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## Edito

Voici notre 53ème bulletin de veille, qui nous espérons toujours informatif !

Nous vous proposons dans ce bulletin une tribune concernant la méthode PICT (Pollution-Induced Community Tolerance), un outil complémentaire pour l'évaluation du risque et le biomonitoring des pesticides. La tribune est téléchargeable sous forme de fiche thématique sur notre site ECOTOX : https://www6.inrae.fr/ecotox/Productions/Fiches-thematiques/Fiche-thematique-N-35-octobre-2021
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L'équipe vous souhaite une bonne lecture de ce bulletin !

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# Tribune libre

## La méthode PICT (Pollution-Induced Community Tolerance), un outil complémentaire pour l'évaluation du risque et le biomonitoring des pesticides ?

### Introduction

Le concept du PICT – La méthode PICT (Pollution- Induced Community Tolerance) proposée par Blanck et al., (1988) est basée sur l'hypothèse qu'une communauté biologique préalablement soumise à la pression d'un toxique dans son environnement, sera plus tolérante à celui-ci. Une communauté biologique regroupe différents « composants », génotypes ou phénotypes, ayant une sensibilité différente vis-à-vis du toxique étudié. L'augmentation de la tolérance de la communauté résulte de plusieurs phénomènes induits par son exposition, dont l'adaptation et/ou l'acclimatation des populations, et/ou des changements dans la composition des espèces. Les organismes les plus sensibles, exposés au toxique à une concentration et pendant une durée suffisantes, sont directement éliminés ou ne sont plus concurrentiels et sont remplacés par des organismes plus tolérants, provoquant ainsi une succession induite par le toxique (TIS) (Blanck, 2002). La structure des peuplements est alors modifiée, et la communauté qui en résulte présente une tolérance supérieure au toxique, en comparaison à une communauté semblable mais n'ayant pas été préalablement exposée (témoin correspondant à la « ligne de base » de tolérance du milieu).

Concrètement, si l'on a le moyen de mesurer la sensibilité de cette communauté (préalablement exposée au toxique) à ce toxique, celle-ci devrait avoir une sensibilité moindre que celle attendue (i.e. celle des témoins). L'analyse de la diversité au sein de la communauté doit également montrer des modifications, pouvant conduire jusqu'à la disparition des taxons les plus sensibles.

Outre les intérêts de cette méthode pour étudier les processus écologiques et physiologiques de sélection et d'adaptation vis-à-vis d'un toxique, elle présente un atout fort pour l'évaluation du risque écotoxicologique à priori et à postériori : la mise en évidence de la relation de cause à effet entre l'exposition d'un contaminant dans le milieu (qu'il soit in situ ou dans le cadre d'expérimentations contrôlées) et les effets sur la communauté, intégrant la complexité structurelle et fonctionnelle du système étudié (Tlili et al., 2015).

Le PICT tient compte des différences de sensibilité des espèces et des interactions interspécifiques au sein de la communauté, alors que celles-ci ne sont pas prises en compte dans les tests monospécifiques (McClellan, et al., 2008).

Le principe du PICT est d'échantillonner une communauté préalablement exposée à un toxique de manière chronique in situ ou expérimentalement (*phase de sélection*), et de l'exposer à ce même toxique dans le cadre d'un bioessai contrôlé, afin d'en mesurer la sensibilité (courbe dose-réponse, CE50 …), et de la comparer à celle d'une communauté comparable issue d'un milieu non contaminé considéré comme témoin (*phase de détection*). Parallèlement à ces mesures de sensibilité, les communautés comparées sont caractérisées par leur structure taxonomique (et/ou fonctionnelle).

Cette méthode a été appliquée dans divers contextes, marins, d'eaux douces, terrestres, principalement sur les communautés microbiennes (phyto et bactérioplancton, biofilms autotrophes et hétérotrophes, communautés microbiennes autotrophes et hétérotrophes de sédiments et de sols …). Les microorganismes présentent des temps de génération courts, favorisant les études sur la sélection, et de nombreux protocoles éprouvés permettent de mesurer diverses activités globales à l'échelle des communautés, favorisant la pratique de bioessais pour évaluer la tolérance induite. De plus rares travaux impliquent des macroorganismes dans des études PICT (*Millward et al., 1995,* Courtney L.A. & Clements, 2000, *Knopper et*

*al., 2002, Oguma et al., 2017*), dont une étude très récente qui a mis en évidence un phénomène d'acquisition de tolérance de communautés zooplanctoniques exposées au glyphosate (Hébert et al., 2021).

**La Méthode** (Fig.1)

1- La phase de sélection : au cours de laquelle la communauté biologique est soumise de manière chronique au toxique dans le milieu. C'est lors de cette phase que le contact entre le contaminant et la communauté doit être établi (biodisponibilité avérée), et que la durée d'exposition doit être suffisante pour induire un phénomène de sélection. Notons qu'en contexte expérimental (microcosmes, ou enclos), les paramètres de durée, d'application et de niveau d'exposition au toxique étudié sont contrôlés. Ces paramètres contrôlés ainsi que le choix entre des systèmes ouverts ou clos (permettant ou non les échanges d'organismes de la communauté étudiée avec l'extérieur) impacteront le processus de sélection et le rétablissement éventuel des communautés étudiées (Lambert et al., 2012, Blanck, 2002).

L'échantillonnage des organismes qui seront testés lors de la phase de détection est primordial. Il doit être le plus représentatif possible afin de saisir l'histoire de contamination chronique de la communauté étudiée. Pour les milieux aquatiques, différents systèmes de colonisation de biofilms sur des supports artificiels ont été développés (Blanck, 1985) : ici encore la durée de colonisation (15 jours à 3 semaines généralement) impacte cette phase de détection. Les échantillonnages des communautés aquatiques in situ peuvent poser le problème de l'ignorance de leur origine (en particulier pour le plancton susceptible de se déplacer avec les courants par exemple, mais la question se pose aussi pour les biofilms) et donc de leur exposition au toxique (Dorigo et al., 2004). L'échantillonnage des communautés microbiennes des sols et des sédiments nécessite parfois de passer par une phase d'extraction des organismes de la matrice complexe (Bérard et al., 2004), avec des biais de sélection possibles. Aucune méthode d'échantillonnage n'est totalement satisfaisante (constat général en écologie), il est important de prendre en compte ces éventuels biais dans l'interprétation des mesures lors de la phase de détection.

2-La phase de détection : au cours de laquelle la communauté biologique échantillonnée (ayant subi une exposition chronique préalable), est soumise de manière aigue au toxique incriminé dans le cadre de bioessais contrôlés. Le point final de mesure de l'effet toxique (endpoint) est généralement adapté au mode d'action du toxique incriminé et peut cibler certaines communautés microbiennes (exemple : phototrophes versus hétérotrophes). Divers endpoints ont été utilisés dans le cadre d'études PICT : en particulier l'incorporation du $^{14}C$ (Blanck et al., 1988 Bérard et Benninghoff, 2001, *Schmitt-Jansen et Altenburger, 2005)* et la fluorescence in vivo (Seguin et al. 2002), la fluorimétrie PAM (Schmitt-Jansen et *Altenburger*, 2008, Magnuson et al., 2012), la synthèse des sulfolipides membranaires (Nyström et al., 2000), et des endpoints ciblant les communautés hétérotrophes tels que l'incorporation de la thymidine et de la leucine tritiées (Demoling et al., 2009), les éco-plaques (type Biolog, Rutger et al., 1999), la respiration microbienne (Dorigo et al., 2007, Tlili et al., 2011, Wakelin et al., 2014), les activités enzymatiques (Tlili et al., 2010, Bonnineau et al., 2013), l'oxydation potentielle de l'ammonium (Gong et al., 2002) ou du méthane (Seghers et al., 2003).

3-La validation : la validation de l'hypothèse PICT est généralement réalisée avec des caractérisations de la structure des communautés testées (structure taxonomique et/ou fonctionnelle), ainsi que par des mesures chimiques de la contamination des milieux étudiés. L'induction de tolérance par l'exposition des communautés aux polluants repose donc sur i) un historique de contamination préalable du milieu étudié (monde réel ou expérimental), ii) une modification de la structure des communautés (biodiversité et abondance des organismes) et iii) une diminution de la sensibilité à court terme lors d'une exposition expérimentale au(x) polluant(s).

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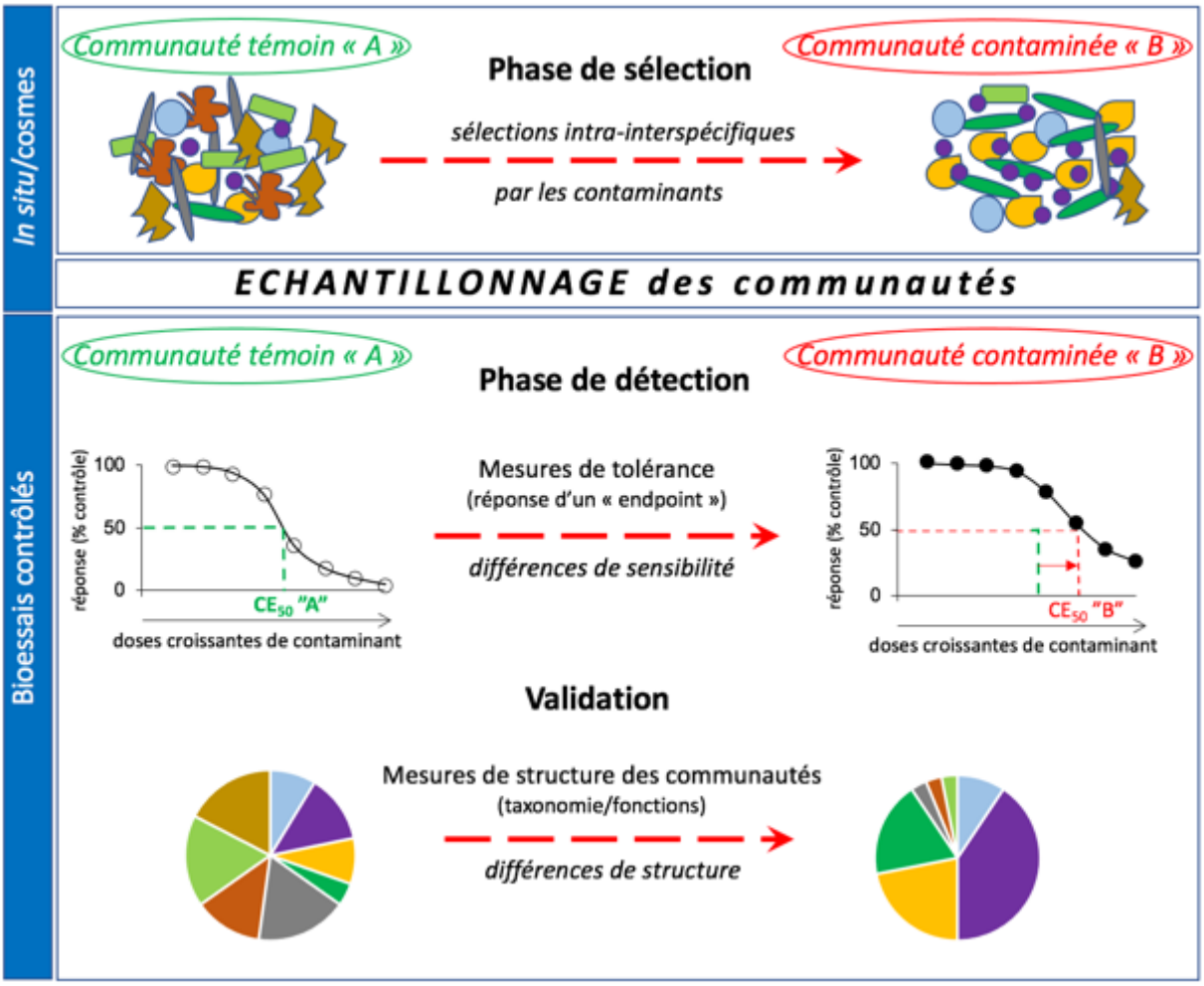


***Figure 1.*** *Les deux phases de l'approche PICT : sélection et détection. Durant la phase de sélection, des sélections inter- et intraspécifiques se produisent sous l'effet de l'exposition de la communauté (B) au toxique (restructuration de la communauté par la disparition des taxons sensibles et la dominance des taxons tolérants). Durant la phase de détection, la tolérance de la communauté échantillonnée est quantifiée en laboratoire au moyen de bioessais à court terme. Les réponses de paramètres fonctionnels (« endpoints ») aux concentrations croissantes du polluant testé sont mesurées, ce qui permet d'établir des courbes concentration-réponse pour la communauté « témoin » (A) et la communauté sélectionnée par le toxique (B). La tolérance est ensuite exprimée sous la forme d'une concentration effective (exemple EC50). La différence entre les valeurs ECx obtenues pour les deux communautés permet de quantifier le PICT. Parallèlement aux mesures de tolérance, la composition des deux communautés est évaluée et comparée pour valider l'hypothèse d'une sélection intra- et interspécifique. (Modifié d'après Tlili et al., 2015).*

## Applications de la méthode PICT aux contaminations par les pesticides

Une requête bibliographique sur l'application du PICT aux pesticides et au cuivre (requête : (Pesticid* OR herbicid* OR cui OR copper) AND 'pollution-induced community tolerance OR PICT) AND (alga* OR Cyanob* OR periphyt* OR phytoplankt* OR liche* OR microbi*) = 116 résultats initiaux), ainsi que des articles connus par les experts, ont permis de sélectionner 68 études. Les premiers travaux sur le concept et la méthode PICT ont été élaborés par Blanck et al. (1988) en contexte de contamination par l'arsenic, les études PICT appliquées au PPP se sont développées à partir des années 2000 (avec un maximum de publications dans les années 2010).

Plus des 2/3 de ces études ont été réalisés en milieux aquatiques d'eau douce, seulement 13 % concernent les milieux marins et 20% les sols. 70% des études en milieux aquatiques ont pour modèle biologique les biofilms et le périphyton (en particulier en eau douce), les 30% des études restants sont principalement réalisés sur le plancton. Très peu d'études ont été réalisées sur les sédiments.

La majorité (53%) des toxiques étudiés sont les herbicides : principalement des inhibiteurs du PSII tels que les triazines (essentiellement atrazine, mais aussi prométryne, terbuthylazine, simazine), et des urées substituées (essentiellement le diuron et l'isoproturon) ; de rares études ont abordé la tolérance au 2,4-D (Zabaloy et al., 2010) et au glyphosate (Allegrini et al., 2015). Une seule étude à notre connaissance a abordé la tolérance vis-à-vis de métabolites d'herbicide (du diuron, Pesce et al., 2010). Les études sur le cuivre représentent plus de 43% des études PICT, il y a très peu d'études appliquées à la tolérance aux fongicides organiques (4%, tébuconazole et azoxystrobine).

C'est aussi en eaux douces que l'on retrouve la plus grande diversité de familles de molécules testées (en milieu marin, les biocides-antifouling ont aussi été étudiés, dont certains comme l'Irgarol sont des triazines, mais ne sont pas repris ici), alors que les études sur les sols sont aux 2/3 axées sur le cuivre (le tiers restant concerne les herbicides, nous n'avons pas trouvé d'études sur des fongicides organiques). Notons que dans les sols la méthode PICT est très majoritairement appliquée aux contaminations par les métaux (contaminations industrielles et liées aux épandages de déchets organiques, Brandt et al., 2010) et depuis les années 2010, à la tolérance aux antibiotiques en interaction avec ces contaminations métalliques (Berg et al., 2010, mais ces travaux ne sont pas repris ici). Si 80% des études sur sol ont été réalisées *in situ*, près des 2/3 des études aquatiques ont été réalisées en milieux contrôlés. On peut rapprocher cette constatation avec le peu de molécules testées : beaucoup d'études sont réalisées avec des molécules modèles (substances actives seules). Si ces molécules toxiques présentent une réalité de contamination (molécules retrouvées dans les sites étudiés par les laboratoires de recherche), elles sont aussi utilisées dans le cadre d'études en milieux contrôlés pour comprendre des processus écotoxicologiques de sélections/acquisition de tolérance et l'influence des variables du milieu, autres que les toxiques.

On peut citer l'exemple de l'observatoire de l'Ardières-Morcille (bassin versant viticole du Beaujolais), étudié depuis près de 20 ans (Gouy et al., 2021) et qui a permis de développer la méthode PICT en prenant comme molécules modèles deux phytosanitaires présents dans le bassin versant et la rivière : le diuron et le cuivre. Les premières études *in situ* ont permis de montrer les acquisitions de tolérance au diuron et au cuivre, associées aux changements de structure taxonomique des communautés périphytiques échantillonnées en amont et en aval de la rivière (Dorigo et al., 2007, Pesce et al. 2010), en établissant le lien de cause à effet de l'exposition. Des manipulations *in situ* de transplantation de périphyton de l'amont vers l'aval de la rivière ont confirmé ces acquisitions de tolérance, mais aussi des pertes de tolérance des communautés transplantées de l'aval vers l'amont, avec des réponses différentes selon le contaminant étudié (probablement liées au fait que les biofilms avaient initialement internalisé du cuivre et non du diuron). Cependant après 7 semaines d'acclimatation, la tolérance (envers le diuron et le cuivre) et la composition taxonomique des biofilms transplantés n'avaient toujours pas retrouvé les caractéristiques des communautés de l'amont de la rivière (Dorigo et al., 2010). Associé à ces mesures de contamination de l'eau et de transplantations sur le terrain, des expérimentations au laboratoire ont permis de préciser certains phénomènes associés à l'acquisition de tolérance et aux trajectoires de sélection (Tlili et al., 2010, Lambert et al., 2012). Les facteurs environnementaux (température) susceptibles d'impacter la tolérance des communautés aux contaminants (Lambert et al., 2017) et ceci de manière différente selon les communautés et leurs fonctions ont également été étudiés (Pesce et al., 2018). Enfin, le diuron ayant été interdit en 2008, une étude PICT *in situ* réalisée sur trois ans (2009-2011) à un rythme mensuel a permis de valider la méthode en conditions réelles, mettant en évidence la restauration des communautés périphytiques de la rivière (Pesce et al., 2016). Ce genre de résultats a été obtenu sur le lac Léman ayant connu une décroissance de la contamination pélagique par l'atrazine et le cuivre : des campagnes PICT ont été répétées mensuellement sur le phytoplancton durant une année à 12 ans d'intervalle (Larras et al. 2016)

Ces exemples soulignent l'intérêt de la méthode PICT comme outil de biomonitoring. Cependant, cet outil écotoxicologique, basé sur des processus écologiques et fonctionnels des communautés dans leurs milieux contaminés, n'est actuellement pas appliqué en routine pour l'évaluation du risque.

