are established model species for ecological and ecotoxicological studies, since they are sessile and filter feeder organisms and reflect in situ freshwater quality. Despite this strong interest for hydrosystem biomonitoring, omics data are still scarce. In the present study, we achieved full de novo assembly

transcriptomes of digestive glands to gain insight into *Dreissena polymorpha* and *D. rostriformis bugensis* molecular knowledge. Transcriptomes were obtained by Illumina RNA sequencing of seventy-nine organisms issued from fifteen populations inhabiting sites that exhibits multiple freshwater contamination levels and different hydrosystem topographies (open or closed systems). Based on a recent de novo assembly algorithm, we carried out a complete, quality-checked and annotated transcriptomes. The power of the present study lies in the completeness of transcriptomes gathering multipopulational organisms sequencing and its full availability through an open access interface that gives a friendly and ready-to-use access to data. The use of such data for proteogenomic and targeted biological pathway investigations purpose is promising as they are first full transcriptomes for this two *Dreissena* species.

[Accès au document](#)

## Long-term phytomanagement with compost and a sunflower - Tobacco rotation influences the structural microbial diversity of a Cu-contaminated soil

**Authors:** Burges A., Fievet V., Oustriere N., Epelde L., Garbisu C., Becerril J.M., Mench M.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 700, 2020, DOI: 10.1016/j.scitotenv.2019.134529

**Abstract:** At a former wood preservation site contaminated with Cu, various phytomanagement options have been assessed in the last decade through physicochemical, ecotoxicological and biological assays. In a field trial at this site, phytomanagement with a crop rotation based on tobacco and sunflower, combined with the incorporation of compost and dolomitic limestone, has proved to be efficient in Cu-associated risk mitigation, ecological soil functions recovery and net gain of economic and social benefits. To demonstrate the long-term effectiveness and sustainability of phytomanagement, we assessed here the influence of this remediation option on the diversity, composition and structure of microbial communities over time, through a metabarcoding

approach. After 9 years of phytomanagement, no overall effect was identified on microbial diversity ; the soil amendments, notably the repeated compost application, led to shifts in soil microbial populations. This phytomanagement option induced changes in the composition of soil microbial communities, promoting the growth of microbial groups belonging to Alphaproteobacteria, many being involved in N cycling. Populations of Nitrososphaeria, which are crucial in nitrification, as well as taxa from phyla Planctomycetacia, Chloroflexi and Gemmatimonadetes, which are tolerant to metal contamination and adapted to oligotrophic soil conditions, decreased in amended phytomanaged plots. Our study provides an insight into population dynamics within soil microbial communities under long-term phytomanagement, in line with the assessment of soil ecological functions and their recovery. (C) 2019 Elsevier B.V. All rights reserved.

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## Biomagnification of perfluoroalkyl acids (PFAAs) in the food web of an urban river: assessment of the trophic transfer of targeted and unknown precursors and implications

**Authors:** Simonnet-Laprade C., Budzinski H., Maciejewski K., Le Menach K., Santos R., Alliot F., Goutte A., Labadie P.

**Source:** ENVIRONMENTAL SCIENCE-PROCESSES & IMPACTS 21(11):1864-1874, 2019, DOI: 10.1039/c9em00322c

**Abstract:** The present work examined the trophic transfer of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in a typical urban river (Orge River, near Paris, France), and aimed to investigate the potential contribution of precursors to the biomagnification of perfluoroalkyl acids (PFAAs). Sixteen PFAAs, twelve of their precursors (pre-PFAAs(targeted)) and two fluorinated alternatives to long-chain PFASs were analyzed in water, sediments and biota (including biofilm, invertebrates and fish). Twenty two compounds were detected in

biological samples (2.0-147 ng g<sup>-1</sup> wet weight), perfluorooctane sulfonate (PFOS) and C-12-C-14 perfluoroalkyl carboxylates (PFCAs) being predominant while n-ary sumation pre-PFAAs(targeted) contributed to 1-18% of n-ary sumation PFASs. Trophic magnification factors (TMFs) were  $\approx 1$  (i.e. denoting biomagnification) for C-9-C-14 PFCAs, C-7-C-10 perfluoroalkyl sulfonates (PFSAs) and several pre-PFAAs (e.g. 8 : 2 and 10 : 2 fluorotelomer sulfonates). The significant decrease in n-ary sumation pre-PFCAs/ n-ary sumation PFCAs concentration ratio with trophic level suggested a likely contribution of selected precursors to the biomagnification of PFCAs through biotransformation, while this was less obvious for PFOS. The total oxidizable precursor assay, applied for the first time to sediment and biota, revealed the presence of substantial proportions of extractable unknown pre-PFAAs in all samples (i.e. 15-80% of n-ary sumation PFASs upon oxidation). This proportion significantly decreased from sediments to invertebrates and fish, thereby pointing to the biotransformation of unattributed pre-PFAAs in the trophic web, which likely contributes to the biomagnification of some PFAAs (i.e. C-9-C-12 PFCAs and C-7-C-10 PFSAs).

[Accès au document](#)

## Transgenerational effects from single larval exposure to azadirachtin on life history and behavior traits of *Drosophila melanogaster*

**Authors:** Ferdenache M., Bezzar-Bendjazia R., Marion-Poll F., Kilani-Morakchi S.,

**Source:** SCIENTIFIC REPORTS 9:17015, 2019, DOI: 10.1038/s41598-019-53474-x

**Abstract:** Azadirachtin is one of the successful botanical pesticides in agricultural use with a broad-spectrum insecticide activity, but its possible transgenerational effects have not been under much scrutiny. The effects of sublethal doses of azadirachtin on life-table traits and oviposition behaviour of a model organism in toxicological studies, *D. melanogaster*, were evaluated. The fecundity and oviposition preference of flies surviving to single azadirachtin-treated larvae of parental

generation was adversely affected and resulted in the reduction of the number of eggs laid and increased aversion to this compound over two successive generations. In parental generation, early exposure to azadirachtin affects adult's development by reducing the number of organisms, delay larval and pupal development; male biased sex ratio and induced morphological alterations. Moreover, adult's survival of the two generations was significantly decreased as compared to the control. Therefore, Single preimaginal azadirachtin treatment can affect flies population dynamics via transgenerational reductions in survival and reproduction capacity as well as reinforcement of oviposition avoidance which can contribute as repellent strategies in integrated pest management programs. The transgenerational effects observed suggest a possible reduction both in application frequency and total amount of pesticide used, would help in reducing both control costs and possible ecotoxicological risks.

[Accès au document](#)

## Trace-level determination of two neonicotinoid insecticide residues in honey bee royal jelly using ultra-sound assisted salting-out liquid liquid extraction followed by ultra-high-performance liquid chromatography-tandem mass spectrometry

**Authors:** Giroud B., Bruckner S., Strau L., Neumann P., Williams G.R., Vulliet E.

**Source:** MICROCHEMICAL JOURNAL 151:104249, 2019, DOI: 10.1016/j.microc.2019.104249

**Abstract:** A few studies have investigated the analysis of neonicotinoid insecticides in honey bee royal jelly. An analytical method based on salting-out liquid-liquid extraction assisted with ultrasound followed by liquid chromatography-tandem mass spectrometry was developed for the determination of thiamethoxam and clothianidin in royal jelly. A cleaning step based on freezing before injection to the UHPLC-MS/MS (MRM mode) allowed maximizing the signal-to-

noise ratio. The finalized method was validated in line with European legislation. The limits of quantification (LOQ), reached from a test sample of 100 mg royal jelly only, was 0.25 ng/g for both neonicotinoids. The recoveries were close to 100% with relative standard deviation below 13.7%, measured at three concentration levels. The validated method was finally applied to samples of royal jelly commercially available, and showed the presence of thiamethoxam at levels between the limit of determination (LOD = 0.15 ng/g) and LOQ in a few samples.

[Accès au document](#)

## Tracking sources and transfer of contamination according to pollutants variety at the sediment-biota interface using a clam as bioindicator in peri-alpine lakes

**Authors:** Lecrivain N., Duparc A., Clement B., Naffrechoux E., Frossard V.

**Source:** CHEMOSPHER: 238:24569, 2020, DOI: 10.1016/j.chemosphere.2019.124569

**Abstract:** Point pollution sources may differently impact lakes littoral, possibly leading to local ecological risks. The concomitant chemical analysis of littoral-benthic organisms and sediment can provide insights into the bioavailability and thus the ecological risk of contaminants. In this study, the autochthonous *Corbicula fluminea* was used to assess the sources and transfer of six trace metals (TMs) and fourteen Polycyclic Aromatic Hydrocarbons (PAHs) to the littoral-benthic biota of a large lake. The contaminant concentrations spatially varied with a value scale from 1 to 280 000 times along the lake littoral in both the sediment and clams. Multiple linear regressions were performed to explain the spatial variability of *Corbicula fluminea* contamination by considering both watershed and in-lake sources. The concentration of the sum of PAHs in clams was significantly correlated with sediment contamination, suggesting that PAHs contamination of the benthic biota mainly occur from the sediment. Most of the internal TM concentrations of clams were significantly correlated with stormwater drainage areas in the

lake watershed, highlighting the importance of stormwater runoffs in the littoral biota contamination. The transfer of TMs and PAHs was assessed through the bioconcentration factor defined as the ratio of internal and sediment concentrations. As, Cd, Cu, Zn and light molecular weight PAHs were more bioconcentrated in *C. fluminea* than Pb, Sn and heavy molecular weight PAHs, suggesting differences in their bioavailability. This study underlines the relevance of using autochthonous organisms as bioindicators of lake littoral biota contamination concomitantly with sediment matrices, and illustrates the challenge of tracking pollution sources in lakes. (C) 2019 Elsevier Ltd. All rights reserved.

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## Discovery of High Abundances of Aster-Like Nanoparticles in Pelagic Environments : Characterization and Dynamics

**Authors:** Colombet J., Billard H., Vignes B., Balor S., Boule C., Geay L., Benzerara K., Menguy N., Ilango G., Fuster M., Enault F., Bardot C., Gautier V., Ram A.S.P., Sime-Ngando T.

**Source:** FRONTIERS IN MICROBIOLOGY 10:2376, 2019, DOI: 10.3389/fmicb.2019.02376

**Abstract:** This study reports the discovery of Aster-Like Nanoparticles (ALNs) in pelagic environments. ALNs are pleomorphic, with three dominant morphotypes which do not fit into any previously defined environmental entities [i.e., ultramicro-prokaryotes, controversial nanobes, and non-living particles (biomimetic mineralo-organic particles, natural nanoparticles or viruses)] of similar size. Elemental composition and selected-area electron diffraction patterns suggested that the organic nature of ALNs may prevail over the possibility of crystal structures. Likewise, recorded changes in ALN numbers in the absence of cells are at odds with an affiliation to until now described viral particles. ALN abundances showed marked seasonal dynamics in the lakewater, with maximal values (up to  $9.0 \pm 0.5 \times 10^7$  particles.mL<sup>-1</sup>)



reaching eight times those obtained for prokaryotes, and representing up to about 40% of the abundances of virus-like particles. We conclude that (i) aquatic ecosystems are reservoirs of novel, abundant, and dynamic aster-like nanoparticles, (ii) not all virus-like particles observed in aquatic systems are necessarily viruses, and (iii) there may be several types of other ultra-small particles in natural waters that are currently unknown but potentially ecologically important.

[Accès au document](#)

## A glyphosate-based herbicide induces sub-lethal effects in early life stages and liver cell line of rainbow trout, *Oncorhynchus mykiss*

**Authors:** Weeks Santos S., Gonzalez P., Cormier B., Mazzella N., Bonnaud B., Morin S., Clérandeau C., Morin B., Cachot J.

**Source:** AQUATIC TOXICOLOGY 216:105291, 2019, DOI: 10.1016/j.aquatox.2019.105291

**Abstract:** Most pesticides used in agriculture end up in the aquatic environment through runoff and leaching of treated crops. One of the most commonly used herbicides is glyphosate. This compound or its metabolites are frequently detected in surface water in Europe. In the present study, in vivo and in vitro studies were carried out using the early life stages of rainbow trout (*Oncorhynchus mykiss*) and the cell line RTL-W1 (a liver cell line from rainbow trout) to characterize the toxic effects of glyphosate at environmentally-realistic concentrations. Both studies were performed using the commercial formulation Roundup (R) GT Max, and technical-grade glyphosate for the in vitro study. Eyed-stage embryos were exposed for 3 weeks to sub-lethal concentrations (0.1 and 1 mg/L) of glyphosate using Roundup. Numerous toxicity endpoints were recorded such as survival, hatching success, larval biometry, developmental abnormalities, swimming activity, genotoxicity (formamidopyrimidine DNA-glycosylase Fpg-modified comet assay), lipid peroxidation (TBARS), protein carbonyls and target gene transcription. Concentrations neither affected embryonic or larval survival nor increased developmental abnormalities. However, a

significant decrease was observed in the head size of larvae exposed to 1 mg/L of glyphosate. In addition, a significant increase in mobility was observed for larvae exposed to glyphosate at 0.1 mg/L. TSARS levels were significantly decreased on larvae exposed to 1 mg/L (a.i.), and cat and cox1 genes were differently transcribed from controls. DNA damage was detected by the Fpg-modified comet assay in RTL-W1 cell line exposed to the technical-grade glyphosate and Roundup formulation. The results suggest that chronic exposure to glyphosate, at environmental concentrations, could represent a potential risk for early life stages of fish.

[Accès au document](#)

## Tolerance of free-living nematode species to imidacloprid and diuron

**Authors:** Neury-Ormanni J., Doose C., Majdi N., Vedrenne J., Morin S., Höss S., Traunspurger W.

**Source:** Invertebrate Biology e12272, 2019, <https://doi.org/10.1111/ivb.12272>

**Abstract:** The neonicotinoid imidacloprid and the herbicide diuron are long-lived pesticides commonly detected in European rivers. Both have lethal as well as sublethal effects on aquatic invertebrates dwelling in streambeds. Here, we performed lethality tests of imidacloprid and diuron on seven species of widespread, free-living nematodes and the model organism *Caenorhabditis elegans*. Our results indicated that nematodes were relatively tolerant to both pesticides, and only two species (*Diploscapter coronatus* and *Plectus opisthocirculus*) showed mortality at high nominal concentrations of imidacloprid (119 mg/L) and diuron (33 mg/L). The changes observed in nematode community structure after imidacloprid and diuron exposure may have been related to trade-offs between sensitivity to toxicants and changes in competitive abilities of the species. While the former can be tested using single-species tests, we recommend that the latter be tested in further experiments using multispecies communities. Our results suggest that the presence of these pesticides could favor nematodes over other meiofaunal groups found in freshwater sediments.

[Accès au document](#)



## Coupling caging and proteomics on the European flounder (*Platichthys flesus*) to assess the estuarine water quality at micro scale

**Authors:** Borcier E, Artigaud S, Gaillard JC, Armengaud J, Charrier G, Couteau J, Receveur J, Ouddane B, Diop M, Amara R, Laroche J, Pichereau V

**Source:** Sci Total Environ. 695:133760, 2019, doi: 10.1016/j.scitotenv.2019.133760

**Abstract:** Estuaries are important areas highly vulnerable to anthropogenic pollutions. Therefore, the assessment of estuarine water quality is a major ecological issue. In this study, we sampled juveniles of the European flounder in the "pristine" Canche estuary, and caged them in Canche and in two polluted sites of the Seine estuary, Rouen and Fosse Nord. After one month, the metal and organic pollutants in these sites were assessed, and we evaluated several phenotypic indicators (condition index, RNA/DNA ratios and genotoxicity), and extracted the proteins in fish livers for analysis using a shotgun proteomics approach. The results showed strong modifications in the fish caged in both sites of the Seine estuary, as compared to those caged in Canche. In particular, many proteins involved in phase I and phase II detoxification reactions were accumulated in the liver of fish caged in the site showing the highest pollution, Rouen. In addition, we observed a general disruption of metabolism, in particular an increase in lipid synthesis and carbohydrate degradation in Rouen, and a decrease in the abundance of proteins associated to translational activity in Fosse Nord. At both sites, several stress proteins were decreased. The proteomic impact of the encagement by itself was also evaluated, by comparing the liver proteome of fish caged in Canche to that of fish stayed in natura during the same time. The results showed proteomic signatures of exposure to stressful conditions (particularly heat stress), most probably related to the micro-habitat in which the cages were placed. In conclusion, the caging technique is of great interest for ecotoxicological assessment of estuarine waters, but should consider that the results are representative of the micro-habitat around the cages, which does not necessarily

represent the overall heterogeneity of the estuarine environment.