## Des verrous à débloquer

Pour pouvoir utiliser la méthode PICT dans le cadre d'évaluation du risque *a priori* et *a posteriori* induit par les pesticides, il est nécessaire de dépasser des verrous et de poursuivre un cadrage de la méthode (Tlili et al., 2015).

-La ligne de base et facteurs confondants

In situ, la ligne de base de tolérance (témoin) est généralement acquise sur une communauté prélevée dans une zone non (ou faiblement) contaminée par le toxique incriminé, mais comparable à la communauté exposée au toxique. Il est donc nécessaire d'échantillonner et de caractériser cette communauté témoin à chaque mesure PICT. Si l'objectif envisagé est de surveiller à plus large échelle une région selon ses contaminations en pesticides, trouver des sites témoins est complexe et définir une ligne de base plus générique devient un enjeu. Pour cela, il faut connaitre la variabilité de cette ligne de base de tolérance qui peut être influencée par diverses variables environnementales. Par exemple, une étude européenne sur la tolérance des biofilms de rivières vis-à-vis du zinc a mis en évidence de grandes variabilités de tolérance de base. Des outils de modélisation ont permis de caractériser les principaux paramètres impliqués dans cette variabilité, liés à la biodisponibilité du métal (Blanck et al., 2003). Une autre approche très récente, appliquée au sol, a montré avec des régressions multiples qu'il était possible de définir une ligne de base de tolérance au cuivre à partir d'une équation prenant en compte les caractéristiques physico-chimiques du sol et le type de matériau parental (Campillo-Cora et al., 2021). Cette équation dépend du contaminant étudié et de « l'endpoint » utilisé. Il n'existe pas à notre connaissance de travaux comparables sur des tentatives de définition de ligne de base pour estimer la tolérance induite par des contaminations organiques de type pesticides, mais les travaux expérimentaux et de suivis saisonniers in situ révélant certaines variables environnementales influençant cette tolérance de base (Pesce et al., 2018), montrent qu'il est possible d'aller dans cette direction. Dans ce sens, il est nécessaire de poursuivre en parallèle des travaux expérimentaux pour préciser les facteurs susceptibles d'être confondants dans l'évaluation de la tolérance (Blanck, 2002).

-Les mélanges de contaminants

Nous avons vu que la plupart des études PICT étaient focalisées sur un ou deux contaminants. Cependant, les milieux contaminés le sont généralement de manière multiple et non connue, et les pesticides présents dans le milieu sont accompagnés de leurs produits de dégradation. Par ailleurs, plusieurs études ont montré qu'il existait des phénomènes de cotolérance (un contaminant chronique pouvant induire une tolérance à un autre contaminant) entre différents contaminants et que les bioessais PICT ne pouvaient pas les discriminer : par exemple, Knauer et al. (2010), ont montré expérimentalement des phénomènes de cotolérance entre trois herbicides inhibiteurs du PSII, l'atrazine, le diuron et l'isoproturon avec des intensités différentes selon l'herbicide à l'origine de la pression de sélection. Une étude originale (Seghers et al., 2003) ciblée sur les méthanotrophes de sols contaminés par l'atrazine et le métolachlore (traitements sur 20 ans avec 0,75 kg et 2 kg respectivement /ha /an), a mis en évidence une tolérance accrue au 2,4-D (utilisé dans le bioessai PICT comme inhibiteur de l'oxydation du méthane par les microorganismes) de ces communautés préexposées à l'atrazine et au métolachlore, qui pourtant n'ont pas d'effets aigus à court terme (60 µg/ g sol) sur la capacité d'oxydation du méthane des communautés microbiennes.

Dans le cadre du suivi des milieux multicontaminés, on ne peut matériellement pas tester de nombreuses molécules avec l'outil PICT. En ce sens la cotolérance pourrait constituer un avantage, l'approche PICT pouvant être envisagée avec des molécules modèles de groupes chimiques sélectionnées sur la base de leurs propriétés de cotolérance. Ce type d'approche permettrait de renseigner l'exposition de l'écosystème vis-à-vis de classes de polluants. Pour cela il est nécessaire de connaitre les mécanismes induisant la cotolérance (molécules ayant le même mode d'action et/ou induisant des modes de détoxification comparables ?). C'est en multipliant les études dans divers contextes de contaminations pesticides, associant des mesures PICT à une surveillance chimique ; en développant des études expérimentales (normalisées), permettant de tester

diverses molécules ; et en associant ces observations à des approches écotoxiques in silico (Traoré et al., 2017), que nous pourrons faire avancer les connaissances sur cette question.

Une approche complémentaire proposée par Pesce et al. (2011) et Foulquier et al. (2015) est d'aborder la question de la multi contamination en testant directement ces mélanges réalistes dans les bioessais PICT. Des systèmes d'échantillonnage passif permettent de « récolter » la contamination du site et son historique, les solutions extraites obtenues sont d'une part, analysées chimiquement et d'autre part, testées sous forme de dilutions dans les bioessais appliqués aux communautés collectées dans le site impacté et dans le site témoin. Ce type d'approche permettrait d'établir la causalité entre l'exposition in situ à des mélanges complexes de micropolluants et les effets écotoxiques sur les communautés biologiques. Elle a été appliquée récemment avec succès dans le cadre de contaminations complexes de rivières en aval de stations d'épuration (Tlili et al., 2020). Ces deux approches associées permettraient d'augmenter la pertinence environnementale de la méthode PICT pour caractériser les milieux contaminés par les pesticides (Tlili et al., 2015).

La multi contamination interroge aussi sur le choix du(des) « endpoint(s) » de mesure de l'effet toxique à utiliser dans les bioessais PICT. Avoir un « endpoint » adapté au mode d'action du toxique incriminé est pertinent pour cibler un type de contaminant, mais il peut être limitant en contexte *in situ* de contaminations multiples et non connues (Blanck, 2002). Il est alors nécessaire de trouver un « endpoint » intégrateur de différents types de toxicité ou d'associer plusieurs « endpoints » pour tenir compte de la complexité à la fois des communautés étudiées, de la contamination chimique à laquelle elles ont été confrontées, et des impacts indirects possibles (Tlili et al., 2010, Tlili et al., 2020). Notons que Seghers et al. (2003) sont les seuls à notre connaissance à avoir « contourné » cette difficulté en utilisant dans leur bioessai PICT un herbicide un inhibiteur de l'oxydation du méthane (2,4-D) pour étudier la tolérance acquise de communautés ciblées (méthanotrophes) vis-à-vis d'autres types d'herbicides (Atrazine et métolachlore).

## Conclusion, perspectives

Si des travaux plus récents ont permis des avancées, les conclusions de Tlili et al. (2015) restent d'actualité :

-Standardiser les mesures PICT, notamment les échantillonnages des communautés testées, ainsi que les bioessais eux-mêmes (Lambert et al., 2015, Vazquez-Blanco et al., 2021).

-Travailler la question de la ligne de base à des échelles spatiales larges. Par exemple par écorégions en s'inspirant par exemple des travaux réalisés sur les bioindicateurs normalisés (tels que les indicateurs basés sur les diatomées de rivière, Tison et al., 2005).

-Poursuivre les développements de méthodes sur les mélanges complexes de contaminations (voir ci-dessus) et avec des familles récentes de substances actives.

-Développer une plus grande variété (et stabiliser la standardisation) d'« endpoints » représentatifs des fonctions et des structures des écosystèmes microbiens. Dans ce sens, les avancées « omics » (Mahamoud Ahmed et al., 2020) et de chémotaxonomie devraient permettre de préciser nos connaissances sur les processus d'acquisition de tolérance et les acteurs de ces acquisitions et contribuer à analyser la présence de gènes participant à la résistance et à la tolérance des communautés.

Peu d'outils existent ayant à la fois une pertinence écologique et écotoxicologique permettant d'établir le lien de causalité entre une contamination et la santé d'un écosystème. La méthode PICT reste un outil prometteur, et ces dix dernières années ont montré qu'il était utilisable dans le cadre d'expérimentations et de biomonitoring, y compris dans des milieux soumis à des contaminations complexes. L'enjeu de poursuivre son amélioration et de dépasser les verrous actuels afin d'en faire un outil opérationnel d'évaluation du risque des pesticides est fort.

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## Pour en savoir plus

Cette fiche thématique a été rédigée dans le cadre de l'expertise collective « Phytopharmaceutiques Biodiversité Services Ecosystémiques ». Vous pouvez consulter concernant cette ESCo :

-La fiche thématique : https://www6.inrae.fr/ecotox/Productions/Fiches-thematiques/Fiche-thematique-N-29-octobre-2020

-La publication : Pesce, S., Mamy, L., Achard, A.L. et al. Collective scientific assessment as a relevant tool to inform public debate and policymaking: an illustration about the effects of plant protection products on biodiversity and ecosystem services. Environ Sci Pollut Res 28, 38448–38454 (2021). https://doi.org/10.1007/s11356-021-14863-w

A lire également : https://en.wikipedia.org/wiki/Pollution-induced_community_tolerance

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https://doi.org/10.15454/bwf7-8m60



# ERA / PUBLICATIONS SCIENTIFIQUES / COMMUNAUTES MICROBIENNES AQUATIQUES

## Detection of the maximum resistance to the herbicides diuron and glyphosate, and evaluation of its phenotypic cost, in freshwater phytoplankton

**Authors:** Melero-Jimenez IJ, Banares-Espana E, Reul A et al.

**Source:** AQUATIC TOXICOLOGY 240: 105973, 2021, DOI 10.1016/j.aquatox.2021.105973

**Abstract:** One of the most important anthropogenic impacts on freshwater aquatic ecosystems close to intensive agriculture areas is the cumulative increase in herbicide concentrations. The threat is especially relevant for phytoplankton organisms because they have the same physiological targets as the plants for which herbicides have been designed. This led us to explore the evolutionary response of three phytoplanktonic species to increasing concentrations of two herbicides and its consequences in terms of growth and photosynthesis performance. Specifically, we used an experimental ratchet protocol to investigate the differential evolution and the limit of resistance of a cyanobacterium (Microcystis aeruginosa) and two chlorophyceans (Chlamydomonas reinhardtii and Dictyosphaerium chlorelloides) to two herbicides in worldwide use: glyphosate and diuron...

## Microalgae Growth Inhibition-Based Reservoirs Water Quality Assessment to Identify Ecotoxicological Risks

**Authors:** Rodrigues S, Pinto I, Formigo N, Antunes SC

**Source:** WATER 13: 2605, 2021, DOI 10.3390/w13192605

**Abstract:** This work intended to assess the adaptability of bioassay with Raphidocelis subcapitata to be used as a complement to the water quality assessment parameters of reservoirs imposed by the European Water Framework Directive (WFD). Thus, water samples of Portuguese reservoirs (Miranda, Pocinho, Aguieira, and Alqueva) were analyzed in three sampling periods (spring and autumn 2019, and spring 2020). A physical and chemical report of waters was also performed...

## Toxicity assessment and underlying mechanisms of multiple metal organic frameworks using the green algae *Chlamydomonas reinhardtii* model

**Authors:** Li YL, Shang SS, Shang J, Wang WX

**Source:** ENVIRONMENTAL POLLUTION 291: 118199, 2021, DOI 10.1016/j.envpol.2021.118199

**Abstract:** Metal-organic frameworks (MOFs) are an emerging class of materials which have garnered increasing attention for their utility as adsorbents and photocatalysts in water treatment. Nevertheless, the environmental risks of MOFs, especially their underlying impacts on aquatic organisms, are not fully explored. Herein, the toxicity of multiple representative MOFs was systematically assessed using a freshwater green alga (*Chlamydomonas reinhardtii*) model...

https://doi.org/10.15454/bwf7-8m60


## Sediments alleviate the inhibition effects of antibiotics on denitrification: Functional gene, microbial community, and antibiotic resistance gene analysis

**Authors:** Zhang RJ, Xu XM, Jia DT et al.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 804: 150092, 2022, DOI 10.1016/j.scitotenv.2021.150092

**Abstract:** Both antibiotics and sediments can affect the denitrification in aquatic systems. However, little is known how antibiotics influence the denitrification in the presence of sediments. Here, the effects of antibiotics (sulfamethoxazole, tetracycline and ofloxacin) on denitrification in the absence and presence of sediments were investigated. The influencing mechanisms were revealed by quantifying the denitrification functional genes, 16S-seq of bacteria, and antibiotic resistance genes...

## System biology analysis of endosulfan biodegradation in bacteria and its effect in other living systems: modeling and simulation studies

**Authors:** Bhandari G, Sharma M, Negi S et al.

**Source:** JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS Early Access, DOI 10.1080/07391102.2021.1982773

**Abstract:** Endosulfan is a broadly applied cyclodiene insecticide which has been in use across 80 countries since last 5 decades. Owing to its recalcitrant nature, endosulfan residues have been reported from air, water and soil causing toxicity to various non-target organisms. Microbial decontamination of endosulfan has been reported previously by several authors. In the current study, we have evaluated the pathways of endosulfan degradation and its hazardous impact on other living beings including insects, humans, plants, aquatic life and environment by in-silico methods. For establishment of the endosulfan metabolism in different ecosystems, cell designer was employed. The established model was thereafter assessed and simulated to understand the biochemical and physiological metabolism of the endosulfan in various systems of the network...

## Translocation of Epipelic Biofilms and Their Short-Term Responses to Urbanization Impacts in Nutrient Rich Streams

**Authors:** Cochero J, Gelis MMN, Donadelli J, Gomez N

**Source:** ANAIS DA ACADEMIA BRASILEIRA DE CIENCIAS 93: e20210379, 2021, DOI 10.1590/0001-3765202120210379

**Abstract:** Stream biofilms are among the first to react to environmental degradation, since their structural and functional characteristics are tightly linked to the physicochemical variables in the water and sediment. The objectives of this research were to study the differences in chlorophyll-a, bacterial density and metabolism endpoints of epipelic biofilms in nutrient-rich streams under different physical-chemical conditions in the stream water in relation to changes in urbanization, and to measure the short-term responses (up to 72 h) in the biofilm when translocated to more urbanized sites. For these purposes, chlorophyll-a, bacterial density, biofilm respiration (electron transfer activity) and O-2 consumption were measured in epipelic biofilms in nutrient-rich streams exposed to different levels of urbanization after a 30 day colonization. Afterward, biofilms were translocated downstream to more polluted sites, and sampled to identify any fast occurring changes to be considered as potential indicators of environmental degradation...

## The toxicity of cadmium-copper mixtures on daphnids and microalgae analyzed using the Biotic Ligand Model

**Authors:** Clement B, Felix V, Bertrand V

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, DOI 10.1007/s11356-021-16516-4

**Abstract:** For the prediction of metal mixture ecotoxicity, the BLM approach is promising since it evaluates the amount of metals accumulated on the biotic ligand on the basis of water chemistry, i.e., species (major cations) competing with metals, and related toxicity. Based on previous work by Farley et al. (2015) (MMME research project), this study aimed at modeling toxicity of Cd:Cu mixtures to the crustacean Daphnia magna (48-h immobilization tests) and the microalga Pseudokirchneriella subcapitata (72-h growth inhibition tests). The 2012 version of the USGS model was chosen, assuming additivity of effects and accumulation of metals on a single site. The assumption that EDTA could contribute to toxicity through metals complexing was also tested, and potential effects due to reduction of ions Ca2+ absorption by metals were considered...

## The response of sediment microbial communities to temporal and site-specific variations of pollution in interconnected aquaculture pond and ditch systems

**Authors:** Xu M, Xu RZ, Shen XX et al.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 806: 150498, 2022, DOI 10.1016/j.scitotenv.2021.150498

**Abstract:** Sediment microbial communities play critical roles in the health of fish and the biogeochemical cycling of elements in aquaculture ecosystems. However, the response of microbial communities to temporal and spatial variations in interconnected aquaculture pond and ditch systems remains unclear. In this study, 61 sediment bacterial samples were collected over one year from 11 sites (including five ponds and six ditches) in a 30year-old fish aquaculture farm. The 16S rRNA approach was used to determine the relative abundances of microbial communities in the sediment samples. The relationships among nutrients, heavy metals, and abundant microorganisms were analyzed...

## Tylosin toxicity in the alga Raphidocelis subcapitata revealed by integrated analyses of transcriptome and metabolome: Photosynthesis and DNA replication-coupled repair

**Authors:** Li Q, Lu DL, Sun HT et al.

**Source:** AQUATIC TOXICOLOGY 239: 105964, 2021, DOI 10.1016/j.aquatox.2021.105964

**Abstract:** Tylosin (TYN) is widely used in veterinary prophylactic as a macrolide and frequently detected in the surface water. Previous studies showed that exposure to TYN caused suppression of chlorophyll biosynthesis and inhibition of photosynthesis at the physiological level, associated with reduced growth performances in algae, but the molecular mechanisms remain unknown, especially at environmental exposure levels. The present study elucidated the underlying molecular mechanism(s) of TYN toxicity in a model green alga Raphidocelis subcapitata using approaches of transcriptomics and metabolomics...

## Gut microbiome alterations in the crustacean Pacifastacus leniusculus exposed to environmental concentrations of antibiotics and effects on susceptibility to bacteria challenges

**Authors:** Hernandez-Perez A, Zamora-Briseno JA, Soderhall K, Soderhall I

**Source:** DEVELOPMENTAL AND COMPARATIVE IMMUNOLOGY 126: 104181, 2022, DOI 10.1016/j.dci.2021.104181

**Abstract:** Gut-associated microbiota in crustaceans are recognized as a key element for maintaining homeostasis and health in the animal. Since the richness of these microbial communities is strongly influenced by the local environment, especially in aquatic organisms, it is important to address to what extent environmental variations

https://doi.org/10.15454/bwf7-8m60


can affect these communities. In the present study, we used high-throughput 16S rRNA sequencing technology to study the composition of gut-associated microbiota of the crayfish Pacifastacus leniusculus after exposure to environmentally-relevant concentrations of an antibiotic, namely sulfamethoxazole. Also, we examined if alterations of microbiota caused by environmentally-relevant concentrations of this antibiotic affected the host susceptibility to bacterial diseases, including Vibrio species...

## Responses of benthic diatoms to waters affected by post-fire contamination

**Authors:** Vidal T, Pereira JL, Moreira F et al.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 800: 49473, 2021, DOI 10.1016/j.scitotenv.2021.149473

**Abstract:** Wildfire effects go beyond direct impact in terrestrial ecosystems. Specifically, the periphytic communities of aquatic ecosystems standing within and downstream the burnt areas are relevant ecological receptors of post-fire runoff contamination. Nevertheless, the off-site impacts of wildfires in these communities are limitedly studied so far. The present study aimed to assess the effects of river water contaminated with ash loaded runoff in the growth benthic diatom Navicula libonensis (Schoeman 1970). Four surface water samples were collected approximately one year after the wildfire for laboratory testing with the diatom: one was collected from a site upstream the burnt area, within the Unhais river (UU); three were collected from sites standing within the burnt area, one in the Unhais river (UB) and two in the Zezere river (Z1 and Z2), reflecting different hydrological regimes...