[Accès au document](#)

## Applications of chitosan in food, pharmaceuticals, medicine, cosmetics, agriculture, textiles, pulp and paper, biotechnology, and environmental chemistry

**Authors:** Morin-Crini N, Lichtfouse E, Torri G, Crini G

**Source:** ENVIRONMENTAL CHEMISTRY LETTERS 17(4):1667-1692, 2019, DOI: 10.1007/s10311-019-00904-x

**Abstract:** Chitosan is a biopolymer obtained from chitin, one of the most abundant and renewable materials on Earth. Chitin is a primary component of cell walls in fungi, the exoskeletons of arthropods such as crustaceans, e.g., crabs, lobsters and shrimps, and insects, the radulae of molluscs, cephalopod beaks, and the scales of fish and lissamphibians. The discovery of chitin in 1811 is attributed to Henri Braconnot while the history of chitosan dates back to 1859 with the work of Charles Rouget. The name of chitosan was, however, introduced in 1894 by Felix Hoppe-Seyler. Chitosan has attracted major scientific and industrial interests from the late 1970s due to its particular macromolecular structure, biocompatibility, biodegradability and other intrinsic functional properties. Chitosan and derivatives have practical applications in the food industry, agriculture, pharmacy, medicine, cosmetology, textile and paper industries, and in chemistry. In recent years, chitosan has also received much attention in dentistry, ophthalmology, biomedicine and bioimaging, hygiene and personal care, veterinary medicine, packaging industry, agrochemistry, aquaculture, functional textiles and cosmetotextiles, catalysis, chromatography, beverage industry, photography, wastewater treatment and sludge dewatering, and biotechnology. Nutraceuticals and cosmeceuticals are actually growing markets, and therapeutic and biomedical products should be the next markets in the development of chitosan. Chitosan is also the

object of numerous fundamental studies. In this review, we highlight a selection of works on chitosan applications published over the past two decades.

[Accès au document](#)

## Biotic formation of methylmercury: A bio-physico-chemical conundrum

**Authors:** Bravo AG, Cosio C

**Source:** LIMNOLOGY AND OCEANOGRAPHY, 2019, DOI: 10.1002/lno.11366

**Abstract:** Mercury (Hg) is a natural and widespread trace metal, but is considered a priority pollutant, particularly its organic form methylmercury (MMHg), because of human's exposure to MMHg through fish consumption. Pioneering studies showed the methylation of divalent Hg (Hg-II) to MMHg to occur under oxygen-limited conditions and to depend on the activity of anaerobic microorganisms. Recent studies identified the *hgcAB* gene cluster in microorganisms with the capacity to methylate Hg-II and unveiled a much wider range of species and environmental conditions producing MMHg than previously expected. Here, we review the recent knowledge and approaches used to understand Hg-II-methylation, microbial biodiversity and activity involved in these processes, and we highlight the current limits for predicting MMHg concentrations in the environment. The available data unveil the fact that Hg-II methylation is a bio-physico-chemical conundrum in which the efficiency of biological Hg-II methylation appears to depend chiefly on Hg-II and nutrients availability, the abundance of electron acceptors such as sulfate or iron, the abundance and composition of organic matter as well as the activity and structure of the microbial community. An increased knowledge of the relationship between microbial community composition, physico-chemical conditions, MMHg production, and demethylation is necessary to predict variability in MMHg concentrations across environments.

[Accès au document](#)

## Telomere dynamic in humans and animals: Review and perspectives in environmental toxicology

**Authors:** Louzon M., Coeurdassier M., Gimbert F., Pauget B., de Vaufléury A.O.

**Source:** Environ Int. 131:105025, 2019, doi: 10.1016/j.envint.2019.105025. Epub 2019 Jul 25.

**Abstract:** Telomeres (TLs) play major roles in stabilizing the genome and are usually shortened with ageing. The maintenance of TLs is ensured by two mechanisms involving telomerase (TA) enzyme and alternative lengthening telomeres (ALT). TL shortening and/or TA inhibition have been related to health effects on organisms (leading to reduced reproductive lifespan and survival), suggesting that they could be key processes in toxicity mechanisms (at molecular and cellular levels) and relevant as an early warning of exposure and effect of chemicals on human health and animal population dynamics. Consequently, a critical analysis of knowledge about relationships between TL dynamic and environmental pollution is essential to highlight the relevance of TL measurement in environmental toxicology. The first objective of this review is to provide a survey on the basic knowledge about TL structure, roles, maintenance mechanisms and causes of shortening in both vertebrates (including humans) and invertebrates. Overall, TL length decreases with ageing but some unexpected exceptions are reported (e.g., in species with different lifespans, such as the nematode *Caenorhabditis elegans* or the crustacean *Homarus americanus*). Inconsistent results reported in various biological groups or even between species of the same genus (e.g., the microcrustacean *Daphnia* sp.) indicate that the relation usually proposed between TL shortening and a decrease in TA activity cannot be generalized and depends on the species, stage of development or lifespan. Although the scientific literature provides evidence of the effect of ageing on TL shortening, much less information on the relationships between shortening, maintenance of TLs, influence of other endogenous and environmental drivers, including exposure to chemical pollutants, is available, especially in invertebrates. The second objective of this review is to connect knowledge on TL dynamic and exposure to contaminants. Most of

the studies published on humans rely on correlative epidemiological approaches and few in vitro experiments. They have shown TL attrition when exposed to contaminants, such as polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), pesticides and metallic elements (ME). In other vertebrates, the studies we found deals mainly with birds and, overall, report a disturbance of TL dynamic consecutively to exposure to chemicals, including metals and organic compounds. In invertebrates, no data are available and the potential of TL dynamic in environmental risk assessment remains to be explored. On the basis of the main gaps identified some research perspectives (e.g., impact of endogenous and environmental drivers, dose response effects, link between TL length, TA activity, longevity and ageing) are proposed to better understand the potential of TL and TA measurements in humans and animals in environmental toxicology.

[Accès au document](#)

## Evidence for Bisphenol B Endocrine Properties: Scientific and Regulatory Perspectives

**Authors:** Serra H., Beausoleil C., Habert R., Minier C., Picard-Hagen N., Michel C.

**Source:** Environ Health Perspect. 127(10):106001, 2019, doi: 10.1289/EHP5200. Epub 2019 Oct 16.

**Abstract:** BACKGROUND. The substitution of bisphenol A (BPA) by bisphenol B (BPB), a very close structural analog, stresses the need to assess its potential endocrine properties. OBJECTIVE. This analysis aimed to investigate whether BPB has endocrine disruptive properties in humans and in wildlife as defined by the World Health Organization (WHO) definition used in the regulatory field, that is, a) adverse effects, b) endocrine activity, and c) plausible mechanistic links between the observed endocrine activity and adverse effects. METHODS. We conducted a systematic review to identify BPB adverse effects and endocrine activities by focusing on animal models and in vitro mechanistic studies. The results were grouped by modality (estrogenic, androgenic, thyroid hormone, steroidogenesis-related, or other endocrine activities). After

critical analysis of results, lines of evidence were built using a weight-of-evidence approach to establish a biologically plausible link. In addition, the ratio of BPA to BPB potency was reported from studies investigating both bisphenols. RESULTS. Among the 36 articles included in the analysis, 3 subchronic studies consistently reported effects of BPB on reproductive function. In rats, the 28-d and 48-week studies showed alteration of spermatogenesis associated with a lower height of the seminiferous tubules, the alteration of several sperm parameters, and a weight loss for the testis, epididymis, and seminal vesicles. In zebrafish, the results of a 21-d reproductive study demonstrated that exposed fish had a lower egg production and a lower hatching rate and viability. The in vitro and in vivo mechanistic data consistently demonstrated BPB's capacity to decrease testosterone production and to exert an estrogenic-like activity similar to or greater than BPA's, both pathways being potentially responsible for spermatogenesis impairment in rats and fish. CONCLUSION. The available in vivo, ex vivo, and in vitro data, although limited, coherently indicates that BPB meets the WHO definition of an endocrine disrupting chemical currently used in a regulatory context.