## Ecological thresholds of periphytic communities and ecosystems integrity in lower Doce River basin

**Authors:** Zorzal-Almeida S, Fernandes VD

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 796: 148965, 2021, DOI 10.1016/j.scitotenv.2021.148965

**Abstract:** Freshwater biodiversity has been impacted by several stressors such as eutrophication, turbidity and metals. Besides these frequent impacts, large-scale accidents occasionally affect aquatic systems, input an intense load of contaminants to the water bodies, as in the case of the Fundao tailing dam collapse (Brazil), which launched mil-lions of meters cubic of iron ore tailing in the Doce River Basin. Our aim in this study was to assess how much stress the environmental conditions of lentic and lotic environments in the lower region of this basin impact the periphytic community. In addition, we intend to verify whether the limits of changes of the periphytic com-munities agreed with Brazilian legislation for the protection of aquatic life. For that, monthly samplings were car-ried out in seven sampling stations in lentic environments and five in lotic environments, including the Doce River channel, between October/2018 and March/2021 (except in October/2019) ...

## Terrestrial input of herbicides has significant impacts on phytoplankton and bacterioplankton communities in coastal waters

**Authors:** Yang LQ, Mou SL, Li HM et al.

**Source:** LIMNOLOGY AND OCEANOGRAPHY Early Access, 2021, DOI 10.1002/lno.11940

**Abstract:** Herbicide use has increased very rapidly worldwide in recent decades, and some of these herbicides eventually enter the ocean. At present, herbicide pollution in the ocean has become a global environmental problem. Here, in a field investigation of 22 commonly used herbicide residues (triazine, phenylurea, and amide) in the Bohai Sea and the Yellow Sea, we found that the detection rate of herbicide residues within 100 km from shore was 100%. [...] Under exposure to triazine herbicides at close to their total in situ concentrations, the photosynthesis of the phytoplankton community was significantly inhibited, [...] the phytoplankton community structure underwent significant changes with the dominant group shifting from diatoms to dinoflagellates, due to the higher atrazine sensitivity of diatoms compared to facultative dinoflagellates...

## Photoactive titanium dioxide nanoparticles modify heterotrophic microbial functioning

**Authors:** Bundschuh M, Zubrod JP, Konschak M et al.

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH 28: 49550-49558, 2021, DOI 10.1007/s11356-021-14090-3

**Abstract:** Nanoparticulate titanium dioxide (nTiO(2)) is frequently applied, raising concerns about potential side effects on the environment. While various studies have assessed structural effects in aquatic model ecosystems, its impact on ecosystem functions provided by microbial communities (biofilms) is not well understood. This is all the more the case when considering additional stressors, such as UV irradiation - a factor known to amplify nTiO (2)-induced toxicity. Using pairwise comparisons, we assessed the impact of UV (UV-A = 1.6 W/m (2); UV-B = 0.7 W/m (2)) at 0, 20 or 2000 µg nTiO (2)/L on two ecosystem functions provided by leaf-associated biofilms...

## Artificial Intelligence Meets Marine Ecotoxicology: Applying Deep Learning to Bio-Optical Data from Marine Diatoms Exposed to Legacy and Emerging Contaminants

**Authors:** Rodrigues NM, Batista JE, Mariano P et al.

**Source:** BIOLOGY-BASEL 10: 932, 2021, DOI 10.3390/biology10090932

**Abstract:** Our work is motivated by the increasing production of chemicals with environmentally harmful effects to our aquatic ecosystems. We show that it is possible to detect and distinguish the presence of several different emerging contaminants, using the photochemical responses of a microalgae species, which is among the most abundant phytoplankton group in the oceans. We use several machine learning and deep learning models that operate on chlorophyll fluorescence induction curves, which are composed of fluorescence values taken at different time steps from the microalgae exposure trials...

## Micro-polyethylene particles reduce the toxicity of nano zinc oxide in marine microalgae by adsorption

**Authors:** Li JJ, Mao S, Ye YY et al.

**Source:** ENVIRONMENTAL POLLUTION 290: 118042, 2021, DOI 10.1016/j.envpol.2021.118042

**Abstract:** Contaminant adsorption by microplastics (MPs) allows them to act as contaminant vehicles or vectors, complicating eco-toxicological study of MPs. The contaminants adsorbed are mainly organic contaminants, especially hydrophobic organic contaminants (HOCs), although heavy-metal adsorption has also been reported. Compared to the mechanisms of HOC adsorption, those for metals are not fully understood. In the present study, combined-exposure assays revealed that polyethylene microplastics (PEMPs, 150 mu m) alleviate the toxic effect of nano zinc oxide (nZnO, 20-30 nm) on marine microalgal growth by 14.4%. Thus, we hypothesized that nZnO adsorption onto PEMP surfaces ameliorates its toxicity to microorganisms. To test this hypothesis, PEMP samples isolated from nZnO suspensions were characterized. Their surfaces were observed by SEM, their Zn levels were measured by ICP-MS, and the compound form of Zn on the PEMP surface was determined by XRD analysis...

## Taxonomic and Functional Distribution of Bacterial Communities in Domestic and Hospital Wastewater System: Implications for Public and Environmental Health

**Authors:** Selvarajan R, Sibanda T, Pandian J, Mearns K

**Source:** ANTIBIOTICS-BASEL 10: 1059, 2021, DOI 10.3390/antibiotics10091059

**Abstract:** The discharge of untreated hospital and domestic wastewater into receiving water bodies

https://doi.org/10.15454/bwf7-8m60


is still a prevalent practice in developing countries. Unfortunately, because of an ever-increasing population of people who are perennially under medication, these wastewaters contain residues of antibiotics and other antimicrobials as well as microbial shedding, the direct and indirect effects of which include the dissemination of antibiotic resistance genes and an increase in the evolution of antibiotic-resistant bacteria that pose a threat to public and environmental health. This study assessed the taxonomic and functional profiles of bacterial communities, as well as the antibiotic concentrations in untreated domestic wastewater (DWW) and hospital wastewater (HWW), using high-throughput sequencing analysis and solid-phase extraction coupled to Ultra-high-performance liquid chromatography Mass Spectrometry (UHPLC-MS/MS) analysis, respectively. The physicochemical qualities of both wastewater systems were also determined...

## Impacts of municipal wastewater treatment plant discharge on microbial community structure and function of the receiving river in Northwest Tibetan Plateau

**Authors:** Wang JW, Chen Y, Cai PG et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 423: 127170, 2022, DOI 10.1016/j.jhazmat.2021.127170

**Abstract:** Wastewater treatment plant (WWTP) effluents carrying plenty of nutrients and micropollutants pose serious threats to receiving rivers, however, the response of microbial community structure and function to WWTP effluents discharge is still poorly understood. To address this knowledge gap, paired water and sediment samples from 17 sites of the Huangshui River, and effluents from 6 WWTPs were collected to investigate the effect of WWTP discharge on riverine microbial communities...

## Medium composition affects the heavy metal tolerance of microalgae: a comparison

**Authors:** Rathnayake IVN, Megharaj M, Beer M, Naidu R

**Source:** JOURNAL OF APPLIED PHYCOLOGY Early Access, DOI 10.1007/s10811-021-02589-8

**Abstract:** Tolerance of the three metals cadmium (Cd), copper (Cu), and zinc (Zn) by four microalgal species was investigated in three different culture media available in the literature together with a modified version in order to study the effect of growth media components in estimating the bioavailability of metals introduced into the medium. The free metal content of each medium was also determined using Visual MINTEQ version 3.1 to compare the bioassays. Four microalgal isolates were identified as Desmodesmus sp-I, Desmodesmus sp-II, Coelastrella sp., and *Chlorella vulgaris*...

## New insights into mechanisms of copper nanoparticle toxicity in freshwater algae *Chlamydomonas reinhardtii*: Effects on the pathways of secondary metabolites

**Authors:** Janova A, Kolackova M, Bytesnikova Z et al.

**Source:** ALGAL RESEARCH-BIOMASS BIOFUELS AND BIOPRODUCTS 60: 102476, 2021, DOI 10.1016/j.algal.2021.102476

**Abstract:** The effects of copper nanoparticles (Cu-NPs), including their stability in the medium, were studied with the green unicellular algae *Chlamydomonas reinhardtii* (CC-125). Cu-NPs were synthesized and characterized. Cu-NP particles were uniform, regular, and largely spherical, and they had smooth surfaces; the average size was estimated to be 137.4 +/- 2.1 nm. Chlamydomonas cells were cultivated for 96 h under controlled conditions in the presence of Cu-NPs, according to OECD guidelines, and then subjected to toxicological bioassays [...] Attention was also paid to select underexplored metabolites, which were studied with a LC-MS/MS system...

https://doi.org/10.15454/bwf7-8m60


## Single and Combined Effects of Cypermethrin and UVR Pre-Exposure in the Microalgae *Phaeodactylum Tricornutum*

**Authors:** Cabrera J, Marcoval MA, Diaz-Jaramillo M, Gonzalez M

**Source:** ARCHIVES OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY 81: 507-516, 2021, DOI 10.1007/s00244-021-00889-1

**Abstract:** Coastal marine microalgae are exposed to anthropogenic pollutants, including pesticides from aquaculture/agriculture/household uses. Some microalgae species, such as *Phaeodactylum tricornutum*, can induce and accumulate UV-absorbing compounds (UACs) upon ultraviolet radiation (UVR) exposure to prevent deleterious effects. Tolerance mechanisms activated by natural stressors might also protect organisms from anthropogenic stressors. This work assesses the effects of the insecticide cypermethrin (Cyp) and UVR in the marine microalgae *P tricornutum*. Considering the pro-oxidant properties of both stressors and UACs' induction in *P tricornutum*, lethal and sublethal effects of Cyp were tested in cultures with and without UVR acclimation. After a 24-h exposure to 10 µg L-1 of technical Cyp or culture medium, UACs, growth, glutathione-S-transferase activity (GST), sulfhydryl groups (SH-g), and lipid peroxidation (LPO) were analyzed...

## Impact of wastewater on the microbial diversity of periphyton and its tolerance to micropollutants in an engineered flow-through channel system

**Authors:** Carles L, Wullschleger S, Joss A et al.

**Source:** WATER RESEARCH 203: 117486, 2021, DOI 10.1016/j.watres.2021.117486

**Abstract:** Wastewater treatment plants (WWTPs) play an important role in retaining organic matter and nutrients but to a lesser extent micropollutants. Therefore, treated wastewater is recognized as a major source of multiple stressors, including complex mixtures of micropollutants. These can potentially affect microbial communities in the receiving water bodies and the ecological functions they provide. In this study, we evaluated in flow-through channels the consequences of an exposure to a mixture of stream water and different percentages of urban WWTP effluent, ranging from 0% to 80%, on the microbial diversity and function of periphyton communities. Assuming that micropollutants exert a selective pressure for tolerant microorganisms within communities, we further examined the periphyton sensitivity to a micropollutant mixture extracted from passive samplers that were immersed in the wastewater effluent. As well, micropollutants in water and in periphyton were comprehensively quantified...

## Toxicities of three metal oxide nanoparticles to a marine microalga: Impacts on the motility and potential affecting mechanisms

**Authors:** Du XY, Zhou WS, Zhang WX et al.

**Source:** ENVIRONMENTAL POLLUTION 290: 118027, 2021, DOI 10.1016/j.envpol.2021.118027

**Abstract:** With the fast growth of the production and application of engineered nanomaterials (ENMs), nanoparticles (NPs) that escape into the environment have drawn increasing attention due to their ecotoxicological impacts. Motile microalgae are a type of primary producer in most ecosystems; however, the impacts of NPs on the motility of microalgae have not been studied yet. So the toxic impacts of three common metal oxide NPs (nTiO(2), nZnO, and nFe(2)O(3)) on swimming speed and locomotion mode of a marine microalgae, Platymonas subcordiformis, were investigated in this study...

## Microbial diversity alteration reveals biomarkers of contamination in soil-river-lake continuum

**Authors:** Bourhane Z, Lanzen A, Cagnon C et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 421: 126789, 2022, DOI 10.1016/j.jhazmat.2021.126789

https://doi.org/10.15454/bwf7-8m60


**Abstract:** Microbial communities inhabiting soil-water-sediment continuum in coastal areas provide important ecosystem services. Their adaptation in response to environmental stressors, particularly mitigating the impact of pollutants discharged from human activities, has been considered for the development of microbial biomonitoring tools, but their use is still in the infancy. Here, chemical and molecular (16S rRNA gene metabarcoding) approaches were combined in order to determine the impact of pollutants on microbial assemblages inhabiting the aquatic network of a soil-water-sediment continuum around the Ichkeul Lake (Tunisia), an area highly impacted by human activities. Samples were collected within the soil-river-lake continuum at three stations in dry (summer) and wet (winter) seasons...

## Temperature, phytoplankton density and bacteria diversity drive the biotransformation of micropollutants in a lake ecosystem

**Authors:** Chalifour A, Walser JC, Pomati F, Fenner K

**Source:** WATER RESEARCH 202: 117412, 2021, DOI 10.1016/j.watres.2021.117412

**Abstract:** For most micropollutants (MPs) present in surface waters, such as pesticides and pharmaceuticals, the contribution of biotransformation to their overall removal from lake ecosystems is largely unknown. This study aims at empirically determining the biotransformation rate constants for 35 MPs at different periods of the year and depths of a meso-eutrophic lake. We then tested statistically the association of environmental parameters and microbial community composition with the biotransformation rate constants obtained...

## A review on catalytic-enzyme degradation of toxic environmental pollutants: Microbial enzymes

**Authors:** Saravanan A, Kumar PS, Vo DVN et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 419: 126451, 2021, DOI 10.1016/j.jhazmat.2021.126451

**Abstract:** Industrialization and other human anthropogenic activities cause serious threats to the environment. The toxic pollutants can cause detrimental diseases on diverse living beings in their respective ecosystems. Bioremediation is one of the efficient remediation methods in which the toxic pollutants are removed from the environment by the application of microorganisms or their biologically active products (enzymes). Typically, the microorganisms in the environment produce various enzymes to immobilize and degrade the toxic environmental pollutants by utilizing them as a substrate for their growth and development. Both the bacterial and fungal enzymes can degrade the toxic pollutants present in the environment and convert them into non-toxic forms through their catalytic reaction mechanism. [...] This review focused on enzymatic removal of toxic pollutants such as heavy metals, dyes, plastics and pesticides in the environment...

## The effects of copper ions and copper nanomaterials on the output of amino acids from marine microalgae

**Authors:** Huang WQ, Zhou YP, Zhao T et al.

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, DOI 10.1007/s11356-021-16347-3

**Abstract:** In this study, the marine microalgae Skeletonema costatum and Nitzschia closterium were exposed to different forms of copper, such as a metal salt (Cu2+), a nano-metal (nano-Cu), and nano-metal oxide (nano-CuO). During a 96-h exposure to nanoparticles (NPs) and salt, the cell number, Cu2+ concentration in the culture medium, morphology, and intracellular amino acids were measured to assess the toxicity of the copper materials and the toxicity mechanism of the NPs...

https://doi.org/10.15454/bwf7-8m60


## Bacterial survival strategies and responses under heavy metal stress: a comprehensive overview

**Authors:** Pal A, Bhattacharjee S, Saha J et al.

**Source:** CRITICAL REVIEWS IN MICROBIOLOGY Early Access, DOI 10.1080/1040841X.2021.1970512

**Abstract:** Heavy metals bring long-term hazardous consequences and pose a serious threat to all life forms. Being non-biodegradable, they can remain in the food webs for a long period of time. Metal ions are essential for life and indispensable for almost all aspects of metabolism but can be toxic beyond threshold level to all living beings including microbes. Heavy metals are generally present in the environment, but many geogenic and anthropogenic activities has led to excess metal ion accumulation in the environment. To survive in harsh metal contaminated environments, bacteria have certain resistance mechanisms to metabolize and transform heavy metals into less hazardous forms. This also gives rise to different species of heavy metal resistant bacteria. Herein, we have tried to incorporate the different aspects of heavy metal toxicity in bacteria and provide an up-to-date and across-the-board review. The various aspects of heavy metal biology of bacteria encompassed in this review includes the biological notion of heavy metals, toxic effect of heavy metals on bacteria, the factors regulating bacterial heavy metal resistance, the diverse mechanisms governing bacterial heavy metal resistance, bacterial responses to heavy metal stress, and a brief overview of gene regulation under heavy metal stress...

## BactoTraits - A functional trait database to evaluate how natural and man-induced changes influence the assembly of bacterial communities

**Authors:** Cebron A, Zeghal E, Usseglio-Polatera P et al.

**Source:** ECOLOGICAL INDICATORS 130:108047, 2021, DOI10.1016/j.ecolind.2021.108047

**Abstract:** In the environment, abiotic (climatic conditions, physico-chemical parameters), biotic (interactions between microorganisms, vegetation and fauna), and anthropogenic (stress, pollution) filters are driving the microbial diversity observed locally. A key question in microbial ecology is to understand the impact of these filters on bacterial diversity and ecosystem functioning. To highlight the responses of bacterial assemblages to these ecological filters, a new approach based on bacterial functional traits has been developed. This approach provides a functional picture of bacterial assemblages using morphological, physiological, and genomic traits as proxies of functions, and leads to a generalizable approach over a larger range of ecosystems with different bacterial diversities. We have created a user-friendly database of bacterial functional traits, thanks to the properties of 19,455 bacterial strains. This database has been called BactoTraits. [...] As an example of application, BactoTraits was used to characterize the traits and functional diversity of bacterial assemblages in soil samples from 10 sites with different physico-chemical properties and various levels of metal and polycyclic aromatic hydrocarbon (PAH) contaminations...

## Odiel River (SW Spain), a Singular Scenario Affected by Acid Mine Drainage (AMD): Graphical and Statistical Models to Assess Diatoms and Water Hydrogeochemistry Interactions

**Authors:** Grande JA, Luis AT, Cordoba F et al.

**Source:** INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH 18: 8454, 2021, DOI 10.3390/ijerph18168454

**Abstract:** The Odiel River (SW Spain) is one of the most cited rivers in the scientific literature due to its high pollution degree, generated by more than 80 sulphide mines' (mostly unrestored) contamination in the Iberian Pyritic Belt (IPB), that have been exploited for more than 5000 years. Along the river and its tributaries, the physico-chemical parameters and diatoms, from

https://doi.org/10.15454/bwf7-8m60


15 sampling points, were analyzed in the laboratory. Physico-chemical parameters, water chemical analysis, together with richness and Shannon-Wiener indexes were integrated in a matrix. An initial graphical treatment allowed the definition and proposal of a functioning system model, as well as the establishment of cause-effect relationships between pollution and its effects on biota. Then, the proposed model was statistically validated by factor analysis...