[Accès au document](#)

## What are the effective solutions to control the dissemination of antibiotic resistance in the environment ? A systematic review protocol

**Authors:** Goulas A., Livoreil B., Grall N., Benoit P., Couderc-Obert C., Dagot C., Patureau P., Petit F., Laouénan C., Andreumont A.

**Source:** Environmental Evidence volume 7, Article number: 3 (2018) Cite this article

The Correction to this article has been published in Environmental Evidence 2019 8:35

**Abstract:** Background-Antibiotic treatments are indispensable for human and animal health. However, the heavy usage of antibiotics has led to the emergence of resistance. Antibiotic residues, antibiotic-resistant bacteria and genes are introduced into the terrestrial and aquatic

environments via application of human and animal wastes. The emergence and the spread of antibiotic resistance in environmental reservoirs (i.e., soil, water, wildlife) threatens the efficacy of all antibiotics. Therefore, there is an urgent need to determine what effective solutions exist to minimize the dissemination of antibiotic resistance in the environment. The aim of this article is to describe the protocol of a systematic review of the literature considering these solutions. Methods-The primary questions addressed by the systematic review protocol are: how antibiotic resistance in the environment is impacted by changes in practice concerning (i) the use of antibiotics, (ii) the management of wastes or (iii) the management of the natural compartment. Bibliographic searches will be made in eleven publication databases as well as in specialist databases. Grey literature will also be searched. Articles will be screened regarding the inclusion and exclusion criteria at title, abstract and full-text levels. Studies where a causal relationship between the intervention and the outcome is made will be retained. After critical appraisal, data from the selected articles will be extracted and saved in a database validated by the expert panel. Study quality will be assessed by critical appraisal. Data will be compiled into a qualitative synthesis. If data availability and quality allow it, a quantitative synthesis will be carried out.

[Accès au document](#)

## Global distribution of earthworm diversity

**Authors:** Phillips HRP, Guerra CA, Bartz MLC, Briones MJ, Brown G, Crowther TW, Ferlian O, Gongalsky KB, den Hoogen J, Krebs J... More

**Source:** SCIENCE 366:480-485, 2019, DOI: 10.1126/science.aax4851

**Abstract:** Soil organisms, including earthworms, are a key component of terrestrial ecosystems. However, little is known about their diversity, their distribution, and the threats affecting them. We compiled a global dataset of sampled earthworm communities from 6928 sites in 57 countries as a basis for predicting patterns in earthworm diversity, abundance, and biomass. We found that local species richness and abundance typically peaked at higher latitudes, displaying patterns opposite to those observed in aboveground organisms. However, high species

dissimilarity across tropical locations may cause diversity across the entirety of the tropics to be higher than elsewhere. Climate variables were found to be more important in shaping earthworm communities than soil properties or habitat cover. These findings suggest that climate change may have serious implications for earthworm communities and for the functions they provide.

[Accès au document](#)

## Environmental geochemistry and bioaccumulation/bioavailability of uranium in a post-mining context - The Bois-Noirs Limouzat mine (France)

**Authors:** Husson A, Leermakers M, Descostes M, Lagneau V

**Source:** CHEMOSPHERE 236, UNSP 124341, 2019, DOI: 10.1016/j.chemosphere.2019.124341

**Abstract:** Knowledge on the bioavailability of trace elements is essential in developing environmental quality standards. The purpose of this study was to explore the relationships between trace elements (in particular Uranium (U)) in sediments, porewater and their bioaccumulation by *Chironomus riparius* on a uranium mining site and river sediments upstream of the mine. The mobility and speciation of U in sediments was investigated using DGT. Geochemical modelling using CHESS provided insight on sorption behavior of U on ironoxyhydrite (HFO) and aqueous speciation of U.

In the upstream site U concentrations found were 0.05  $\mu\text{mol g}^{-1}$  in surface sediment, 0.84  $\text{nmol L}^{-1}$  in porewater and 2.4  $\text{nmol g}^{-1}$  in *Chironomus riparius* whereas in the ferrihydrite deposits on the mining sites the concentrations found were up to 9.4  $\mu\text{mol g}^{-1}$  in surface sediment, 0.37  $\mu\text{mol L}^{-1}$  in porewater and 0.684  $\mu\text{mol g}^{-1}$  in *Chironomus riparius*. Despite the large differences in concentrations of U between the two sites, sediment to dissolved partitioning coefficients, bioconcentration factor (BCF) and biota sediment accumulation factors (BSAF) were very comparable. In the upstream sediment binding of



U to organic matter controls sorption and aqueous speciation of U, whereas in the HFO rich sediments, sorption on HFO and the formation of HFO colloids are the determining factors. The low BSAF factors and high BCF factors indicate that the bioaccumulation is due to uptake from the dissolved phase. The DGT probes with different binding resins provide information on the colloidal nature and lability of the dissolved U species. (C) 2019 Published by Elsevier Ltd.

[Accès au document](#)

## Copper phytoavailability in vineyard topsoils as affected by pyoverdine supply

**Authors:** Cornu JY, Randriamamonjy S, Gutierrez M, Rocco K, Gaudin R, Ouerdane L, Lebeau T

**Source:** CHEMOSPHERE 236:UNSP 124347, 2019, DOI: 10.1016/j.chemosphere.2019.124347

**Abstract:** Pyoverdine (Pvd) is a bacterial siderophore produced by some Pseudomonads species that can bind copper in addition to iron in soil. Pvd is expected to alter the dynamics and the ecotoxicity of Cu in vineyard soils. This study investigated the extent to which the mobility and the phytoavailability of Cu varied among vineyard soils with different pH and how they were affected by a supply of Pvd. Pvd was supplied (or not) to ten vineyard topsoils with pH ranging from 5.9 to 8.6 before metal was extracted with 0.005 M CaCl<sub>2</sub>. Cu mobility was assessed through its total concentration and Cu phytoavailability through its free ionic concentration measured in the CaCl<sub>2</sub> extract. Cu mobility varied by a factor of six and Cu phytoavailability by a factor of 5000 among the soil samples. In the CaCl<sub>2</sub> extract, the concentration of Cu<sup>2+</sup> was not correlated with the concentration of total Cu but was correlated with pH. This revealed that Cu phytoavailability depends to a great extent on Cu complexation in soil pore water, the latter being highly sensitive to pH. Adding Pvd enhanced the mobility of Cu in the soils including in carbonate soils. The Pvd-mobilization factor for Cu varied from 1.4 to 8 among soils, linked to the availability of Fe and Al in the solid phase and to Pvd partitioning between the solid and the liquid phase. Adding Pvd reduced the concentration of Cu<sup>2+</sup> in CaCl<sub>2</sub> extract, which challenges the idea of using Pvd-producing bacteria to promote Cu

phytoextraction. (C) 2019 Elsevier Ltd. All rights reserved.

[Accès au document](#)

## Environmental transcriptomes of invasive dreissena, a model species in ecotoxicology and invasion biology

**Authors:** Peden R, Poupin P, Sohm B, Flayac J, Giamberini L, Klopp C, Louis F, Pain-Devin S, Potet M, Serre RF, Devin S

**Source:** SCIENTIFIC DATA 6:234, 2019, DOI: 10.1038/s41597-019-0252-x

**Abstract:** Dreissenids are established model species for ecological and ecotoxicological studies, since they are sessile and filter feeder organisms and reflect in situ freshwater quality. Despite this strong interest for hydrosystem biomonitoring, omics data are still scarce. In the present study, we achieved full de novo assembly transcriptomes of digestive glands to gain insight into Dreissena polymorpha and D. rostriformis bugensis molecular knowledge. Transcriptomes were obtained by Illumina RNA sequencing of seventy-nine organisms issued from fifteen populations inhabiting sites that exhibits multiple freshwater contamination levels and different hydrosystem topographies (open or closed systems). Based on a recent de novo assembly algorithm, we carried out a complete, quality-checked and annotated transcriptomes. The power of the present study lies in the completeness of transcriptomes gathering multipopulational organisms sequencing and its full availability through an open access interface that gives a friendly and ready-to-use access to data. The use of such data for proteogenomic and targeted biological pathway investigations purpose is promising as they are first full transcriptomes for this two Dreissena species.