## Intraspecific variation in metal tolerance modulate competition between two marine diatoms

**Authors:** Andersson B, Godhe A, Filipsson HL et al.

**Source:** ISME JOURNAL Early Access, DOI 10.1038/s41396-021-01092-9

**Abstract:** Despite widespread metal pollution of coastal ecosystems, little is known of its effect on marine phytoplankton. We designed a co-cultivation experiment to test if toxic dose-response relationships can be used to predict the competitive outcome of two species under metal stress. Specifically, we took into account intraspecific strain variation and selection. We used 72 h dose-response relationships to model how silver (Ag), cadmium (Cd), and copper (Cu) affect both intraspecific strain selection and competition between taxa in two marine diatoms (Skeletonema marinoi and Thalassiosira baltica). The models were validated against 10-day co-culture experiments, using four strains per species...

## Marine biofilms on different fouling control coating types reveal differences in microbial community composition and abundance

**Authors:** Papadatou M, Robson SC, Dobretsov S et al.

**Source:** MICROBIOLOGYOPEN 10: e1231, 2021, DOI 10.1002/mbo3.1231

**Abstract:** Marine biofouling imposes serious environmental and economic impacts on marine applications, especially in the shipping industry. To combat biofouling, protective coatings are applied on vessel hulls which are divided into two major groups: biocidal and non-toxic fouling release. The current study aimed to explore the effect of coating type on microbial biofilm community profiles to better understand the differences between the communities developed on fouling control biocidal antifouling and biocidal-free coatings. Biocidal (Intersmooth (R) 7460HS SPC), fouling release (Intersleek (R) 900), and inert surfaces were deployed in the marine environment for 4 months, and the biofilms that developed on these surfaces were investigated using Illumina NGS sequencing, targeting the prokaryotic 16S rRNA gene...

## Benthic microbial diversity trends in response to heavy metals in an oxygen-deficient eutrophic bay of the Humboldt current system offshore the Atacama Desert

**Authors:** Zarate A, Dorador C, Valds J et al.

**Source:** ENVIRONMENTAL POLLUTION 286:117281, 2021, DOI 10.1016/j.envpol.2021.117281

**Abstract:** Mejillones Bay is a coastal ecosystem situated in an oxygen-deficient upwelling area impacted by mining activities in the coastal desert region of northern Chile, where conspicuous microbial life develops in the sediments. Herein, heavy metal (loid)s (HMs) such as Cu, Pb, As, Zn, Al, Fe, Cd, Mo, Ni and V as well as benthic microbial communities were studied using spectrometry and iTag-16 S rRNA sequencing. Samples were taken from two contrasting sedimentary localities in the Bay named Punta Rieles (PR) and Punta Chacaya (PC) within 10-50 m water-depth gradient...

## Effect of heavy metals on protein content of marine unicellular green alga *Dunaliella tertiolecta*

**Authors:** El Agawany N, Kaamoush M, El-Zeiny A, Ahmed M

**Source:** ENVIRONMENTAL MONITORING AND ASSESSMENT193: 584, 2021, DOI 10.1007/s10661-021-09353-y

**Abstract:** Microalgae are rich source of protein containing necessary amino acids at different levels. The present study was designed to assess stimulatory and/or inhibitory impact of five different concentrations (5, 10, 15, 20, and 25 mg/L) of three essential heavy metals (nickel, zinc, and copper) on protein content (soluble, insoluble, and total) of the marine unicellular green alga *Dunaliella tertiolecta*. Further, geospatial analyses were used to assess the suitability of Qaroun Lake for *D. tertiolecta* proliferation...

## Environmentally relevant fungicide levels modify fungal community composition and interactions but not functioning

**Authors:** Baudy P, Zubrod JP, Konschak M et al.

**Source:** ENVIRONMENTAL POLLUTION 285:117234, 2021, DOI 10.1016/j.envpol.2021.117234

**Abstract:** Aquatic hyphomycetes (AHs), a group of saprotrophic fungi adapted to submerged leaf litter, play key functional roles in stream ecosystems as decomposers and food source for higher trophic levels. Fungicides, controlling fungal pathogens, target evolutionary conserved molecular processes in fungi and contaminate streams via their use in agricultural and urban landscapes. Thus fungicides pose a risk to AHs and the functions they provide. To investigate the impacts of fungicide exposure on the composition and functioning of AH communities, we exposed four AH species in monocultures and mixed cultures to increasing fungicide concentrations (0, 5, 50, 500, and 2500 mg/L). We assessed the biomass of each species via quantitative real-time PCR. Moreover, leaf decomposition was investigated...

## Specific toxicity of azithromycin to the freshwater microalga *Raphidocelis subcapitata*

**Authors:** Almeida AC, Gomes T, Lomba JAB, Lillicrap A

**Source:** ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY 222:112553, 2021, DOI 10.1016/j.ecoenv.2021.112553

**Abstract:** Pharmaceuticals are produced to inflict a specific physiological response in organisms. However, as only partially metabolized after administration, these types of compounds can also originate harmful side effects to non-target organisms. Additionally, there is still a lack of knowledge on the toxicological effects of legacy pharmaceuticals such as the antibiotic azithromycin. This macrolide occurs at high concentrations in the aquatic environment and can constitute a threat to aquatic organisms that are at the basis of the aquatic food chain, namely microalgae. This study established a high-throughput methodology to study the toxicity of azithromycin to the freshwater microalga Raphidocelis subcapitata. Flow cytometry and pulse amplitude modulated (PAM) fluorometry were used as screening tools...

# ERA / PUBLICATIONS SCIENTIFIQUES / ECOTOXICOLOGIE SPATIALE

## High spatial resolution measurements of passive-sampler derived air concentrations of persistent organic pollutants in the Campania region, Italy: Implications for source identification and risk analysis

**Authors:** Qu C, De Vivo B, Albanese S, Fortelli A et al.

**Source:** Environmental Pollution 286: 117248, 2021, https://doi.org/10.1016/j.envpol.2021.117248

**Abstract:** Because most relevant studies have used small sample sizes, to date, representative atmospheric monitoring of persistent organic pollutants (POPs) on a regional scale has been very limited, which makes it difficult to precisely identify "hotspots" and possible pollution sources. In this study, an ultrahigh resolution monitoring technique was used to measure the atmospheric spatial variations in POP concentrations on a regional scale, throughout Campania, Italy…

## Application of land use regression modelling to describe atmospheric levels of semivolatile organic compounds on a national scale

**Authors:** White KB, Sáňka O, Melymuk L, Přibylová P et al.

**Source:** Science of The Total Environment 148520, 2021, https://doi.org/10.1016/j.scitotenv.2021.148520

**Abstract:** Despite the success of passive sampler-based monitoring networks in capturing global atmospheric distributions of semivolatile organic compounds (SVOCs), their limited spatial resolution remains a challenge. Adequate spatial coverage is necessary to better characterize concentration gradients, identify point sources, estimate human exposure, and evaluate the effectiveness of chemical regulations such as the Stockholm Convention on Persistent Organic Pollutants. Land use regression (LUR) modelling can be used to integrate land use characteristics and other predictor variables (industrial emissions, traffic intensity, demographics, etc.) to describe or predict the distribution of air concentrations at unmeasured locations across a region or country…

## Occurrence and risk assessment of pesticides in a Mediterranean Basin with strong agricultural pressure (Guadiana Basin: Southern of Portugal)

**Authors:** Palma P, Fialho S, Lima A, Catarino A et al.

**Source:** Science of the Total Environment 794: 148703, 2021, https://doi.org/10.1016/j.scitotenv.2021.148703

**Abstract:** The study aimed to assess the occurrence and the environmental risk of a group of 51 selected pesticides in the Guadiana Basin (a biodiversity hotspot, in the Mediterranean).

The site-specific risk assessment showed a spatial and temporal pattern, with a higher risk occurring mainly in intermittent streams, in the drought period…

## A spatially explicit model for estimating risks of pesticide exposure to bird populations

**Authors:** Etterson M, Schumaker N, Garber K, Lennartz S et al.

**Source:** PLOS ONE 16(6): e0252545, 2021, https://doi.org/10.1371/journal.pone.0252545

**Abstract:** Pesticides are used widely in agriculture and have the potential to affect non-target organisms, including birds. We developed an integrated modeling system to allow for spatially-explicit evaluation of potential impacts to bird populations following exposures to pesticides…

## Supporting non-target arthropods in agroecosystems: Modelling effects of insecticides and landscape structure on carabids in agricultural landscapes

**Authors:** Ziółkowska E, Topping CJ, Bednarska AJ, & Laskowski R

**Source:** Science of the Total Environment 774: 145746, 2021, https://doi.org/10.1016/j.scitotenv.2021.145746

https://doi.org/10.15454/bwf7-8m60


**Abstract:** Intensification of agricultural practices is one of the most important drivers of the dramatic decline of arthropod species. We do not know, however, the relative contribution to decline of different anthropogenic stressors that are part of this process. We used high-resolution dynamic landscape models and advanced spatially-explicit population modelling to estimate the relative importance of insecticide use and landscape structure for population dynamics of a widespread carabid beetle *Bembidion lampros*. The effects of in-crop mitigation measures through the application of insecticides with reduced lethality, and off-crop mitigation measures by increasing abundance of grassy field margins, were evaluated for the beetle along the gradient of landscape heterogeneity…

## Conservation risks and benefits of establishing monarch butterfly (*Danaus plexippus*) breeding habitats close to maize and soybean fields in the north central United States: A landscape-scale analysis of the impact of foliar insecticide on nonmigratory monarch butterfly populations

**Authors:** Grant TJ, Krishnan N, & Bradbury SP

**Source:** Integrated Environmental Assessment and Management 17(5): 989-1002, 2021, DOI 10.1002/ieam.4402

**Abstract:** Establishing habitat in agricultural landscapes of the north central United States is critical to reversing the decline of North America's eastern monarch butterfly (*Danaus plexippus*) population. Insecticide use could create population sinks and threaten recovery. Discouraging habitat establishment within a 38-m zone around crop fields is a suggested risk mitigation measure. In Story County, Iowa, United States, this mitigation would discourage habitat establishment in 84% of roadsides and 38% of noncrop land. It is unclear if the conservation benefits from establishing habitat close to crop fields outweigh suppression of population growth owing to insecticide exposure. Consequently, monarch conservation plans require spatially and temporally explicit landscape-scale assessments…

## A Simplified Population-Level Landscape Model Identifying Ecological Risk Drivers of Pesticide Applications, Part One: Case Study for Large Herbivorous Mammals

**Authors:** Tarazona D, Tarazona G & Tarazona JV

**Source:** Int. J. Environ. Res. Public Health 18(15): 7720, 2021, https://doi.org/10.3390/ijerph18157720

**Abstract:** Environmental risk assessment is a key process for the authorization of pesticides, and is subjected to continuous challenges and updates. Current approaches are based on standard scenarios and independent substance-crop assessments. This arrangement does not address the complexity of agricultural ecosystems with mammals feeding on different crops. This work presents a simplified model for regulatory use addressing landscape variability, co-exposure to several pesticides, and predicting the effect on population abundance. The focus is on terrestrial vertebrates and the aim is the identification of the key risk drivers impacting on mid-term population dynamics…

## Natural habitat partially mitigates negative pesticide effects on tropical pollinator communities

**Authors:** Obregon D, Guerrero OR, Stashenko E & Poveda K

**Source:** Global Ecology and Conservation e01668, 2021, https://doi.org/10.1016/j.gecco.2021.e01668

**Abstract:** Land-use change and pesticides have been identified as two of the main causes behind pollinator decline. Understanding how these factors affect crop pollinator communities is crucial to inform practices that generate optimal

pollination and ensure sustainable food production. In this study, we investigated the effects of landscape composition and pesticide residues on bee communities and their pollination services in *Solanum quitoense* Lam. “lulo” crops in Colombia…

## The Role of Source-Sink Dynamics in the Assessment of Risk to Nontarget Arthropods from the Use of Plant Protection Products

**Authors:** Lewis G, Dinter A, Elston C, Marx MT et al.

**Source:** Environmental Toxicology and Chemistry 40(10): 2667-2679, 2021, https://doi.org/10.1002/etc.5137

**Abstract:** The concept of source-sink dynamics as a potentially important component of metapopulation dynamics was introduced in the 1980s. The objective of the present review was to review the considerable body of work that has been developed, to consider its theoretical implications as well as to understand how source-sink dynamics may manifest under field conditions in the specific case of nontarget arthropods in the agricultural environment...

We highlight the importance of considering the spatial and temporal heterogeneity of agricultural landscapes when assessing the population dynamics of nontarget arthropods in the context of the risk from the use of plant protection products…

## Identities, concentrations, and sources of pesticide exposure in pollen collected by managed bees during blueberry pollination

**Authors:** Graham KK, Milbrath MO, Zhang Y, Soehnlen A et al.

**Source:** Scientific Reports 11(1): 1-13, 2021, https://doi.org/10.1038/s41598-021-96249-z

**Abstract:** Bees are critical for crop pollination, but there is limited information on levels and sources of pesticide exposure in commercial agriculture. We collected pollen from foraging honey bees and bumble bees returning to colonies placed in blooming blueberry fields with different management approaches (conventional, organic, unmanaged) and located across different landscape settings to determine how these factors affect pesticide exposure. We also identified the pollen and analyzed whether pesticide exposure was correlated with corbicular load composition…

# ERA / PUBLICATIONS SCIENTIFIQUES / MICROBIOLOGIE ET CONTAMINANTS

## Interactions between heavy metals and bacteria in mangroves

**Authors:** Meng SS, Peng T, Pratush A et al.

**Source:** Marine Pollution Bulletin 172: 2021, DOI 10.1016/j.marpolbul.2021.112846

**Abstract:** Environmental heavy metal pollution has become a serious problem in recent years. Therefore, our study investigated seven heavy metal-contaminated mangroves (Beihai, Fangchenggang, Hainan, Hongkong, Shenzhen, Yunxiao, and Zhanjiang) in southern China, and found that they were particularly polluted with Zn and Pb. These heavy metals were mainly distributed in the surface sediments of the mangroves...

## A direct contact bioassay using sulfur-oxidizing bacteria (SOB) for toxicity assessment of contaminated field soils

**Authors:** Ashun E, Toor UA, Kim HS et al.

**Source:** Chemosphere 286: 1, 2022, DOI 10.1016/j.chemosphere.2021.131599

https://doi.org/10.15454/bwf7-8m60


**Abstract:** In this study, 11 low/uncontaminated (including Lufa 2.2) and 9 contaminated field soils with varying geophysical and physicochemical characteristics were evaluated for toxicities based on oxygen consumption of sulfur-oxidizing bacteria (SOB)...

## Fatty acid signatures of sediment microbial community in the chronically polluted mangrove ecosystem

**Authors:** Semanti P, Robin RS, Purvaja R, Ramesh R

**Source:** Marine Pollution Bulletin 172, 2021, DOI 10.1016/j.marpolbul.2021.112885

**Abstract:** Phospholipid fatty acid (PLFA) analysis was used to examine variation in the distribution of microbial communities in heavily polluted mangrove sediments of Thane creek, west coast of India. A total of 40 individual PLFAs representing 11 functional groups were identified in the sediment and were mainly dominated by saturated fatty acids (anaerobic prokaryotes) 1%) were detected in the sediment indicating their sensitivity to anthropic stressors...

## Microbial Metal Resistance within Structured Environments Is Inversely Related to Environmental Pore Size

**Authors:** Harvey HJ, Mitzakoff AMT, Wildman RD and more...

**Source:** Applied and Environmental Microbiology 87: 20, 2021, DOI 10.1128/AEM.01005-21

**Abstract:** The physical environments in which microorganisms naturally reside rarely have homogeneous structure, and changes in their porous architecture may have effects on microbial activities that are not typically captured in conventional laboratory studies. In this study, to investigate the influence of environmental structure on microbial responses to stress, we constructed structured environments with different pore properties (determined by X-ray computed tomography)...

## Detection of metals and associated bacteria from Mumbai mangroves and their impact analysis

**Authors:** Banerjee S, Ghosh S, Singh K and more...

**Source:** Regional Studies in Marine Science 8, 2021, DOI 10.1016/j.rsma.2021.102007

**Abstract:** The distribution of Pb, Ni, Zn, Cu, Cr, Mn, S, P, Na, Ca, K, Si, Al, Fe were studied in the mangrove sediments across five different sites in Maharashtra. Energy dispersive X-ray fluorescence method was utilized for the determination of the elements in the sediment both before and after the monsoon. The spatial variation, as well as the monsoon was seen to affect the metal concentration in the mangroves. A total of 34 and 9 bacterial isolates were isolated pre and post-monsoon respectively. The metal tolerance index of the microbes was increased...

## Effects of environmental factors on soil bacterial community structure and diversity in different contaminated districts of Southwest China mine tailings

**Authors:** Wu BH, Luo HY, Wang XT and more...

**Source:** Science of the Total Environment 802, 2022, DOI 10.1016/j.scitotenv.2021.149899

**Abstract:** A mass of tailings left by mineral exploitation have caused serious environmental pollution. Although many studies have shown that soil microorganisms have the potential to remediate environmental pollution, the interaction mechanism between microorganisms and the surrounding environment of tailings is still unclear. In this study, 15 samples around pyrite mine tailing were collected to explore the ecological effects of environmental factors on bacterial community...

https://doi.org/10.15454/bwf7-8m60


## Nano zero-valent iron-induced changes in soil iron species and soil bacterial communities contribute to the fate of Cd

**Authors:** Liu MJ, Wang J, Xu M and more...

**Source:** Journal of Hazardous Materials 424, A, 2021, DOI 10.1016/j.jhazmat.2021.127343

**Abstract:** Nano zero-valent iron (nZVI) is used for soil remediation; however, the impact of nZVI on soil solid iron phases and its interactions with soil microorganisms in relation to the fate of Cd in soil remains unclear. In the current study, we investigated the mechanisms underlying the change in mobility of Cd in exogenous Cd-contaminated soil with nZVI and gamma radiation treatments...

## Comparison of the effects of three fungicides on clubroot disease of tumorous stem mustard and soil bacterial community

**Authors:** Liao JJ, Luo LY, Zhang L and more...

**Source:** Journal of Soils and Sediments, 2021, DOI 10.1007/s11368-021-03073-z

**Abstract:** Purpose The application of fungicides is one of the main strategies to prevent clubroot disease. Currently, numerous studies focus on changes in the soil microbial community at different levels of clubroot disease severity. However, the effects of fungicides on the soil microbial community and causative pathogen, Plasmodiophora brassicae, while preventing clubroot disease remain unclear...