[Accès au document](#)



## Action-orientated research and framework: insights from the French long-term social-ecological research network

**Authors:** Bretagnolle, V; Benoit, M; Bonnefond, M; Breton, V; Church, JM; Gaba, S; Gilbert, D; Gillet, F; Glatron, S; Guerbois, C; Lamouroux, N; Lebouvier, M; Maze, C; Mouchel, JM; Ouin, A; Pays, O; Piscart, C; Ragueneau, O; Servain, S; Spiegelberger, T; Fritz, H

**Source:** ECOLOGY AND SOCIETY 24(3), 2019, DOI: [10.5751/ES-10989-240310](https://doi.org/10.5751/ES-10989-240310)

**Abstract:** Many social-ecological system (SES)-based approaches have been proposed to address environmental problems. Most social-ecological frameworks developed to date, however, lack clear operational linkages between humans and nature to efficiently guide SESs toward resilience. A conceptual framework designed to be operational is therefore necessary, as well as a network of research platforms with which to apply it. We defined explicit coupling processes that can be used as leverages to pilot an SES toward sustainability. We proposed to formalize an SES as a dynamic entity composed of two coupling interfaces, i.e., adaptive management and ecosystem services, both set within a landscape context to provide an actionable framework. These interfaces describe the way various actors, including scholars, benefit from and manage complex and changing interactions between the biophysical and social templates. Understanding the key processes underlying the interaction dynamics, especially those leveraging adaptive management processes, would help identify adaptive pathways for practices and collective actions, provide a crucial knowledge base for policy makers, and foster operationality as a requisite of an SES research agenda. Using several examples, we explained why long-term social-ecological research platforms provide an ideal operational network of research infrastructures to conduct place-based action-orientated research targeting the sustainability of SESs.

[Accès au document](#)

## A global synthesis reveals biodiversity-mediated benefits for crop production

**Authors:** Dainese, M; Martin, EA; Aizen, MA; Albrecht, M; Bartomeus, I; Bommarco, R; Carvalheiro, LG; Chaplin-Kramer, R; Gagic, V; Garibaldi, LA; Ghazoul, J; Grab, H; Jonsson, M; Karp, DS; Kennedy, CM; Kleijn, D; Kremen, C; Landis, DA; Letourneau, DK; Marini, L; Poveda, K; Rader, R; Smith, HG; Tscharrntke, T; Andersson, GKS; Badenhausser, I; Baensch, S; Bezerra, ADM; Bianchi, FJJA; Boreux, V; Bretagnolle, V; Caballero-Lopez, B; Cavigliasso, P; Cetkovic, A; Chacoff, NP; Classen, A; Cusser, S; Silva, FDDE; de Groot, GA; Dudenhoffer, JH; Ekroos, J; Fijen, T; Franck, P; Freitas, BM; Garratt, MPD; Gratton, C; Hipolito, J; Holzschuh, A; Hunt, L; Iverson, AL; Jha, S; Keasar, T; Kim, TN; Kishinevsky, M; Klatt, BK; Klein, AM; Krewenka, KM; Krishnan, S; Larsen, AE; Lavigne, C; Liere, H; Maas, B; Mallinger, RE; Pachon, EM; Martinez-Salinas, A; Meehan, TD; Mitchell, MGE; Molina, GAR; Nesper, M; Nilsson, L; O'Rourke, ME; Peters, MK; Plecas, M; Potts, SG; Ramos, DD; Rosenheim, JA; Rundlof, M; Rusch, A; Saez, A; Scheper, J; Schleuning, M; Schmack, JM; Sciligo, AR; Seymour, C; Stanley, DA; Stewart, R; Stout, JC; Sutter, L; Takada, MB; Taki, H; Tamburini, G; Tschumi, M; Viana, BF; Westphal, C; Willcox, BK; Wratten, SD; Yoshioka, A; Zaragoza-Trello, C; Zhang, W; Zou, Y; Steffan-Dewenter, I

**Source:** SCIENCE ADVANCES 5(10), 2019, DOI: [10.1126/sciadv.aax0121](https://doi.org/10.1126/sciadv.aax0121)

**Abstract:** Human land use threatens global biodiversity and compromises multiple ecosystem functions critical to food production. Whether crop yield-related ecosystem services can be maintained by a few dominant species or rely on high richness remains unclear. Using a global database from 89 studies (with 1475 locations), we partition the relative importance of species richness, abundance, and dominance for pollination; biological pest control; and final yields in the context of ongoing land-use change. Pollinator and enemy richness directly supported ecosystem services in addition to and independent of abundance and dominance. Up to 50% of the negative effects of landscape simplification on ecosystem services was due to richness losses of service-providing organisms, with negative consequences for crop yields. Maintaining the biodiversity of ecosystem service

providers is therefore vital to sustain the flow of key agroecosystem benefits to society.

[Accès au document](#)

## Toward the protection of bees and pollination under global change: present and future perspectives in a challenging applied science

**Authors:** Decourtye A, Alaux C, Le Conte Y, Henr, M

**Source:** CURRENT OPINION IN INSECT SCIENCE 35:123-131, 2019, DOI: [10.1016/j.cois.2019.07.008](https://doi.org/10.1016/j.cois.2019.07.008)

**Abstract:** Over the past 30 years (1987-2016), bibliometric data have shown a drastic change in the scientific investigation of threats to bee populations. Bee research efforts committed to studying bioagressors of honeybees (mainly *Varroa* sp.) were predominant, but now appear to be shifting from bioagressors to global change in the published literature. This rise of global change science reveals prevailing topics, for current and future years: climate change, landscape alteration, agricultural intensification and invasive species. We argue that with increased investment in applied research and development, the scientific, beekeeping and agricultural communities will be able to find management strategies for productive agrosystems and enhanced resilience of pollination and beekeeping. This implies the need for restoring and improving food resources and shelters of bees by ecological intensification of diversified farming systems, and also reconciling sustainable beekeeping with wild pollinator conservation.

[Accès au document](#)

## Bee pollination outperforms pesticides for oilseed crop production and profitability

**Authors:** Catarino R, Bretagnolle V, Perrot T, Vialoux F, Gaba S

**Source:** PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES 286, 1912, 2019, DOI: [10.1098/rspb.2019.1550](https://doi.org/10.1098/rspb.2019.1550)

**Abstract:** Nature-based agriculture that reduces dependency on chemical inputs requires using ecological principles for sustainable agroecosystems, aiming to balance ecology, economics and social justice. There is growing evidence that pollinator-dependent crops with high insect, particularly bee, pollination service can give higher yields. However, the interacting effects between insect pollination and agricultural inputs on crop yields and farm economics remain to be established to reconcile food production with biodiversity conservation. We quantified individual and combined effects of pesticides, insect pollination and soil quality on oilseed rape (*Brassica napus* L.) yield and gross margin, using a total of 294 farmers' fields surveyed between 2013 and 2016. We show that yield and gross margins are greater (15-40%) in fields with higher pollinator abundance than in fields with reduced pollinator abundance. This effect is, however, strongly reduced by pesticide use. Greater yields may be achieved by either increasing agrochemicals or increasing bee abundance, but crop economic returns were only increased by the latter, because pesticides did not increase yields while their costs reduced gross margins.

[Accès au document](#)

## Monitoring and Origin of Polycyclic Aromatic Hydrocarbons (PAHs) in Effluents from a Surface Treatment Industry

**Authors:** Euvrard E, Druart C, Morin-Crini N, Crini G

**Source:** POLYCYCLIC AROMATIC COMPOUNDS 39(5):452-461, 2019, DOI: [10.1080/10406638.2017.1342666](https://doi.org/10.1080/10406638.2017.1342666)

**Abstract:** In Europe, polycyclic aromatic hydrocarbons (PAHs) are a source of concern due to their toxic effects and are considered as priority pollutants by water authorities. In this study, we reported the results of qualitative and quantitative monitoring of 16 PAHs in effluents from a surface treatment industry to determine

their origin. The results indicated that PAHs were present in the discharge waters at a concentration of 500 ng L<sup>-1</sup> (in average for the PAH sum). However, the further we returned to the start of the industrial process, the more the PAH concentrations increased. Indeed, the highest concentrations (>20,000 ng L<sup>-1</sup> for the PAH sum) were found in the degreasing baths ? the first step in the part treatment. The final analyses showed that the PAHs came from the oils left on the metal parts by the suppliers. The important difference in concentrations between the upstream (first baths in the production line) and the downstream (discharge water) of the effluent showed that phenomena including dilution or potentially degradation occurred but that the major part of the PAHs tended to adsorb to sludge during the settling step in the effluent treatment plant.

[Accès au document](#)

## A dual mixture of persistent organic pollutants modifies carbohydrate metabolism in the human hepatic cell line HepaRG

**Authors:** Leblanc AF, Attignon EA, Distel E, Karakitsios SP, Sarigiannis DA, Bortoli S, Barouki R, Coumoul X, Aggerbeck M, Blanc EB

**Source:** ENVIRONMENTAL RESEARCH 178, 2019, DOI: [10.1016/j.envres.2019.108628](https://doi.org/10.1016/j.envres.2019.108628)

**Abstract:** Individuals as well as entire ecosystems are exposed to mixtures of Persistent Organic Pollutants (POPs). Previously, we showed, by a non-targeted approach, that the expression of several genes involved in carbohydrate metabolism was almost completely inhibited in the human hepatic cell line HepaRG following exposure to a mixture of the organochlorine insecticide alpha-endosulfan and 2,3,7,8 tetrachlorodibenzo-p-dioxin. In this European HEALS project, which studies the effects of the exposome on human health, we used a Physiologically Based BioKinetic model to compare the concentrations previously used in vitro with in vivo exposures for humans. We investigated the effects of these POPs on the levels of proteins, on glycogen content, glucose production and the oxidation of glucose into CO<sub>2</sub>

and correlated them to the expression of genes involved in carbohydrate metabolism as measured by RT-qPCR. Exposure to individual POPs and the mixture decreased the expression of the proteins investigated as well as glucose output (up to 82%), glucose oxidation (up to 29%) and glycogen content (up to 48%). siRNAs that specifically inhibit the expression of several xenobiotic receptors were used to assess receptor involvement in the effects of the POPs. In the HepaRG model, we demonstrate that the effects are mediated by the aryl hydrocarbon receptor and the estrogen receptor alpha, but not the pregnane X receptor or the constitutive androstane receptor. These results provide evidence that exposure to combinations of POPs, acting through different signaling pathways, may affect, more profoundly than single pollutants alone, metabolic pathways such as carbohydrate/energy metabolism and play a potential role in pollutant associated metabolic disorders.

[Accès au document](#)

## Application of the European Water Framework Directive : Identification of reference sites and bioindicator fish species for mercury in tropical freshwater ecosystems (French Guiana)

**Authors:** Gentes S, Coquery M, Vigouroux R, Hanquiez V, Allard L, Maury-Brachet R

**Source:** ECOLOGICAL INDICATORS 106, 2019, DOI: [10.1016/j.ecolind.2019.105468](https://doi.org/10.1016/j.ecolind.2019.105468)

**Abstract:** Mercury (Hg) is a toxic metal subject to several international regulations. The European Water Framework Directive (WFD) established in 2008 an Environmental Quality Standard for biota (EQS(biota)) at 0.02 µg.g<sup>-1</sup> fresh weight. This standard is not always adapted, such as in French Guiana subjected to high natural background Hg levels and intensive illegal gold mining. Therefore, this study focuses on how to apply the WFD for the definition of good chemical status (i.e., EQS(biota)) in a context of strong and generalized natural and anthropic Hg contamination. Based on Hg

concentrations measured in 6208 fish over 200 sites between 2004 and 2015, we first aimed at discriminating the natural or anthropogenic influences at each site. Then, as WFD recommends considering only high trophic level fish species as bioindicator species, we selected carnivorous/piscivorous fish species able to significantly accumulate Hg and discriminate reference sites from gold mining polluted sites. Total Hg concentrations measured in fish muscle were mostly above the EQS(biota) (100% for creeks and 84% for rivers), confirming the unsuitability of the direct application of this standard in French Guiana. Among the studied sites, few potential reference sites were identified: eight sites spread over six different watersheds for creeks, and only two areas (group of sites) both on the Oyapock watershed for rivers. Several relevant bioindicator fish species are proposed: ten species (over 35 species tested) belonging to seven genera on creeks (*Moenkhausia oligolepis*, *Gymnotus carapo*, *Sternopygus macrurus*, *Jupiaba* [abramoides + keithi], *Pimelodella* [cristata + geryi + macturki], *Copella carsevennensis*, *Pyrrhulina filamentosa*.), and four species (over 21 species tested) belonging to three genera on rivers (*Acestrorhynchus* [micropelis + falcatus], *Hoplias aimara*, *Ageneiosus inermis*). In order to facilitate field sampling, difficult in such remote hydrosystems, and to improve results interpretation, we tested the possibility to group some of these species. Our results indicate that only *Jupiaba*, *Moenkhausia*, *Pimelodella* and *Pyrrhulina* on creeks could be grouped; and the three bioindicator species proposed on rivers could be pooled. Finally, this work proposes in situ-based reference Hg concentrations for selected bioindicator fish species from French Guiana as an alternative to detect Hg-impacted sites and help the application of the WFD in tropical systems.

[Accès au document](#)

## COLLOQUES

### Colloque de la SEFA : 2-3 juillet 2020 à Versailles



Colloque 2020 de la Société Française d'Ecotoxicologie Fondamentale et Appliquée

à Versailles,

les 2 et 3 juillet 2020

La SEFA rassemble une grande partie de la communauté de chercheurs et d'ingénieurs en écotoxicologie qui mènent des travaux sur la contamination chimique des milieux (air, sol, eau) et ses conséquences en termes d'exposition des organismes, ainsi que sur les impacts de cette contamination sur la qualité des écosystèmes terrestres et aquatiques.

<https://colloque.inra.fr/sefa2020>

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## OUVRAGES / RAPPORTS / ACTES DE CONGRES

### The Exposome - 2<sup>nd</sup> Edition



The Exposome: A New Paradigm for the Environment and Health, Second Edition, is a thoroughly expanded and updated edition of The Exposome: A Primer, the first book dedicated to the topic.

This new release outlines the purpose and scope of this emerging field of study, its practical



applications, and how it complements a broad range of disciplines. The book contains sections on -omics-based technologies, newer detection methods, managing and integrating exposome data (including maps, models, computation and systems biology), and more. Both students and scientists in toxicology, environmental health, epidemiology and public health will benefit from this rigorous, yet readable, overview.

This updated edition includes a more in-depth examination of the exposome, including full references, further reading and thought questions.

#### Readership

Graduate students and professional scientists interested in environmental mediators of disease. These include students and scientists from such disciplines as toxicology, environmental health sciences, epidemiology, genetics, public health, medicine, and nursing

#### Table of Contents

1. Introduction: The Need of the Exposome
2. Genes, Genomes and Genomics: A Historical Perspective of Genomics up to Modern Day Advances
3. What is Nurture?
4. The Environment: The Good, the Bad and the Ugly
5. Collecting Exposure Information, Signals, Noise and Noise-Measure
6. Technological Issues
7. Exposome and Pathways
8. Big Data for the Exposome
9. The Exposome in the Community
10. The Exposome in Large Human Studies
11. The Exposome in the Future

[Accès au document](#)

## Physical Chemistry of Atmospheric Pollution - Juan Cuesta

- What are the most harmful air pollutants ?
- What are the main impacts of these pollutants on health and the environment ?

- What are the sources of these two major pollutants ?
- What about ozone pollution ?
- What are the physico-chemical mechanisms that affect the evolution and distribution of pollutants in the atmosphere?
- Why do we have peaks of atmospheric pollution?

[Accès au document](#)

## Dépolluer la planète



Auteur Médaille d'or du CNRS, Jean Weissenbach est biologiste. Pionnier dans l'exploration et l'analyse des génomes, en particulier de celles du génome humain, il a longtemps dirigé le Génoscope.

Il s'intéresse aujourd'hui aux micro-organismes de l'environnement.

Sols contaminés, eaux souillées, rejets toxiques, etc. Si la présence de polluants dans la biosphère remonte à la nuit des temps, l'augmentation de la population de la planète et l'accroissement des activités humaines ont provoqué une multiplication des cas de pollution depuis le début de l'ère industrielle. Que l'on parle de plastiques, d'hydrocarbures, de pesticides, d'arsenic... à chaque fois, le constat est le même : il est très difficile de décontaminer les sites pollués. La bio-remédiation pourrait néanmoins constituer une réponse efficace et naturelle à ce problème environnemental. Cette pratique consiste à mobiliser les organismes vivants (micro-organismes ou plantes) pour réaliser ou accélérer la dégradation des polluants, et les transformer en substances inoffensives. Jean Weissenbach nous introduit de manière claire au fonctionnement de la bio-remédiation, et à la façon dont elle permet d'inactiver naturellement des polluants.