## Effect of round-shaped silver nanoparticles on the genetic and functional diversity of soil microbial community in soil and "soil-plant" systems

**Authors:** Macurkova A., Maryska L., Jindrichova B and more...

**Source:** Applied Soil Ecology 168, 2021, DOI 10.1016/j.apsoil.2021.104165

**Abstract:** Silver and silver nanoparticles (AgNPs) are extensively used as antimicrobial agents in various products and consequently enter the soil ecosystem, in which they accumulate and can have adverse effects on above and belowground organisms. Since the composition of the soil microbiome could have a significant impact on soil fertility, we focused, in this study, on the effect of AgNPs on soil microbial communities...

## Soil microbial community responses to the application of a combined amendment in a historical zinc smelting area

**Authors:** Tan CJ, Luo YF, Fu TL

**Source:** Environmental Science and Pollution Research, 2021, DOI 10.1007/s11356-021-16631-2

**Abstract:** Farmland soils that surround a historical zinc smelting area in northwestern Guizhou, China, are characterized by high levels of heavy metal accumulation. Previous studies have mainly focused on the potential risk evaluations of heavy metals in soil and crops. However, at present, the effects of amendment applications on the bioavailability of heavy metals and on microbial community in the heavily contaminated soils of the mining region are still unclear...

## Application, release, ecotoxicological assessment of biocide in building materials and its soil microbial response

**Authors:** Reiss F, Kiefer N, Noll M, Kalkhof S

**Source:** Ecotoxicology and Environmental Safety 224, 2021, DOI 10.1016/j.ecoenv.2021.112707

**Abstract:** Biocides are used in building materials to protect the building against microbial colonization and biodeterioration. However, these biocides are introduced by gradual leaching into soils in proximity of the buildings. This review

https://doi.org/10.15454/bwf7-8m60


discusses the aspects and characteristics of biocides from building materials...

## Effects of Atrazine on Chernozem Microbial Communities Evaluated by Traditional Detection and Modern Sequencing Technology

**Authors:** Yang FS, Gao MY, Lu HG and more...

**Source:** Microorganisms 9(9): 1832, 2021, DOI 10.3390/microorganisms9091832

**Abstract:** Atrazine is a long residual herbicide commonly used in maize fields. Although atrazine can effectively control weeds and improve crop yield, long-term application leads to continuous pollution in the agricultural ecological environment, especially in the soil ecosystem, and its impact on soil microorganisms is still not clear. Four methods were used in the experiment to clarify the effect of atrazine on the bacterial populations of cultivated soil layers of chernozem in a cold region in different periods: high-performance liquid chromatography (HPLC), colorimetry, microplate, and high-throughput sequencing...

## Microbial biomass and activity dynamics in restored lands in a metal contaminated region

**Authors:** McKergow M, Narendrula-Kotha R, Beckett P, Nkongolo KK

**Source:** Ecotoxicology, 2021, DOI 10.1007/s10646-021-02464-9

**Abstract:** Soil microbial communities are important for biogeochemical processes, along with the cycling of nutrients in an ecosystem. Their enzymatic activities are key indicators of their responses to stress. The objective of this research was to assess the effect of land reclamation on microbial biomass and activities in soils impacted by metal contamination...

## Repeated exposure to fungicide tebuconazole alters the degradation characteristics, soil microbial community and functional profiles

**Authors:** Han LX, Kong XB, Xu M, Nie JY

**Source:** Environmental Pollution 287, 2021, DOI 10.1016/j.envpol.2021.117660

**Abstract:** Tebuconazole is a broad-spectrum triazole fungicide that has been extensively applied in agriculture, but its toxicity on soil ecology remains unknown after repeated introduction to soil. This study investigated the degradation of tebuconazole and the changes in soil microbial community composition and functional diversity as well as network complexity in soil repeatedly treated with tebuconazole ...

## Perspectives on microalgae as model organisms toward the standardization of soil algal toxicity test methods

**Authors:** Nam SH, An YJ

**Source:** Comparative Biochemistry and Physiology C-Toxicology and Pharmacology 249, 2021, DOI 10.1016/j.cbpc.2021.109144

**Abstract:** When considering test species for soil ecotoxicity, the development of new model organisms is often suggested to increase the reliability of ecological risk assessments. Ubiquitous soil algae could offer potential test species for assessing various soil pollution levels. Currently, there are few reviews offering comprehensive perspectives on stressors-based toxicological studies using microalgae in soil media, with the majority of scholarly attention paid to the toxicological effects of freshwater algae or marine algae in aquatic ecosystems. In this review, we focus on current toxicological studies of microalgae assessed in soil-related media and suggest considerations for using microalgae in soil toxicity tests...

https://doi.org/10.15454/bwf7-8m60


## Interactions between pyrene and heavy metals and their fates in a soil-maize (*Zea mays* L.) system: Perspectives from the root physiological functions and rhizosphere microbial community

**Authors:** Wang YH, Li MJ, Liu ZW and more...

**Source:** Environmental Pollution 287, 2021, DOI 10.1016/j.envpol.2021.117616P

**Abstract:** The co-occurrence of polycyclic aromatic hydrocarbons (PAHs) and heavy metals in agricultural soils has become a worldwide food crop security concern. Pot experiments, rhizosphere microbial metagenomic sequencing, and root metatranscriptomic sequencing were performed to investigate the interactions among pyrene, Cu, and Cd in a soil-maize (*Zea mays* L.) system...

## Responses of microbial community and soil enzyme to heavy metal passivators in cadmium contaminated paddy soils: An in situ field experiment

**Authors:** Jiang YX, Hu T, Peng OU and more...

**Source:** International Biodeterioration & Biodegradation 164, 2021, DOI 10.1016/j.ibiod.2021.105292

**Abstract:** Heavy metal passivators could reduce the transfer of heavy metal ions from soil to crops and exhibit great potential in safe cropping in heavy metal contaminated agricultural soils. However, the effects of heavy metal passivators on microbial diversity and microorganisms-based biogeochemical processes in agricultural soil are poorly explored. In this study, the effects of three heavy metal passivators, viz. lime, silicon (Si) fertilizer, and gypsum, on the structure and function of microorganisms in cadmium (Cd) contaminated paddy soils were investigated...

## Effects of Heavy Metals/Metalloids and Soil Properties on Microbial Communities in Farmland in the Vicinity of a Metals Smelter

**Authors:** Hu XW, Wang JL, Lv Y and more...

**Source:** Frontiers in Microbiolgy 12, 2021, DOI 10.3389/fmicb.2021.707786

**Abstract:** Microorganisms play a fundamental role in biogeochemical cycling and are highly sensitive to environmental factors, including the physiochemical properties of the soils and the concentrations of heavy metals/metalloids. In this study, high-throughput sequencing of the 16S rRNA gene was used to study the microbial communities of farmland soils in farmland in the vicinity of a lead-zinc smelter...

## Response of Soil Microbial Communities to Different Doses of Glyphosate and Sulfosulfuron in a Calcareous Soil

**Authors:** Mollaee M, Ghadiri H, Zarei M and more...

**Source:** Journal of Agricultural Science and Technology 23(5):1149-1162

**Abstract:** To investigate the response of soil microbial populations to different doses of glyphosate and sulfosulfuron, a factorial experiment based on a complete block design was conducted at Shiraz University, Iran. The factors included different herbicides and dose rates (glyphosate at 0, 540, 1,080, and 4,320 g ae ha(-1) and sulfosulfuron at 0, 12.5, 25, and 50 g ai ha(-1)), and time of measurements (4, 15, 45, and 65 days after herbicides spray). Microbial respiration, microbial biomass carbon, metabolic quotient, dehydrogenase activity, and aerobic heterotrophic bacteria were measured in soil samples...

## Heavy metal pollution increases soil microbial carbon limitation: Evidence from ecological enzyme stoichiometry

**Authors:** Xu MZ, Cui YX, Beiyuan JZ and more...

**Source:** SOIL ECOLOGY LETTERS 3(3): 230-241, 2021, DOI 10.1007/s42832-021-0094-2

**Abstract:** Heavy metals can exist in soil for a long time and seriously affect soil quality. The coexistence of various heavy metal pollutants leads to biotoxicity and alters the activity of microorganisms. Soil microbial metabolism plays an important role in nutrient cycling and biochemical processes of soil ecosystem. However, the effects of heavy metal contamination on microbial metabolism in soil are still unclear. This study aims to reveal the responses of microbial metabolic limitation to heavy metals using extracellular enzyme stoichiometry...

## The Variations of Bacterial Community Structures in Tailing Soils Suffering from Heavy Metal Contaminations

**Authors:** Gao TP, Li HJ, He YQ and more...

**Source:** Water Air and Soil Pollution 232, 9, 2021, DOI 10.1007/s11270-021-05338-2

**Abstract:** Investigations of the impact of heavy metals on microbial community structure are crucial for bioremediation of the contaminated sites. To this end, high-throughput 16S rRNA sequencing was performed to assess the variations of bacterial communities in 6 heavy metal-contaminated soils sampled from Liujiaping (LJP) and Shanping (SP) lead-zinc tailings situated in northwestern China...

## Discovery and characterization of UipA, a uranium- and iron-binding PepSY protein involved in uranium tolerance by soil bacteria

**Authors:** Gallois N, Alpha-Bazin B, Bremond N, and more...

**Source:** ISME Journal 2021, DOI 10.1038/s41396-021-01113-7

**Abstract:** Uranium is a naturally occurring radionuclide. Its redistribution, primarily due to human activities, can have adverse effects on human and non-human biota, which poses environmental concerns. The molecular mechanisms of uranium tolerance and the cellular response induced by uranium exposure in bacteria are not yet fully understood. Here, we carried out a comparative analysis of four actinobacterial strains isolated from metal and radionuclide-rich soils that display contrasted uranium tolerance phenotypes...

## Response of soil enzyme activity and bacterial community to copper hydroxide nanofertilizer and its ionic analogue under single versus repeated applications

**Authors:** Tang Q, Xu ZL, Hong AM and more...

**Source:** Science of the Total Environement 796, 2021, DOI 10.1016/j.scitotenv.2021.148974

**Abstract:** Nanosized agrochemicals like nanofertilizers are being applied to soils. Adverse impacts of nanofertilizers on soil microflora were reported in past studies, but only considering a single application. Repeated applications are however more likely to occur in agriculture. We investigated effects of single versus repeated applications of a copper hydroxide nanofertilizer formulation (NFF) on soil enzyme activity and bacterial community...

https://doi.org/10.15454/bwf7-8m60



## Comprehensive characterization of stress tolerant bacteria with plant growth-promoting potential isolated from glyphosate-treated environment

**Authors:** Zhumakayev AR, Voros M, Szekeres A and more...

**Source:** World Journal of Microbiology and Biotechnology 37, 6, 2021, DOI 10.1007/s11274-021-03065-8

**Abstract:** The application of plant growth-promoting bacteria in agricultural systems is an efficient and environment-friendly strategy to improve crop yields and maintain soil quality. However, as different soils have diverse and specific ecological characteristics and may represent adverse abiotic conditions, in vivo application requires the careful selection of the desired beneficial microorganisms. In this study we report Ensifer adhaerens SZMC 25856 and Pseudomonas resinovorans SZMC 25875 isolates recovered from glyphosate-treated soil to possess yet undiscovered plant growth-enhancing potential...

## Evaluating the metabolic functional profiles of the microbial community and alfalfa (*Medicago sativa*) traits affected by the presence of carbon nanotubes and antimony in drained and waterlogged sediments

**Authors:** Cao WC, Zhu RL, Gong JL and more...

**Source:** Journal of Hazardous Materials 420, 2021, DOI 10.1016/j.jhazmat.2021.126593

**Abstract:** Antimony (Sb) is the ubiquitous re-emerging contaminant greatly accumulated in sediments which has been revealed risky to ecological environment. However, the impacts of Sb (III/V) on microbes and plants in sediments, under different water management with presence of engineering materials are poorly understood. This study conducted sequential incubation of sediments (flooding, draining and planting) with presence of multiwall carbon nanotubes (MWCNTs) and Sb to explore the influence on microbial functional diversity, Sb accumulation and alfalfa traits...

## Vertical distribution and effect of historical residual organochlorine pesticides on microbial community structure in sediment cores from an abandoned oxidation pond after dredging for 15 years

**Authors:** Wang YF, Liu T, Tang JC and more...

**Source:** Environmental Science and Pollution Research 2021, DOI 10.1007/s11356-021-16192-4

**Abstract:** The vertical distribution pattern of 19 organochlorine pesticides (OCPs), together with microbial ester-linked fatty acid methyl ester (EL-FAME) profiles were investigated in sediments from an abandoned oxidation pond of Ya-Er lake, China, which had been heavily polluted by hexachlorocyclohexanes (HCHs) and chlorobenzenes in 1980s...

## When nanoparticle and microbes meet: The effect of multi-walled carbon nanotubes on microbial community and nutrient cycling in hyperaccumulator system

**Authors:** Chen XF, Wang JC, YouYM and more...

**Source:** Journal of Hazardous Materials 423-A, 2022, DOI 10.1016/j.jhazmat.2021.126947

**Abstract:** Carbon nanotubes can potentially stimulate phytoremediation of heavy metal contaminated soil by promoting plant biomass and root growth. Yet, the regulating mechanism of carbon nanotubes on the rhizosphere micro-

environment and their potential ecological risks remain poorly characterized. The purpose of this study was to systematically evaluate the effects of multi-walled carbon nanotubes (MCNT) on the diversity and structure of rhizosphere soil bacterial and fungal communities, as well as soil enzyme activities and nutrients, in Solanum nigrum L. (S. nigrum)-soil system...

## Ecological network analysis reveals distinctive microbial modules associated with heavy metal contamination of abandoned mine soils in Korea

**Authors:** Chun SJ, Kim YJ, Y Nam KH

**Source:** Environmental Pollution 289, 2021, DOI 10.1016/j.envpol.2021.117851

**Abstract:** Heavy metal pollution in soil around abandoned mine sites is one of the most critical environmental issues worldwide. Soil microbes form complex communities and perform ecological functions individually or in cooperation with other organisms to adapt to harsh environments. In this study, we investigated the distribution patterns of bacterial and fungal communities in non-contaminated and heavy metal-contaminated soil of the abandoned Samkwang mine in Korea to explore microbial interaction mechanisms and their modular structures...

## Ant nests as a microbial hot spots in a long-term heavy metal-contaminated soils

**Authors:** Klimek B, Poliwka-Modliborek H, Grzes IM

**Source:** Environmental Science and Pollution Research 2021, DOI 10.1007/s11356-021-16384-y

**Abstract:** Interactions between soil fauna and soil microorganisms are not fully recognized, especially in extreme environments, such as long-term metal-polluted soils. The purpose of the study was to assess how the presence of Lasius niger ants affected soil microbial characteristics in a long-term metal-polluted area (Upper Silesia in Poland)...

## Microbial diversity alteration reveals biomarkers of contamination in soil-river-lake continuum

**Authors:** Bourhane Z, Lanzen A, Cagnon C and more...

**Source:** Journal of Hazardous Material 421, 2022, DOI 10.1016/j.jhazmat.2021.126789P

**Abstract:** Microbial communities inhabiting soil-water-sediment continuum in coastal areas provide important ecosystem services. Their adaptation in response to environmental stressors, particularly mitigating the impact of pollutants discharged from human activities, has been considered for the development of microbial biomonitoring tools, but their use is still in the infancy. Here, chemical and molecular (16S rRNA gene metabarcoding) approaches were combined in order to determine the impact of pollutants on microbial assemblages inhabiting the aquatic network of a soil-water-sediment continuum around the Ichkeul Lake (Tunisia), an area highly impacted by human activities...

## Changes in the Composition of the Soil Bacterial Community in Heavy Metal-Contaminated Farmland

**Authors:** Tseng SC, Liang CM, Chia T, Ton SS

**Source:** International Journal of Environmental Research and Public Health 18, 16, 2021, DOI 10.3390/ijerph18168661

**Abstract:** The structural changes of microorganisms in soil are the focus of soil indicators research. The purpose of this study was to investigate the changes in the composition of the soil bacterial community in heavy metal-contaminated soil. A total of six soil samples (two sampling times) were collected from contaminated farmland at three different depths (surface, middle, and deep layer)...

## Cadmium retention and microbial response in volcanic soils along gradients of soil age and climate on the Galapagos Islands

**Authors:** Rechberger MV, Roberti D, Phillips A and more...

**Source:** Journal of Envionmental Quality 2021, DOI 10.1002/jeq2.20275

**Abstract:** The behavior of trace metals may vary strongly in the course of volcanic soil development. Cadmium retention in soils is specifically important for some Galapagos islands where agriculture is leading to anthropogenic Cd contamination. To assess the influence of soil development factors on soil Cd retention and toxicity, we performed Cd sorption-desorption experiments with volcanic topsoils from the Galapagos Islands sampled along gradients of (a) substrate age (chronosequence, 1.5-1,070 ka) and (b) climate (elevation sequence, 47-866 m asl) ranging from arid lowland areas to humid highland areas...

## Microbial Community's Dynamic Response to Fomesafen Usage in Chernozems of Northeast China

**Authors:** Yang FS, Wang YB, Huang YA, Wei YN and more...

**Source:** Diversity Basel 13, 8, 2021, DOI 10.3390/d13080340

**Abstract:** The main purpose of this study was to explore the effects of the recommended usage level and twice the recommended usage level of the long-acting herbicide fomesafen on the soil enzymes and microbial community structure in chernozems of soybean fields. Culturable microbial biomass and phospholipid fatty acids (PLFA) were used as the main references for this evaluation...

## Effect of an Equal Dose of Polymetallic Pollution on the Microbiological Characteristics of Two Soils with Different Organic Carbon Contents

**Authors:** Terekhova VA, Fedoseeva EV, Kiryushina AP and more...

**Source:** Water Air and Soil Pollution 232, 2021, DOI 10.1007/s11270-021-05174-4

**Abstract:** Reliable stable indicators are very important for assessing soil quality. This paper compares the dynamics of microbial parameters in two different soils (rich/poor in organic carbon), contaminated in laboratory experiments with an equal dose of heavy metals (HMs) after 30 and 90 days. For this purpose, the changes in the number, biomass, and taxonomic structure of bacterial and fungal communities were assessed in microcosm experiments using an organic carbon-rich ordinary chernozem (Ch-humus-rich soil) and a depleted carbon agrozem (Ag-humus-poor soil), spiked with high concentrations of a zinc, lead, and copper solution (1100 Zn+660 Cu+650 Pb mg per kg soil) ...