[Accès au document](#)



## De la modélisation des techniques aux OAD, l'apport du numérique pour optimiser la pulvérisation des produits phytosanitaires

Séminaire de la Chaire AgroTIC - 3 décembre 2019 - Bordeaux Sciences Agro

La réduction des intrants (engrais, produits phytosanitaires, eau, énergie...) est aujourd'hui une problématique majeure en agriculture.

Les technologies numériques font partie des leviers identifiés pour relever le défi de produire mieux avec moins. Le champ d'investigation est large : agriculture de précision, outils et méthodes alternatifs, nouveaux outils de modélisation et de communication... Le numérique au service de la réduction des intrants soulève également de nombreuses questions relatives aux changements profonds de la façon de travailler, voire de penser, pour les acteurs du monde agricole. [...]

Ce séminaire s'adresse à un public large : professionnels du monde agricole, entreprises du numérique et de l'agro-fourmiture, acteurs de la recherche et de l'innovation, étudiants, institutions...

Séminaire animé par Pierre Compère, Agri Sud-Ouest Innovation

[Accès au document](#)

## Du conseil à la mise en oeuvre, retour d'expérience sur l'apport d'un outil d'aide à la décision pour la réduction des traitements fongicides en blé tendre

Séminaire de la Chaire AgroTIC - 3 décembre 2019 - Bordeaux Sciences Agro

La réduction des intrants (engrais, produits phytosanitaires, eau, énergie...) est aujourd'hui une problématique majeure en agriculture.

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mieux avec moins. Le champ d'investigation est large : agriculture de précision, outils et méthodes alternatifs, nouveaux outils de modélisation et de communication... Le numérique au service de la réduction des intrants soulève également de nombreuses questions relatives aux changements profonds de la façon de travailler, voire de penser, pour les acteurs du monde agricole. [...]

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## Pollution of Water Bodies in Latin America

Book - Springer

The indiscriminate use of chemical substances in industrial processes and anthropogenic activities, have resulted in the release of these compounds into aquatic ecosystems through municipal, hospital and industrial discharges, producing various undesired effects on the environment and on species of ecological interest. These compounds, such as metals, pesticides, emerging pollutants and other substances are persistent and susceptible to biotic and/or abiotic transformations, yielding metabolites that can be more toxic than the original compounds. In this book, researchers from diverse environmental science disciplines share their experiences in countries such as Argentina, Brazil, Colombia and Mexico, and critically examine the problem of contaminants in aquatic ecosystems in Latin America, as well as the risks presented by their presence.

DOI <https://doi.org/10.1007/978-3-030-27296-8>

[Accès au document](#)

## Le numérique au service de la réduction des intrants

Canal-u 20/11/19

Séminaire de la Chaire AgroTIC - 3 décembre 2019 - Bordeaux Sciences Agro

La réduction des intrants (engrais, produits phytosanitaires, eau, énergie...) est aujourd'hui une problématique majeure en agriculture.

Les technologies numériques font partie des leviers identifiés pour relever le défi de produire

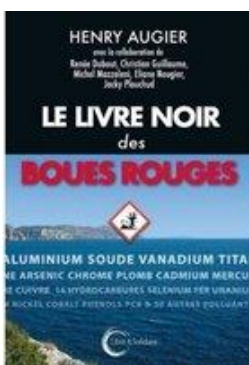
mieux avec moins. Le champ d'investigation est large : agriculture de précision, outils et méthodes alternatifs, nouveaux outils de modélisation et de communication... Le numérique au service de la réduction des intrants soulève également de nombreuses questions relatives aux changements profonds de la façon de travailler, voire de penser, pour les acteurs du monde agricole.

Ainsi, ce séminaire, qui ponctuera le premier cycle de vie de la Chaire AgroTIC, souhaite apporter un éclairage transversal sur ce sujet. Par le biais d'interventions d'experts scientifiques et techniques et de retours d'expérience, différentes questions pourront être abordées telles que : Quels enjeux liés au numérique au service de la réduction des intrants ? Quelles solutions, actuelles ou en perspective, selon les types d'intrants ? Les technologies numériques permettent-elles réellement de réduire les intrants ? Quelles conditions pour que le numérique soit un levier efficace pour la réduction des intrants ? Quels risques, quels verrous ?

Ce séminaire s'adresse à un public large : professionnels du monde agricole, entreprises du numérique et de l'agro-fourmiture, acteurs de la recherche et de l'innovation, étudiants, institutions...

[Accès au document](#)

## Le livre noir des boues rouges



**Auteur :** Renée DUBOUT, Christian GUILLAUME, Michel MAZZOLENI

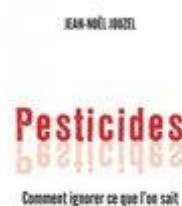
**Editeur :** LIBRE ET SOLIDAIRE

Les rejets massifs de boues polluantes en Méditerranée par l'usine d'alumine de Gardanne ont duré depuis plus de cinquante ans, opérations couvertes par les autorités locales et nationales.

Des dizaines de millions de tonnes recouvrent à jamais les fonds marins profonds entre Toulon et Fos-sur-Mer. Aujourd'hui, l'industriel continue son massacre environnemental en répandant en mer comme sur terre ses effluents et déchets pollués. La partie marine du Parc national des Calanques est empoisonnée. La France, pays du Grenelle de l'Environnement et de la COP 21, ferme les yeux sur ce scandale. Pourtant, cet ouvrage démontre qu'une solution simple et sans conséquence sur l'emploi peut arrêter ce gâchis. Vous y découvrirez ces faits révoltants et bien réels, conséquence du laxisme des élus. Un véritable déni de nos valeurs démocratiques.

[Accès au document](#)

## Pesticides : Comment ignorer ce que l'on sait



**Auteur :** Jean-Noël JOUZEL

**Editeur :** SCIENCES PO LES PRESSES ;  
Collection :  
Domaine :  
Gouvernances

Les pesticides sont des produits dangereux. Pour cette raison, ils comptent parmi les substances chimiques les plus surveillées et ce, depuis des décennies.

Des agences d'évaluation des risques contrôlent leur mise sur le marché et assurent une toxicovigilance de leurs effets sur la santé. Comment alors expliquer l'accumulation de données épidémiologiques qui attestent la sur-incidence de pathologies chroniques - maladies neurodégénératives, hémopathies malignes, cancers - parmi les populations humaines les plus exposées, et en particulier les agriculteurs ? Pourquoi des résultats aussi inquiétants sont-ils si peu de répercussion sur les autorisations de mise en vente ? Le sociologue Jean-Noël Jouzel a mené l'enquête en France et aux Etats-Unis pour comprendre ce qui conduit les agences d'évaluation à ignorer volontairement certaines données scientifiques lorsqu'elles n'ont pas été

élaborées selon les normes de la toxicologie réglementaire. Les industriels ont bien compris le profit qu'ils pouvaient tirer de cette routine normative. Ils ont en effet tout intérêt à suivre ce cadre, disposant par ailleurs des ressources matérielles nécessaires pour s'y conformer.

[Accès au document](#)

## La fin du monde pour tous



Le climat se dérègle à une vitesse inouïe. La disparition des insectes, oiseaux et autres mammifères est désormais une réalité. L'eau se charge de microfibres plastiques, l'air n'est plus qu'un concentré de métaux lourds et nos aliments sont bourrés d'additifs, de pesticides et de perturbateurs endocriniens. L'urgence de la situation nous oblige à agir, et vite. Une autre voie est non seulement souhaitable mais possible.

Signé par Stéphane Kerckhove, délégué général d'Agir pour l'environnement, et magnifiquement illustré par Red !, ce livre traite avec brio et ironie de cet écocide en cours. Il laisse la parole aux arbres qu'on arrache, aux mers qu'on pollue, aux migrants qu'on laisse sombrer, aux malades qui souffrent en silence... Un cri, mille cris qu'il faut entendre avant que la nature ne meure.