## Dinotefuran alters Collembola-fungi-bacteria interactions that control mineralization of maize and soil organic carbon

**Authors:** Yu ZY, Schmidt O, Zhao Y and more...

**Source:** Journal of Hazardous Materials 18, 2021, DOI 10.1016/j.jhazmat.2021.126391

**Abstract:** Rare studies investigated influence of neonicotinoid insecticides on the whole soil biota including non-target invertebrates and microorganisms. And less is known about the consequent intervention on soil C processes. This study aimed to decipher Collembola-fungi-bacteria interactive effects on pathways of maize C translocation, combining isotopic tracer analysis of relevant compartments with high-throughput sequencing for bacterial and fungal genetic profiles...

https://doi.org/10.15454/bwf7-8m60



## Microbiological Nitrogen Transformations in Soil Treated with Pesticides and Their Impact on Soil Greenhouse Gas Emissions

**Authors:** Jezierska-Tys S, Joniec J, Bednarz J, Kwiatkowska E

**Source:** Agriculture Basel 11, 8, 2021, DOI 10.3390/agriculture11080787

**Abstract:** Research was conducted in connection with the pressure exerted by man on the environment through the use of pesticides. The aim of the study was to assess the impact of pesticides on soil and to evaluate the effect of these changes on greenhouse gas emissions into the atmosphere. The research was carried out on soil sown with oilseed rape...

## Effects of heavy metals and organic matter fractions on the fungal communities in mangrove sediments from Techeng Isle, South China

**Authors:** Xiao YZ, He MY, Xie JF and more...

**Source:** Ecotoxicology and Environmental Safety 222, 2021, DOI 10.1016/j.ecoenv.2021.112545

**Abstract:** Heavy metal pollution has become a serious environmental problem in mangrove ecosystems and has attracted more attention. Most of previous studies have mainly focused on the effects of heavy metals on bacterial communities in mangrove sediments. This study was the first to investigate the effects of heavy metals (e.g., As, Co, Cr, Cu, Mn, Ni, Pb, V and Zn) and organic matter fractions (including total organic carbon (TOC), total nitrogen (TN), and total sulfur (TS)) on the fungal communities in mangrove sediments from Techeng Isle, South China...

# ERA / PUBLICATIONS SCIENTIFIQUES / MICROBIOLOGIE ET CONTAMINANTS / Antibiotiques et antibiorésistances

## Incubation trial indicated the earthworm intestinal bacteria as promising biodigestor for mitigating tetracycline resistance risk in anthropogenic disturbed forest soil

**Authors:** Chao HZ, Zheng XX, Xia R and more...

**Source:** Science of the Total Environement 798, 2021, DOI 10.1016/j.scitotenv.2021.149337

**Abstract:** The continuous input of antibiotics due to frequent anthropogenic activities have increased the dissemination risk of antibiotic resistance genes (ARGs) in forest soil. As soil engineers, it remains undear whether earthworm intestinal microbial communities might play a role in controlling the ARG proliferation in forest soil. This study collected forest soil in the Yangtze River Delta. China, and its resident Metaphire guillelmi to investigate the interaction between tetracycline (50 mu g kg (-1)) and the bacteria in worm gut and soil...

## Sulfamethoxazole biodegradation and impacts on soil microbial communities in a Bolivian arid high altitude catchment

**Authors:** Archundia D, Martins JMF, Lehembre F and more...

**Source:** Chemosphere 284, 2021, DOI 10.1016/j.chemosphere.2021.131335

https://doi.org/10.15454/bwf7-8m60


**Abstract:** The processes controlling antibiotics fate in ecosystems are poorly understood, yet their presence can inhibit bacterial growth and induce the development of bacterial resistance. Sulfamethoxazole (SMX) is one of the most frequently detected sulfonamides in natural environments due to its low metabolism and molecular properties. This work presents pioneering results on SMX biodegradation and impact in high altitude soils (Bolivian Alti-plano), allowing a better understanding of the persistence, spread and impact of this antibiotic at the global watershed scale...

## Fertilization with poultry litter increases the abundance of antibiotic-resistant bacteria in tropical soil: a microcosm study

**Authors:** Chaves-Ulate C, Granados-Chinchilla F, Rodriguez C

**Source:** Water Air and Soirl Pollution 232, 10, 2021, DOI 10.1007/s11270-021-05347-1

**Abstract:** Various antimicrobial agents are used in the poultry industry to treat microbial infections and prevent disease or as growth promoters. As a result, poultry litter (PL) can contain antibiotic residues (AR), antibiotic-resistant bacteria (ARB), and antibiotic resistance genes. Still, PL is used in many countries as a fertilizer and feed supplement for cattle. To evaluate whether usage of PL in agriculture leads to the accumulation of AR and ARB accumulate in the soil, we (i) measured the concentration of monensin, tylosin, ciprofloxacin, oxytetracycline, and chlortetracycline and the abundance of culturable monensin-, tylosin-, and ciprofloxacin-resistant bacteria in 15 commercial PL samples and (ii) exposed soil microcosms...

## Antibiotic resistance, antimicrobial residues, and bacterial community diversity in pasture-raised poultry, swine, and beef cattle manures

**Authors:** Rothrock MJ, Min BR, Castleberry L and more...

**Source:** Journal of Animal Science 99, 8, 2021, DOI 10.1093/jas/skab144

**Abstract:** Animal manure can be a source of antibiotic-resistant genes (ARGs) and pharmaceutical residues; however, few studies have evaluated the presence of ARG in pasture-raised animal production systems. The objective of this study was to examine changes in microbiome diversity and the presence of antibiotic residues (ABRs) on three farms that contained a diverse range of animal species: pasture-raised poultry (broiler and layer), swine, and beef cattle...

## Impact of chicken litter pre-application treatment on the abundance, field persistence, and transfer of antibiotic resistant bacteria and antibiotic resistance genes to vegetables

**Authors:** Subirats J, Murray R, Yin XL and more…

**Source:** Science of the Total Environment 801, 2021, DOI 10.1016/j.scitotenv.2021.149718

**Abstract:** Treatment of manures prior to land application can potentially reduce the abundance of antibiotic resistance genes and thus the risk of contaminating crops or water resources. In this study, raw and composted chicken litter were applied to field plots that were cropped to carrots, lettuce and radishes. Vegetables were washed per normal culinary practice before downstream analysis. The impact of composting on manure microbial composition, persistence of antibiotic resistant bacteria in soil following application, and distribution of antibiotic resistance genes and bacteria on washed vegetables were determined...

## Assessing Antibiotics Biodegradation and Effects at Sub-inhibitory Concentrations by Quantitative Microbial Community Deconvolution

**Authors:** Duygan BDO, Gaille C, Fenner K, van der Meer JR

**Source:** Frontiers in Environmental Science 9, 2021, DOI 10.3389/fenvs.2021.737247

**Abstract:** Antibiotics in the environment cause widespread concern as a result of their potent inhibitory action on microbial growth and their role in potentially creating selective conditions for proliferation of antibiotic resistant bacteria. Comprising a carbon skeleton, antibiotics should be amenable to microbial biodegradation, but this is still largely uncharted territory because of their simultaneous strong toxicity. In this study, we estimated potential antibiotics degradation by and effects on mixed microbial communities at concentrations sufficiently high to allow sensitive detection of biomass growth, but simultaneously, low enough to mitigate their toxic action...

## Manure microbial communities and resistance profiles reconfigure after transition to manure pits and differ from those in fertilized field soil

**Authors:** Sukhum KV, Vargas RC, Boolchandani M and more...

**Source:** MBIO 12, 3, 2021, DOI 10.1128/mBio.00798-21

**Abstract:** In agricultural settings, microbes and antimicrobial resistance genes (ARGs) have the potential to be transferred across diverse environments and ecosys-tems. The consequences of these microbial transfers are unclear and understudied. On dairy farms, the storage of cow manure in manure pits and subsequent applica-tion to field soil as a fertilizer may facilitate the spread of the mammalian gut micro-biome and its associated ARGs to the environment...

## Insights into the role of the fungal community in variations of the antibiotic resistome in the soil collembolan gut microbiome

**Authors:** Wang YF, Qiao M, Duan GL and more...

**Source:** Environmental Science & Technology 55, 17: 11784-11794, 2021, DOI 10.1021/acs.est.0c08752

**Abstract:** Fertilization is known to affect antibiotic-resistance gene (ARG) patterns in the soil, even in the gut of soil fauna. Here, we conducted a microcosm experiment to investigate differences of effects of different fertilizers on collembolan gut ARG profiles and to further explore the microecological mechanisms that cause the differences...

## From the soil to the clinic: the impact of microbial secondary metabolites on antibiotic tolerance and resistance

**Authors:** Perry EK, Meirelles LA, Newman DK

**Source:** Nature Reviews Microbiology 2021, DOI 10.1038/s41579-021-00620-w

**Abstract:** Secondary metabolites profoundly affect microbial physiology, metabolism and stress responses. Increasing evidence suggests that these molecules can modulate microbial susceptibility to commonly used antibiotics; however, secondary metabolites are typically excluded from standard antimicrobial susceptibility assays. This may in part account for why infections by diverse opportunistic bacteria that produce secondary metabolites often exhibit discrepancies between clinical antimicrobial susceptibility testing results and clinical treatment outcomes...

https://doi.org/10.15454/bwf7-8m60

## Distribution and Influence on the Microbial Ecological Relationship of Antibiotic Resistance Genes in Soil at a Watershed Scale

**Authors:** Hao YL, Li G, Xiao ZF and more...

**Source:** Sustainability 13, 17, 2021, DOI 10.3390/su13179748

**Abstract:** Antibiotic resistance genes (ARGs) are ubiquitous in the environment, with previous studies mainly focusing on the terrestrial ecosystem, which is prone to higher antibiotic application. However, the characteristics, distribution pattern, and driving factors of soil ARGs at the macro scale are still unclear. In this study, the soil ARGs, antibiotics, mobile genetic elements (MGEs), soil properties, toxic metals, polycyclic aromatic hydrocarbons (PAHs), and bacterial community in the Taipu River Basin were analyzed to investigate the distribution and dissemination of ARGs at a watershed scale...

## Persistence and spread of tetracycline resistance genes and microbial community variations in the soil of animal corrals in a semi-arid planted forest

**Authors:** Nejidat A, Diaz-Reck D, Gelfand I, Zaady E

**Source:** FEMS Microbiology Ecology 97, 8, 2021, DOI 10.1093/femsec/fiab106

**Abstract:** At the spring, goat and sheep herds are transferred to planted forests, in a semi-arid region in the northern Negev Desert, Israel, to reduce herbaceous biomass and, fire risk. The herds are held overnight in corrals for about 4 months, enriching the soil with organic matter and nitrogen. This research examined the effect of these enrichments on soil bacterial community structure (BCS) and the abundance of tetracycline resistance genes (TRGs) in active and abandoned corrals (1-10-years-old)...

## Post-digestate composting shifts microbial composition and degrades antimicrobial resistance genes

**Authors:** Gurmessa B, Milanovic V, Pedretti EF and more...

**Source:** Bioresource Technology 340, 2021, DOI 10.1016/j.biortech.2021.125662

**Abstract:** Post-digestate treatments may reduce the risk linked to Antibiotic Resistant Genes (ARGs) release with digestate direct land application. Thus, this study aimed to evaluate post-digestate composting and co-composting with biogas production feedstock (maize silage, food processing waste, and poultry litter) effect on abundance of selected ARGs: erm(B), tet(K), tet(M), tet(O), and tet(S) genes...

## Insights into the mechanism of the interference of sulfadiazine on soil microbial community and function

**Authors:** Qiu LL, Daniell TJ, Banwart SA and more...

**Source:** Journal of Hazardous Material 419, 2021, DOI 10.1016/j.jhazmat.2021.126388

**Abstract:** The accumulation of sulfonamides in the soil environment possessed the potential to change soil microbial community and function. Metabolomics is capable of providing insights into the carbon metabolic pool and molecular mechanisms associated with external stressors. Here we evaluated alternations in soil bacterial community and soil metabolites profiles under sulfadiazine (SDZ) exposure and proposed a potential mechanism that SDZ accumulation in soil affected soil organic matter (SOM) cycling...

https://doi.org/10.15454/bwf7-8m60


## The Effect of Clarithromycin Toxicity on the Growth of Bacterial Communities in Agricultural Soils

**Authors:** Rodriguez-Gonzalez L, Santas-Miguel V, Campillo-Cora C and more...

**Source:** Processes 9, 8, 2021, DOI 10.3390/pr9081303

**Abstract:** The presence of antibiotics in different environmental matrices is a growing concern. The introduction of antibiotics into the soil is mainly due to sewage treatment plants. Once in the soil, antibiotics may become toxic to microbial communities and, as a consequence, can pose a risk to the environment and human health. This study evaluates the potential toxicity of the antibiotic clarithromycin (CLA) in relation to the bacterial community of 12 soils with different characteristics...

## Enzymatic activity and microbial diversity of sod-podzolic soil microbiota using 16s rrna amplicon sequencing following antibiotic exposure

**Authors:** Trifonova T, Kosmacheva A, Sprygin A, Chesnokova S, Byadovskaya O

**Source:** Antibiotic Basel 10, 8, 2021, DOI 10.3390/antibiotics10080970

**Abstract:** Antibiotic contamination of the environment negatively affects soil fertility by disrupting natural microbial communities. Currently, the study of the effect of antibacterial drugs on soils typical in Russia, which are of great importance for agriculture, is insufficient. Despite a rapid increase in the number of metagenomic studies, this article is the first publication devoted to the microbial diversity of sod-podzolic soil and its relationship with enzymatic activity ...

## Antibiotic Resistance Gene-Carrying Plasmid Spreads into the Plant Endophytic Bacteria using Soil Bacteria as Carriers

**Authors:** Xu H, Chen ZY, Huang RY and more...

**Source:** Environmental Science & Technology 55: 10462-10470, 2021, DOI 10.1021/acs.est.1c01615

**Abstract:** Applications of animal manure and treated wastewater could enrich antibiotic-resistant bacteria (ARB) and antibiotic resistance genes (ARGs) in the plant microbiome. However, the mechanistic studies of the transmission of ARB and ARGs from the environment to plant endophytic bacteria were few. Herein, a genetically engineered fluorescent Escherichia coli harboring a conjugative RP4 plasmid that carries three ARGs was used to trace its spread into *Arabidopsis thaliana* interior in a tetracycline-amended hydroponic system in the absence or presence of a simulated soil bacterial community...

# ERA / PUBLICATIONS SCIENTIFIQUES / MICROBIOLOGIE ET CONTAMINANTS / Biocontrôle

## Using crop diversity to lower pesticide use: Socio-ecological approaches

**Authors:** Thomine E, Mumford J, Rusch A, Desneux N

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 804: 150156, 2022, DOI 10.1016/j.scitotenv.2021.150156

**Abstract:** The farming practices adopted since the end of the Second World War, based on large areas of monocultures and chemical use, have adversely affected the health of farmers and consumers and dramatically reduced farmland biodiversity. As a consequence, many studies over more than twenty years have stated that agriculture is facing three main challenges: (1) feeding the growing world population (2) with more environmentally friendly products (3) at a reasonable return for the producer. Increasing the efficacy of biocontrol could be one lever for agriculture to meet these expectations...

## Impacts of decaying aromatic plants on the soil microbial community and on tomato seedling growth and metabolism: suppression or stimulation?

**Authors:** Ainalidou A, Bouzoukla F, Menkissoglu-Spiroudi U and more...

**Source:** Plant Basel 10, 9, 2021, DOI 10.3390/plants10091848

**Abstract:** This study provides insight into changes in the features of tomato seedlings growing in soils enriched with spearmint, peppermint, or rosemary leaves and into changes in the microbial communities of these soils used as seedbeds; an organic amendment was also applied as a positive control. While the soil microbial community flourished in the presence of all three aromatic plants, tomato growth was inhibited or stimulated depending on the plant that was used...

## Benefits of corn-cob biochar to the microbial and enzymatic activity of soybean plants grown in soils contaminated with heavy metals

**Authors:** Haddad SA, Lemanowicz J

**Source:** Energies 14, 18, 2021, DOI 10.3390/en14185763

**Abstract:** Synchronous effects of biochar on heavy metals stress, microbial activity and nodulation process in the soil are rarely addressed. This work studied the effects, under greenhouse conditions, of selected heavy metals Cd2+, Pb2+ and Ni2+ on soybean plants grown in two different soils amended with biochar, and studied their effect on the microbial and enzymatic activity...

## Biopesticide evaluation from lab to greenhouse scale of essential oils used against macrosiphum euphorbiae

Authors: Dunan L, Malanga T, Bearez P, Benhamou S et al.

Source: AGRICULTURE-BASEL 11(9): 867, 2021, DOI 10.3390/agriculture11090867

Abstract: Aphids are recognized as a major threat to economically important crops. Their control is predominantly based on synthetic insecticides that are detrimental to human health and the environment. Botanical pesticides based on essential oils (EOs) are a promising alternative. In this study, the entomotoxicity of green anise and fennel EO fumigation was tested on the potato aphid Macrosiphum euphorbiae. Three different settings of increasing scale were considered (leaflet, whole plant and greenhouse) to appraise the consistency of EO impact from controlled laboratory to greenhouse production conditions...

## Apiaceae essential oils and their constituents as insecticides against mosquitoes-A review

**Authors:** Spinozzi E, Maggi F, Bonacucina G, Pavela et al.

**Source:** INDUSTRIAL CROPS AND PRODUCTS 171:113892, 2021, DOI 10.1016/j.indcrop.2021.113892

**Abstract:** Apiaceae is a family encompassing medicinal and aromatic plants. They produce essential oils (EOs) inside oil canals, known as ducts and vittae, which occur in their vegetative and reproductive organs. Given the high EO yields and the availability of raw material from cultivations widespread all over the world, Apiaceae are exploitable for different industrial applications. An interesting perspective is their utilization in the fabrication of botanical insecticides effective against insect vectors of public importance such as mosquitoes, aiming to be ecofriendly alternatives to synthetic insecticides. On this basis, in the current review, we collected scientific evidence supporting the use of Apiaceae EOs and their major constituents as active ingredients in insecticidal formulations against larvae and adults of several mosquitoes

https://doi.org/10.15454/bwf7-8m60


that are important pathogen vectors (e.g., Anopheles, Aedes and Culex species)...

## Impact of biocontrol microbes on soil microbial diversity in ginger (*Zingiber officinale Roscoe*)

**Authors:** Huang ZQ, Liu BW, Yin Y, Liang F and more...

**Source:** Pest Management Science 2021, DOI 10.1002/ps.6595

**Abstract:** Bacteria are the most diverse and abundant group of soil organisms that influence plant growth and health. Bacillus and Trichoderma are commonly used as biological control agents (BCA) that directly or indirectly act on soil bacteria. Therefore, it is essential to understand how the applied microbes impact the indigenous microbial community before exploring their activity in the control of soilborne diseases...

# ERA / PUBLICATIONS SCIENTIFIQUES / MICROBIOLOGIE ET CONTAMINANTS / Bioremédiation

## System biology analysis of endosulfan biodegradation in bacteria and its effect in other living systems: modeling and simulation studies

**Authors:** Bhandari G, Sharma M, Negi S and more...

**Source:** Journal of Biomolecular Structures & Dynamics 2021, DOI 10.1080/07391102.2021.1982773

**Abstract:** Endosulfan is a broadly applied cyclodiene insecticide which has been in use across 80 countries since last 5 decades. Owing to its recalcitrant nature, endosulfan residues have been reported from air, water and soil causing toxicity to various non-target organisms. Microbial decontamination of endosulfan has been reported previously by several authors...

## Photo-biodegradation of imidacloprid under blue light-emitting diodes with bacteria and co-metabolic regulation

**Authors:** Elumalai P, Yi XH, Cai TT and more...

**Source:** Environental Research 201, 2021, DOI 10.1016/j.envres.2021.111541

**Abstract:** Imidacloprid (IMI) is existence in the soil environment with a half-life habitually more than hundred days. This study targets to determine, identify and characterize photo-biodegradation bacteria from neonicotinoids (NEOs) contaminated agricultural field soils. The sub-surface soil had a higher level contamination of NEOs...

## A field study reveals links between hyperaccumulating Sedum plants-associated bacterial communities and Cd/Zn uptake and translocation

**Authors:** Wu YJ, Santos SS, Vestergard M and more...

**Source:** Science of the Total Environment 805, 2022, DOI 10.1016/j.scitotenv.2021.150400

**Abstract:** Hyperaccumulating ecotypes of Sedum plants are promising Cd/Zn phytoextractors, with potential for leveraging its rhizospheric or endophytic microbiomes to improve phytoremediation efficiency. However, research of bacteria associated with Sedum at field scale is still lacking. Here, we presented a detailed investigation of the bacterial microbiome of hyperaccumulating Sedum ecotypes (*S. alfredii* and *S. plumbizincicola*) and a

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nonhyperaccumulating *S. alfredii* ecotype, which grow at different soil environments...

## Functional analysis of chlorpyrifos biodegradation in agricultural soils augmented with a three-strain bacterial consortium

**Authors:** Islam N, Iyer R

**Source:** Water Air and Soil Pollution 232, 10, 2021, DOI 10.1007/s11270-021-05349-z

**Abstract:** Chlorpyrifos (CP) is a widely used organophosphate (OP) insecticide and a potent environmental neurotoxin. This research focuses on the potential of bacteria, both native to agricultural soil and part of a designed consortium composed of laboratory strains, to completely degrade CP and its toxic metabolites...

## Endophytic bacterium CIMAP-A7 mediated amelioration of atrazine induced phyto-toxicity in *Andrographis paniculata*

**Authors:** Tripathi P, Yadav R, Das P and more...

**Source:** Environmental Pollution 287, 2021, DOI 10.1016/j.envpol.2021.117635

**Abstract:** The presence of atrazine, a triazine herbicide, and its residues in agriculture soil poses a serious threat to human health and environment through accumulation in edible plant parts. Hence, the present study focused on atrazine induced stress amelioration of Andrographis paniculata, an important medicinal plant, by a plant growth promoting and atrazine degrading endophytic bacterium CIMAP-A7 inoculation...

## Assessing the arsenic-saturated biochar recycling potential of vermitechnology: Insights on nutrient recovery, metal benignity, and microbial activity

**Authors:** Roy S, Sarkar D, Datta R and more...

**Source:** Chemospherec 286, 1, 2021, DOI 10.1016/j.chemosphere.2021.131660

**Abstract:** Biochar mediated pollutant removal is gaining attention because of high efficiency of the process. However, effective recycling avenues of the pollutant-saturated biochars are scarce in the knowledge base; while such materials can be a new source of long-range contamination...

## Disentangling the role of ectomycorrhizal fungi in plant nutrient acquisition along a Zn gradient using X-ray imaging

**Authors:** Zhang KL, Tappero R, Ruytinx J and more...

**Source:** Science of the Total Environment 801, 2021, DOI 10.1016/j.scitotenv.2021.149481

**Abstract:** Zinc (Zn) is a plant essential micronutrient involved in a wide range of cellular processes. Ectomycorrhizal fungi (EMF) are known to play a critical role in regulating plant Zn status. However, how EMF control uptake and trans location of Zn and other nutrients in plant roots under different Zn conditions is not well known. Using X-ray fluo-rescence imaging, we found the EMF species Suillus luteus increased pine root Zn acquisition under low Zn concentrations...

## An efficient manganese-oxidizing fungus *Cladosporium halotolerans* strain XM01: Mn(II) oxidization and Cd adsorption behavior

**Authors:** Wang M, Xu ZX, Dong B and more...

**Source:** Chemosphere 28, 1, 2022, DOI 10.1016/j.chemosphere.2021.132026

https://doi.org/10.15454/bwf7-8m60


**Abstract:** The applications of biogenic Mn oxides (BMOs) formed by Mn-oxidizing fungus in decontaminating heavy metals have attracted increasing attention. In this study, an efficient Mn-oxidizing fungus was isolated from soil and identified as Cladosporium halotolerans strain XM01. The Mn(II) adsorption and oxidation activities of this strain were investigated, showing significantly high removal and oxidation rates of soluble Mn(II)...

## A biogenic microbial biosurfactin that degrades difenoconazole fungicide with potential antimicrobial and oil displacement properties

**Authors:** Satapute P, Jogaiah S

**Source:** Chemosphere 286, 1, 2022, DOI 10.1016/j.chemosphere.2021.131694

**Abstract:** Surfactin is a bacterial lipopeptide and an influential biosurfactant mainly known for excellent surfactant ability. The amphiphilic nature of surfactin helps it to sustain under hydrophobic and hydrophilic conditions. In this investigation, a bacterium strain (BTKU3) that produces biosurfactant were isolated from oil-contaminated soil. Based on the blue agar plate (Bap) assay, the BTKU3 strain was found to be promising for biosurfactant production...

## Biochar and earthworms synergistically improve soil structure, microbial abundance, activities and pyraclostrobin degradation

**Authors:** Zhang QM, Li SZ, Saleem M and more...

**Source:** Applied Soil Ecology 168, 2021, DOI 10.1016/j.apsoil.2021.104154

**Abstract:** As a widely used fungicide, the toxic impacts of pyraclostrobin on soil ecosystems have attracted extensive concern. Thus, it is very important and meaningful to develop effective strategies to alleviate its toxic effects. Therefore, in this study, we used corn straw-derived biochar produced at 500 degrees C as a soil amendment to study its effects on soil microbial populations, aggregation, enzymatic activities, and earthworm *Eisenia fetida* in pyraclostrobin-contaminated soil...

## Theoretical design and process control of neonicotinoids insecticides suitable for synergistic degradation with the rubisco enzyme from rhizobia and carbon-fixing bacteria in soil

**Authors:** Deng ZY, Ren ZX, Sun SH, Wang YJ

**Source:** Environmental Sciences and Pollution Research 2021, DOI 10.1007/s11356-021-16531-5

**Abstract:** In this study, we studied and developed the modification schemes of environmentally friendly substitutes of neonicotinoid insecticides (NNIs) along with the regulatory measures that effectively enhanced the synergistic degradation of NNIs by soil rhizobia and carbon-fixing bacteria. Firstly, the binding ability of NNIs to the two key proteins was characterized by molecular docking; secondly, the mean square deviation decision method, which is a comprehensive evaluation method, was used to investigate the binding ability of NNI molecules with the two Rubisco rate-limiting enzymes...

## Enhanced Bioremediation of Heavy Metals from Phosphate Processing Wastewater Using the Indigenous *Bacterium Serratia rubidaea* NCTC12971

**Authors:** Moula A, Ellafi A, Borgi MA and more...

**Source:** Geomicrobiology Journal 2021, DOI 10.1080/01490451.2021.1979696

**Abstract:** Bioremediation using microorganisms have become innovative efficient tools for detoxifying a wide variety of urban and industrial wastewaters. In this study, we investigated for the first time the microbial detoxification of

phosphate processing wastewaters (PPWW) by using the indigenous bacterium Serratia rubidaea NCTC12971, having numerous plant growth promoting traits...

## Bacterial consortium biotransformation of pentachlorophenol contaminated wastewater

**Authors:** Ammeri RiW, Simeone GD, Hassen W, and more...

**Source:** Archives of Microbiology DOI10.1007/s00203-021-02589-9

**Abstract:** The aims of this study were (i) to compare PCP removal (100 mg L-1) by two bacterial consortia B-1 and B-2 in sterile wastewater (STWW) and liquid mineral medium (MSM), (ii) PCP effect in biofilm formation and antimicrobial susceptibility...

## Passivation of multiple heavy metals in lead-zinc tailings facilitated by straw biochar-loaded N-doped carbon aerogel nanoparticles: Mechanisms and microbial community evolution

**Authors:** Li JH, Xia CG, Cheng R and more...

**Source:** Science of the Total Environment 803, 2021, DOI 10.1016/j.scitotenv.2021.149866

**Abstract:** Heavy metal (HM) soil pollution has become an increasingly serious problem with the development of industries. Application of biochar in HMs remediation from contaminated environment has attracted considerable research attention during the past decade. Although the mechanism of HMs passivation with biochar has been investigated, effects and mechanisms of interaction among soil-indigenous microbes and novel carbon matrix composites for HMs adsorption and passivation are still unclear...

## Microbial Community Diversity Dynamics in Acid Mine Drainage and Acid Mine Drainage-Polluted Soils: Implication on Mining Water Irrigation Agricultural Sustainability

**Authors:** Munyai R, Ogola HJO, Modise DM

**Source:** FRONTIERS IN SUSTAINABLE FOOD SYSTEMS 5, 2021, DOI 10.3389/fsufs.2021.701870

**Abstract:** Environmental degradation related to mining-generated acid mine drainage (AMD) is a major global concern, contaminating surface and groundwater sources, including agricultural land. In the last two decades, many developing countries are expanding agricultural productivity in mine-impacted soils to meet food demand for their rapidly growing population. Further, the practice of AMD water (treated or untreated) irrigated agriculture is on the increase, particularly in water-stressed nations around the world. For sustainable agricultural production systems, optimal microbial diversity, and functioning is critical for soil health and plant productivity. Thus, this review presents up-to-date knowledge on the microbial structure and functional dynamics of AMD habitats and AMD-impacted agricultural soils...

## Microbial investigations of new hydrogel-biochar composites as soil amendments for simultaneous nitrogen-use improvement and heavy metal immobilization

**Authors:** Zhang LX, Guan YT

**Source:** Journal of Hazardous Materials 424, A, 2021, DOI 10.1016/j.jhazmat.2021.127154

**Abstract:** Agricultural sustainability is challenging because of increasingly serious and co-existing issues, e.g., poor nitrogen-fertilizer use and heavy metal pollution. Herein, we introduced a new poly (acrylic acid)-grafted chi-tosan and biochar

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composite (PAA/CTS/BC) for soil amendment, and provided a first microbial insight into how PAA/CTS/BC amendment simultaneously improved nitrogen cycling and immobilized heavy metals...

## Interactions among heavy metal bioaccessibility, soil properties and microbial community in phyto-remediated soils nearby an abandoned realgar mine

**Authors:** Xiao WW, Lin GB, He XM and more...

**Source:** Chemosphere 286, 1, 2021, DOI 10.1016/j.chemosphere.2021.131638

**Abstract:** Soil samples were collected from a representative arsenic (As) contaminated region under phytoremediation of hyperaccumulation plants. Relative abundance and diversity of microbial communities in the soil samples were characterized via 16S rRNA genes sequencing...

## Soil microbial community and abiotic soil properties influence Zn and Cd hyperaccumulation differently in *Arabidopsis halleri*

**Authors:** Kushwaha P, Neilson JW, Maier RM, Babst-Kostecka A

**Source:** Science of the Total Environment 803, 2022, DOI 10.1016/j.scitotenv.2021.150006

**Abstract:** Soil contamination with trace metal(loid) elements (TME) is a global concern. This has focused interest on TME tolerant plants, some of which can hyperaccumulate extraordinary amounts of TME into above-ground tissues, for potential treatment of these soils. However, intra-species variability in TME hyperaccumulation is not yet sufficiently understood to fully harness this potential. Particularly, little is known about the rhizosphere microbial communities associated with hyperaccumulating plants and whether or not they facilitate TME uptake...

## Effects of arbuscular mycorrhizal fungi on frond antimony enrichment, morphology, and proteomics in *Pteris cretica* var. *nervosa* during antimony phytoremediation

**Authors:** Xi L, Shen YaQ, Zhao X and more...

**Source:** Science of the Total Environment 804, 2022, DOI 10.1016/j.scitotenv.2021.149904

**Abstract:** *Pteris cretica var. nervosa* is a dominant fern species found in antimony (Sb) mining areas, capable of forming symbiosis with arbuscular mycorrhizal fungi (AMF), especially with those members of the Glomus genus. Despite this fern's relevance and the potential contribution of mycorrhizal symbiosis to phytoremediation, the AMF's im-pact on P. var. nervosa phytoremediation of Sb remains unknown. Here, we exposed *P. var. nervosa* to different concentrations of Sb for 6 months...

## Critical review on microbial community during in-situ bioremediation of heavy metals from industrial wastewater

**Authors:** Sharma P, Pandey AK, Kim SH and more...

**Source:** Environemental Technology & innovation 4, 2021, DOI 10.1016/j.eti.2021.101826

**Abstract:** This review aims to summarise recent studies on in-situ microbial remediation of heavy metals from industrial wastewater. The major environmental issue of heavy metal(s) pollution in groundwater is worldwide due to the continuous development of industrial activities. Microbial remediation has been reported to show intense changes in the microbial diversity induced by heavy metals, environmental pollution, and

adaptation mechanisms that enable microbes to live in environments contaminated by metals...

## Unraveling the effects of arbuscular mycorrhizal fungi on cadmium uptake and detoxification mechanisms in perennial ryegrass (Lolium perenne)

**Authors:** Han Y, Zveushe OK, Dong FQ and more...

**Source:** Science of the Total Environment 798, 2021, DOI 10.1016/j.scitotenv.2021.149222

**Abstract:** Cadmium (Cd) is a major environmental pollutant and one of the most toxic metals in the environment. Arbuscular mycorrhizal fungi (AMF) assisted phytoremediation can be used to remove Cd from polluted soils but the role of AMF, which mediate in Cd accumulation and tolerance, remains poorly understood. Here we inoculated Lawn perenne with two different AMF species (*Glomus Minimum* and *Glomus mosseae*). Mycorrhizal *L. perenne* and non-mycorrhizal controls were exposed to Cd stress and we tested the effects of AMF mycorrhization on Cd uptake and subsequent tolerance, as well as the underlying mechanisms.

## Effect of the natural establishment of two plant species on microbial activity, on the composition of the fungal community, and on the mitigation of potentially toxic elements in an abandoned mine tailing

**Authors:** Solis-Hernandez AP, Chavez-Vergara BM, Rodriguez-Tovar AV and more...

**Source:** Science of the Total Environment 802, 2021, DOI 10.1016/j.scitotenv.2021.149788

**Abstract:** In Mexico, millions of tons of mining wastes are deposited in the open pit. Their content in potentially toxic elements (PTE) represents an environmental risk. In the tailings, pioneer plant communities are established, associated with a determined diversity of fungi; plants, and fungi are fundamental in the natural rehabilitation of mining wastes. The objective was to evaluate the impact of the natural establishment of two plant species on the microbial activity, on the composition of the fungal community, and on the mitigation of the effect of PTE in a contaminated mine tailing...

## New Associations of Aerobic Bacteria that Actively Decompose Lindane

**Authors:** Nazarova EA, Egorova DO, Anan'ina LN and more...

**Source:** Applied Biochemistry and Microbiology 57, 5:643-655, 2021, DOI 10.1134/S0003683821050112

**Abstract:** Associations of aerobic bacteria capable of decomposing the organochlorine pesticide lindane at a concentration of 0.1 g/L in a mineral medium for 30-180 days were obtained via selection. It was found that the lindane-degrading associations L2-6, L3-6, L4-6, L6-6, and L4-10 were characterized by a low level of species diversity (Shannon index of 1.88-2.46)...

## Evaluation of Cr(VI) Reduction Using Indigenous Bacterial Consortium Isolated from a Municipal Wastewater Sludge: Batch and Kinetic Studies

**Authors:** Kholisa B, Matsena M, Chirwa EMN

**Source:** Catalysts 11, 9, 2021, DOI 10.3390/catal11091100

**Abstract:** Hexavalent Chromium (Cr(VI)) has long been known to be highly mobile and toxic when compared with the other stable oxidation state, Cr(III). Cr(VI)-soluble environmental pollutants have been detected in soils and water bodies receiving industrial and agricultural waste. The reduction of Cr(VI) by microbial organisms is considered to be an environmentally compatible, less expensive and sustainable remediation alternative when compared to conventional treatment methods, such as chemical neutralization and chemical precipitation of Cr.

This study aims to isolate and identify the composition of the microbial consortium culture isolated from waste activated sludge and digested sludge...

## Isolation and identification of arsenic resistant bacteria: a tool for bioremediation of arsenic toxicity

**Authors:** Mandal D, Sonar R, Saha I and more...

**Source:** International Journal of Environmental Science and Technology, 2021, DOI 10.1007/s13762-021-03673-9

**Abstract:** The soil and groundwater of Asanpara village (Bhagobangola I block) of Murshidabad district are contaminated with non-permissible limit of arsenic and other elements that co-exist with arsenic in various chemical compounds like arsenopyrite, ferrous arsenate, ferric arsenate, etc. Arsenic resistant bacteria (ARB) were isolated from arsenic contaminated soil of Asanpara and biochemically characterized...

## Paracoccus and Achromobacter bacteria contribute to rapid biodegradation of imidacloprid in soils

**Authors:** Gao YX, Liu M, Zhao XY and more...

**Source:** Ecotoxicology and Environmental Safety 225, 2021, DOI 10.1016/j.ecoenv.2021.112785

**Abstract:** Neonicotinoids are among the most widely used insecticides worldwide, and as such, have garnered increasing attention from the scientific community in regards to their potentially negative environmental impacts. Recently, the degradability of neonicotinoid in soil has gained more attentions. However, what role soil microbes play in this degradation remains vastly underexplored. In this study, we compared the capacity of soil microbes sampled from different geographic regions and fields to degrade the neonicotinoid insecticide imidacloprid...