[Accès au document](#)

## REVUE DE PRESSE

### Persistent organic pollutants in mother's blood linked to smaller fetal size

EurekaAlert! 30/12/19

Pregnant women exposed to persistent organic pollutants, or POPs, had slightly smaller fetuses than women who haven't been exposed to these chemicals, according to an analysis of ultrasound scans by researchers at the National Institutes of Health and other institutions. The researchers also found that the women in their study had lower levels of POPs than women in the 2003-2004 U.S. Health and Nutrition Survey, the most recent comprehensive study of these compounds in U.S. pregnant women. The latest findings suggest that the chemicals, which are no longer produced in the United States but persist in the environment, may have lasting health effects even at low levels.

The study appears in JAMA Pediatrics and was conducted by Pauline Mendola, Ph.D., an investigator in the Epidemiology Branch at NIH's Eunice Kennedy Shriver National Institute of Child Health and Human Development, and colleagues. [...]

[Accès au document](#)

### Publication officielle des textes encadrant les pesticides : le compte n'y est pas !

Génération Futures 30/12/19

Rappel des faits [...]

Analyse de l'arrêté et du décret.

Le décret (1) encadrant les chartes et l'arrêté (2) fixant notamment les futures zones de non traitement sont finalement parus au Journal Officiel ce dimanche 29 décembre (les textes sont eux datés du 27/12). Ils sont très en deçà de cette attente !

Concernant l'arrêté, rien de vraiment nouveau par rapport à la version mise en consultation du public en octobre si ce n'est un élargissement de

10 à 20 mètres de la ZNT pour les produits les plus dangereux qui de toute façon ne concernera qu'un nombre très faible de produits. En outre, comme l'obligation d'informer le public sur la nature des produits n'est toujours pas rendue obligatoire par ces textes, les riverains devront faire « confiance » à l'agriculteur qui épand ces produits pour le respect des ZNT pour lesquelles il pourra d'ailleurs déroger (quand il ne s'agira pas des produits les plus dangereux) à partir du moment où il adopte certains dispositifs soi-disant antidérives...

Concernant le décret qui porte spécifiquement sur les chartes, comme pour l'arrêté rien de nouveau. Très peu de contraintes (notamment aucune obligation d'informer précisément les riverains sur les pulvérisations à venir) et une gestion unique dans les mains des utilisateurs sans réelles possibilité de négociation et d'évolution favorable aux riverains !

« Générations Futures dénonce le manque total d'ambition de ces textes qui ne changeront rien sur le terrain et ne protégeront nullement les riverains des zones d'utilisation de pesticides » déclare François Veillerette, Directeur de Générations Futures. « Le compte n'y est pas et notre association, sollicitée également par des associations de consommateurs et de médecins, va déposer très prochainement un recours en justice contre ces textes. » ajoute t'il

[Accès au document](#)

## **SDHI Une commission indépendante alerte plusieurs ministères**

**Terre-Net 19/11/19**

La Commission de déontologie et des alertes (CNDASPE) a annoncé mardi avoir attiré l'attention de plusieurs ministères sur les fongicides SDHI et recommande de poursuivre les recherches à ce sujet.

« La CNDASPE a informé les ministres chargés de l'environnement, de la santé, de la recherche, de l'agriculture, des sports que le signalement reçu sur les dangers des SDHI est constitutif d'une alerte », selon un communiqué de presse.

« La Commission recommande la poursuite des travaux de recherche et en conséquence des financements dédiés, pour améliorer les

connaissances sur les dangers identifiés et réduire les incertitudes qui demeurent sur les risques » pour les humains, selon le communiqué. [...]

[Accès au document](#)

## **Glyphosate : les usages dérogatoires, ultime champ de bataille ?**

**Journal de l'environnement 13/11/19**

La sortie du glyphosate se rapproche : au 1er janvier 2021, seront interdits les usages agricoles où il existe une alternative à cet herbicide. Dans un rapport d'étape publié mardi 12 novembre, une commission parlementaire appelle à presser le pas pour clarifier les usages dérogatoires, tout en pointant les difficultés techniques et financières qui guettent la profession. [...]

[Accès au document](#)

## **Glyphosate, les urines de la discorde**

**Campagnes et environnement 06/11/19**

Alors que la recherche de glyphosate dans les urines est devenue une arme de communication dans les débats sur la molécule polémique, la question de la méthode d'analyse prend de l'épaisseur : les deux types de tests pratiqués semblent aboutir à des résultats discordants... [...]

Pour Anthony Guihur, créateur du collectif « No Fake Science » et chercheur en biologie moléculaire végétale à l'Université de Lausanne, trancher la question ne serait pas si compliqué. « Il suffit de tester des échantillons d'eau avec des doses précises de glyphosate avec les deux méthodes, suggère-t-il. Une manière simple de déterminer leur fiabilité. » Plusieurs acteurs de l'agriculture, lassés par la polémique, seraient prêts à financer une telle expérimentation pour faire la lumière sur ce débat. En attendant, Anthony Guihur rappelle que détection ne signifie pas danger : « Même si les taux relevés dans les urines des « pisseurs volontaires » correspondaient réellement à du glyphosate, [les](#)

[quantités évoquées sont clairement sans risque pour la santé.](#)

[Accès au document](#)

## Biggest ever human screening for toxic chemicals in Europe

EEB 08/11/19

- Chemical safety laws are failing, NGOs warn
- Brussels to strengthen regulations this winter

Evidence of widespread contamination from harmful man-made chemicals has triggered the largest human screening programme ever seen in Europe.

Biomonitoring has found that Europeans absorb hundreds of industrial chemicals, with contamination from phthalates, bisphenol A and PFAS considered a “serious public health problem”. Most of the population is contaminated by some forms of persistent and toxic chemicals. Children are found with higher concentrations of some substances than their mothers and carry “alarming” levels of PFAS. The findings are echoed by the WHO.

Now scientists are carrying out the first ever harmonised snapshot of exposure in Europe. The €74 million human biomonitoring programme HMB4EU ([video](#)) has taken blood, urine and other biological samples from thousands of children, teenagers and adults in over 20 European countries from a range of socio-economic backgrounds. The scientists are checking levels of human contamination from 18 of the most concerning chemical groups, including flame retardants, pesticides, plasticisers and the ‘forever chemicals’ family PFAS.[...]

[Accès au document](#)

## SDHI : Rustin en voie de séralinisation ?

Alerte-Environnement 08/11/19

Pierre Rustin, qui n’est pas n’importe qui, un chercheur reconnu même (un peu « fou » disent certains mais sans connotation négative), vient de publier dans la revue scientifique PLOS One une étude qui affirme que l’utilisation des SDHI, une classe de pesticides destinée à lutter contre les champignons et moisissures autorisée en Europe depuis la fin des années 2000, provoque des pathologies chez l’être humain.

Sur la forme : Nous assistons à une inquiétante mutation, celle d’un chercheur émérite au CNRS en militant qui a parfaitement compris les « séquences de la communication » et pilote parfaitement celle-ci. [...]

De quoi nous faire craindre pour Pierre Rustin une pathologie qui n’a (vraiment) rien à voir avec les phytos : [la séralinisation](#)

[Accès au document](#)

## Mortalité des abeilles : les phytos dans l’agriculture accusés à tort

Alerte-Environnement 08/11/19

Les médias en ont peu parlé et pourtant, cette affaire éclaire d’un jour nouveau la surmortalité récente des abeilles. Comptant 40% de perte naturelle dans ses essaims entre avril et septembre 2015, un apiculteur d’Anjou avait eu l’intuition que les feuilles de cire achetées à un fournisseur de la région, étaient à l’origine de cette mortalité, rapporte Le Courrier de l’Ouest du 30 octobre 2019. Il avait du nez... et du courage. [...]

[Accès au document](#)

## Companies that Claim Sustainable Sourcing Lack Criteria, Virtually None Includes Pesticide Use

Beyond Pesticides, 08/11/19



new report out from As You Sow – 2019 Pesticides in the Pantry: Transparency and Risk in Food Supply Chains – focuses on the risks that agricultural pesticide use represents for food manufacturers, and offers recommendations and benchmarks for improvement in the areas of management and transparency. The report concludes that companies typically have some sort of sustainable sourcing program within their supply chains, but that most of those “lack clear criteria,” and virtually none of them includes pesticide use as an indicator.

[Accès au document](#)