## The intercropping and arbuscular mycorrhizal fungus decrease Cd accumulation in upland rice and improve phytoremediation of Cd-contaminated soil by *Sphagneticola calendulacea* (L.) Pruski

**Authors:** Lei LL, Zhu QY, Xu PX, Jing YX

**Source:** Journal of Environmental Management 98, 2021, DOI 10.1016/j.jenvman.2021.113516

**Abstract:** Little is known about the impact of the combined application of intercropping and arbuscular mycorrhizal fungus (AMF) on the plant growth and Cd accumulation in the two intercropped plants. A greenhouse pot experiment was performed to investigate the effects of intercropping (IC) and AMF-*Glomus versiforme* (GV) on the growth, photosynthesis, Cd accumulation and antioxidant activities in the two intercropped plants-upland rice and Cd hyperaccumulator *Sphagneticola calendulacea* (L.) Pruski in the soils added with 5 mg Cd kg (-1)...

## Optimisation of Various Physicochemical Variables Affecting Molybdenum Bioremediation Using Antarctic Bacterium, Arthrobacter sp. Strain AQ5-05

**Authors:** Darham S, Syed-Muhaimin SN, Subramaniam K and more...

**Source:** Water 13, 17, 2021, DOI 10.3390/w13172367

**Abstract:** The versatility of a rare metal, molybdenum (Mo) in many industrial applications is one of the reasons why Mo is currently one of the growing environmental pollutants worldwide. Traces of inorganic contaminants, including Mo, have been discovered in Antarctica and are

compromising the ecosystem. Bioremediation utilising bacteria to transform pollutants into a less toxic form is one of the approaches for solving Mo pollution...

## Biodegradation of organophosphorus pesticide profenofos by the bacterium Bacillus sp. PF1 and elucidation of initial degradation pathway

**Authors:** Mahajan R, Verma S, Chatterjee S

**Source:** Environmental Technology DOI 10.1080/09593330.2021.1976282

**Abstract:** Among the organophosphate pesticides, the wide and indiscriminate use of profenofos (PFF) in agricultural and horticultural crops has resulted in serious environmental and animal health concerns and therefore demands an urgent need to develop a biological solution for its effective removal from the environment. For the bioremediation of PFF, a strain PF1, capable of utilizing profenofos as the sole source of carbon and energy was isolated from the soil samples of apple orchards of Shimla region of Himachal Pradesh, India...

## Responses of rhizosphere bacterial communities, their functions and their network interactions to Cd stress under phytostabilization by Miscanthus spp.

**Authors:** Chen ZJ, Tian W, Li YJ and more...

**Source:** Environmental Pollution 287, 2021, DOI 10.1016/j.envpol.2021.117663

**Abstract:** Miscanthus has good tolerance to heavy metals (HMs) and has received increasing attention in studies of HM-contaminated soil remediation. In this study, four Miscanthus cultivars (*M. lutarioriparius Xiangnadi* NO4, *M. sinensis Xiangmang* NO1, *M. lutarioriparius x M. sinensis* hybrid Xiangzamang NO1, and *M. floridulus Wujiemang* NO1) that grow in China were studied. Their tolerance and enrichment abilities in soils containing 50 mg kg(-1) cadmium (Cd) and the structure and function of their rhizosphere bacterial communities during the remediation process were analyzed...

## Biodegradation of phorate by bacterial strains in the presence of humic acid and metal ions

**Authors:** Singh S, Kumar V, Anil AG, Romero R and more...

**Source:** Journal of Basic Microbiology DOI 10.1002/jobm.202100332

**Abstract:** Phorate is a systemic insecticide used to eradicate mites, insects, and nematodes. Extensive use of this organophosphate has engendered severe environmental concerns. The current research aimed to explore the kinetic pathways of phorate biodegradation in aqueous solutions. Two novel bacterial strains *Pseudomonas aeruginosa strain* PR1 (KP268772.1) and Pseudomonas sp. PR_02 (KP268773.1) were isolated, screened, and developed given their potential to degrade phorate...

## Enhancing Zn and Cd removal from heavy metal-contaminated paddy soil using an artificial microbial consortium

**Authors:** Ge Y, Cheng HN, Zhou WB and more...

**Source:** Journal of Soils and Sediments 2021, DOI 10.1007/s11368-021-03066-y

**Abstract:** Purpose Agricultural soil contamination by heavy metals is a serious environmental problem, and developing feasible and effective soil remediation technologies is a top priority. In this study, a microbial consortium dominated by sulfur-oxidizing bacteria was constructed to enhance Cd and Zn removal from contaminated soil...

## Current strategies and prospects in algae for remediation and biofuels: An overview

**Authors:** Kandasamy S, Narayanan M, He Z and more…

**Source:** BIOCATALYSIS AND AGRICULTURAL BIOTECHNOLOGY 35, 2021, DOI 10.1016/j.bcab.2021.102045

**Abstract:** Phycoremediation is an environmentally sustainable method that utilizes macro and microalgae to remediate polluted land and water. Phycoremediation consists of two elements: the microbial niche around the algae and the second by the algae itself, which absorb and degrade the toxic pollutants into less or non-toxic components. The advanced gene cloning technology on algae could improve gene efficiency and produce the active xenobiotic degrading enzyme...

## Bacterial Exopolysaccharides: Insight into Their Role in Plant Abiotic Stress Tolerance

**Authors:** Bhagat N, Raghav M, Dubey S, Bedi N

**Source:** Journal of Microbiology and Biotechnology 31(8): 1045-1059, 2021, DOI 10.4014/jmb.2105.05009

**Abstract:** Various abiotic stressors like drought, salinity, temperature, and heavy metals are major environmental stresses that affect agricultural productivity and crop yields all over the worl .../...The third environmental stressor is presence of heavy metals in the soil due to improper industrial waste disposal practices that are toxic for plants. EPS production by soil bacteria can result in the biomineralization of metal ions, thereby imparting metal stress tolerance to plants...

## Mercury resistance and plant growth promoting traits of endophytic bacteria isolated from mercury-contaminated soil

**Authors:** Ustiatik R, Nuraini Y, Suharjono S and more...

**Source:** Bioremediation Journal 2021, DOI 10.1080/10889868.2021.1973950

**Abstract:** Mercury (Hg) is a toxic trace element that can cause serious environmental problems. The main source of Hg contamination to soil across Indonesia is artisanal and small-scale gold mining (ASGM) and strategies to manage or remove Hg from soil are needed. This study isolated Hg-resistant endophytic bacteria from indigenous local grasses (Cynodon dactylon and Eleusine indica) growing in Hg-contaminated soils to identify potential inoculants that could increase plant growth and mercury uptake for phytoremediation...

## Rhizosphere bacterial community dynamics of the cadmium hyperaccumulator *Sedum plumbizincicola* under a cadmium concentration gradient during phytoextraction

**Authors:** Hou JY, Liu WX, Li Y and more...

**Source:** Plant and Soil 2021, DOI 10.1007/s11104-021-05123-4

**Abstract:** Aims The rhizosphere microbiome plays an important role in plant growth and behavior during phytoremediation. This work aims to explore how hyperaccumulating plant performance (shoot biomass and Cd uptake) and rhizosphere bacterial community are driven by plant development under a Cd concentration gradient and their relationship during plant growth...

https://doi.org/10.15454/bwf7-8m60


## Phosphate functionalized iron based nanomaterials coupled with phosphate solubilizing bacteria as an efficient remediation system to enhance lead passivation in soil

**Authors:** Teng ZD, Zhao X, Yuan JJ and more...

**Source:** Journal of Hazardous Materials 419, 2021, DOI 10.1016/j.jhazmat.2021.126433

**Abstract:** Bioremediation technology has attracted increasing interest due to it efficient, economical and eco-friendly to apply to heavy metal contaminated soil. This study presents a new biological remediation system with phosphate functionalized iron-based nanomaterials and phosphate solubilizing bacterium strain *Leclercia adecarboxylata*...

## Anaerobic-petroleum degrading bacteria: Diversity and biotechnological applications for improving coastal soil

**Authors:** Wang BC, Kuang SPS, Shao HB, Wang L, Wang HH

**Source:** Ecotoxicology and Environmental Safety 224, 2021, DOI 10.1016/j.ecoenv.2021.112646

**Abstract:** Due to the industrial emissions and accidental spills, the critical material for modern industrial society petroleum pollution causes severe ecological damage. The prosperous oil exploitation and transportation causes the recalcitrant, hazardous, and carcinogenic sludge widespread in the coastal wetlands. The costly physicochemicalbased remediation remains the secondary and inadequate treatment for the derivatives along with the tailings. Anaerobic microbial petroleum degrading biotechnology has received extensive attention for its cost acceptable, eco-friendly, and fewer health hazards...

## Sugarcane bagasse biochar modulates metal and salinity stresses on microbial functions and enzyme activities in saline co-contaminated soils

**Authors:** Azadi N, Raiesi F

**Source:** Applied Soil Ecology 167, 2021, DOI 10.1016/j.apsoil.2021.104043

**Abstract:** Biochar can reduce salinity stress and metal toxicity to soil microbial community and enzymatic activity, hence would improve soil biological fertility and quality. However, the effects of sugarcane bagasse biochar (SCB) on microbial and biochemical responses to salinity stress in metal co-contaminated soils still remain unknown. The aim of this study was to assess the impact of SCB application on microbial activity, biomass and enzymatic activities in a soil co-contaminated with cadmium (Cd) and lead (Pb) when simultaneously exposed to NaCl salinity stress during an incubation experiment...

## Arbuscular mycorrhizal fungi alleviate negative effects of arsenic-induced stress on crop plants: A meta-analysis

**Author:** Neidhardt H

**Source:** PLANTS PEOPLE PLANET 3(5): 523-535, 2021, DOI1 0.1002/ppp3.10122

**Abstract:** Societal Impact Statement The inoculation with arbuscular mycorrhizal (AM) fungi shows great potential to increase the tolerance of host plants toward toxic arsenic. In many Asian countries and elsewhere, crops are increasingly being irrigated with arsenic-contaminated groundwater, which causes loss of yield and the risk that arsenic enters the food chain. Greenhouse cultivation experiments demonstrated that AM fungi are able to increase the arsenic tolerance in crop plants, but the results are highly variable. This meta-analysis demonstrates that AM fungi significantly reduce the arsenic concentration, and at the same time, positively modify the nutrient supply and the

https://doi.org/10.15454/bwf7-8m60


biomass in host crops that are grown under arsenic stress...

## Specific arbuscular mycorrhizal fungal-plant interactions determine radionuclide and metal transfer into *Plantago lanceolata*

**Authors:** Rosas-Moreno J, Pittman JK, Robinson CH

**Source:** PLANTS PEOPLE PLANET 3(5): 667-678, 2021, DOI 10.1002/ppp3.10185

**Abstract:** Societal Impact Statement Industrial activity has left a legacy of pollution by radionuclides and heavy metals. The exposure of terrestrial environments to increased levels of ionising radiation and toxic elements is of concern, not only because of the immediate effects to biota but also because of the potential risk of mobilisation into higher levels of a food chain. Here, we present a study that extends our knowledge of how arbuscular mycorrhizal fungi contribute to the mobilisation of non-essential elements in environments such as former mine sites, and provides a perspective that will be of interest for the management and remediation of such sites...

## Biodegradation of low-density polyethylene (LDPE) sheet by microalga, *Uronema africanum* Borge

**Authors:** Sanniyasi E, Gopal K, Gunasekar DK, Raj PP

**Source:** Scientific Reports 11, 1, 2021, DOI 10.1038/s41598-021-96315-6

**Abstract:** Plastic (polyethylene) pollution is a severe cause of deterioration of a healthy environment. For example, ingestion of plastics in the animal gut, clogging of water canals and retarded solid waste management. Many conventional methods of polyethylene degradation include UV photooxidation, thermal oxidation, incineration, chemical oxidation and landfill are being practiced. However, these methods are not feasible, costlier and not a complete solution for this global issue. Therefore, plausible, alternative solution for this issue is biodegradation. Microbes such as bacteria, fungi and algae are involved in polyethylene degradation in its natural habitat. Among them, algae were given very less importance...

## A review on the microbial degradation of chlorpyrifos and its metabolite TCP

**Authors:** Bose S, Kumar PS, Vo DVN

**Source:** Chemosphere 283, 2021, DOI 10.1016/j.chemosphere.2021.131447

**Abstract:** Chlorpyrifos (CPF) falls under the category of organophosphorus pesticides which are in huge demand in the agricultural sector. Overuse of this pesticide has led to the degradation of the quality of terrestrial and aquatic life. The chemical is moderately persistent in the environment but its primary metabolite 3,5,6-trichloro-2-pyridinol (TCP) is comparatively highly persistent. Thus, it is important to degrade the chemical and there are many proposed techniques of degradation...

## Arbuscular mycorrhizal fungi reduce cadmium accumulation in plants: evidence and uncertainty

**Author:** Sterckeman T

**Source:** Plant and Soil 2021, DOI 10.1007/s11104-021-05126-1

**Commentary:** Non-essential and toxic for all living organisms, cadmium (Cd) is a trace element to which a significant part of the world population is chronically overexposed through the consumption of food made from cereals, tubers or vegetables (Clemens et al. 2013). Cadmium in these plant products comes from the soil, through root absorption and translocation to the harvested organs (Sterckeman and Thomine 2020)...

## Culture-dependent study of arsenic-reducing bacteria in deep aquatic sediments of Bengal Delta

**Authors:** Bandopadhyay C, Manna SK, Samanta S, and more...

**Source:** Environmental Science and Pollution Research 2021, DOI 10.1007/s11356-021-16312-0

**Abstract:** Biogeochemical release of soil-bound arsenic (As) governs mobilization of the toxic metalloid into the groundwater. The present study has examined As-V-reduction ability of bacteria from anoxic aquatic sediments that might contribute to arsenic mobilization in the Bengal Delta...

## Comparative Investigation of 15 Xenobiotic-Metabolizing N-Acetyltransferase (NAT) Homologs from Bacteria

**Authors:** Garefalaki V, Papavergi MG, Savvidou O and more...

**Source:** Applied and Environmental Microbiology 87, 19, 2021, DOI 10.1128/AEM.00819-21

**Abstract:** Arylamines constitute a large group of industrial chemicals detoxified by certain bacteria through conjugation reactions catalyzed by N-acetyltransferase (NAT) enzymes. NAT homologs, mostly from pathogenic bacteria, have been the subject of individual studies that do not lend themselves to direct comparisons. By implementing a practicable pipeline, we carried out a comparative investigation of 15 NAT homologs from 10 bacteria, mainly bacilli, streptomycetes, and one alphaproteobacterium...

## Inhibition of cadmium releasing from sulfide tailings into the environment by carbonate-mineralized bacteria

**Authors:** Yin TT, Lin H, Dong YB and more...

**Source:** Journal of Hazardous Materials 419, 2021, DOI 10.1016/j.jhazmat.2021.126479

**Abstract:** Microbially induced carbonate precipitation (MICP) could be a potential green solution to resolve the issue of heavy metal releasing from the sulfide tailings. However, detailed mechanism of heavy metal-biomineralization in sulfide tailings and impact of procedure parameters on in-situ applications remain unexplored. We systematically investigated the biomineralization process in the column tests for a better understanding of the mechanism...

## Glyphosate-degrading behavior of five bacterial strains isolated from stream biofilms

**Authors:** Rossi F, Carles L, Donnadieu F, Batisson I, Artigas J

**Source:** Journal of Hazardous Materials 420, 2021, DOI 10.1016/j.jhazmat.2021.126651

**Abstract:** The present study investigates the individual degrading behavior of bacterial strains isolated from glyphosate degrading stream biofilms. In this aim, biofilms were subjected to enrichment experiments using glyphosate or its metabolite AMPA (aminomethyl phosphonic acid) as the sole phosphorus source...

## Lowered Cd toxicity, uptake and expression of metal transporter genes in maize plant by ACC deaminase-producing bacteria Achromobacter sp

**Authors:** Sun LN, Zhang XH, Ouyang WK and more...

**Source:** Journal of Hazardous Materials 423, 2021, DOI 10.1016/j.jhazmat.2021.127036

**Abstract:** In this study, an ACC deaminase-producing bacterial strain Achromobacter sp. A1 was isolated from maize rhizosphere soil, characterized and evaluated for the effects on cadmium (Cd) immobilization in solution/

https://doi.org/10.15454/bwf7-8m60


rhizosphere, physiological characteristics and the tissue Cd contents in maize and the molecular mechanisms involved by hydroponic and pot experiments...

## Succession of enzymes and microbial biomarkers in the process of vermicomposting: An insight towards valorization of toxic paper mill wastes using *Perionyx excavates* (Oligochaeta; Perrier, 1872)

**Authors:** Ganguly RK, Chakraborty SK

**Source:** Journal of Environmental Health Science and Engineering 2021, DOI 10.1007/s40201-021-00701-1

**Abstract:** Main insight of the study was to evaluate the potential of Perionyx excavates, an indigenous earthworm of India towards bioconversion of toxic paper mill wastes. The study had considered a comprehensive study over succession of different enzymes and microbial biomasses alongside removal of heavy metals to reflect the qualitative enrichment of the toxic waste through valorisation procedure...

## The effect of combined pollution by PAHs and heavy metals on the topsoil microbial communities of Spolic Technosols of the lake Atamanskoe, Southern Russia

**Authors:** Gorovtsov A, Demin K, Sushkova S and more...

**Source:** Environmental Geochemistry and Health 2021, DOI 10.1007/s10653-021-01059-x

**Abstract:** The contamination with organic and inorganic pollutants changes significantly soil microbial community structure. These shifts indicate anthropogenic pressure and help to discover new possibilities for soil remediation. In this study, the microbial community structure of Spolic Technosols formed at the territory of a former industrial sludge reservoir near the Kamensk-Shakhtinsky (Southern Russia) was studied using a metagenomics approach...

## Microbial reduction of Cr(VI) in the presence of Ni, Cu and Zn by bacterial consortium enriched from an electroplating contaminated site

**Authors:** Gong WJ, Wang XR, Zhao HP

**Source:** Biodegradation 2021, DOI 10.1007/s10532-021-09962-x

**Abstract:** The bioremediation of Cr(VI) has been intensively reported in recent years, while little information about Cr(VI)-reducing consortium enriched from in-situ contaminated soil has been revealed, specifically the functional genes involved. In this study, we verified a Cr(VI) reduction process by a consortium enriched from in-situ contaminated soil through enzymatic analysis...

## Biochar aging alters the bioavailability of cadmium and microbial activity in acid contaminated soils

**Authors:** Bandara T, Franks A, Xu JM and more...

**Source:** Journal of Hazardous Materials 420, 2021, DOI 10.1016/j.jhazmat.2021.126666

**Abstract:** The effects of biochar aging on heavy-metal bioavailability and microbial activity are not fully understood. This study determined the effect over 270 days of poultry-litter biochar (PBC) and sugar-gum-wood biochar (SBC) on the bioavailability of Cd and microbial activity in acidic soils differing in organic matter content...

## Microbial response and adaption to thallium contamination in soil profile

**Authors:** She JY, Liu J, He HP and more...

**Source:** Journal of Hazardous Material 423-A, 2022, DOI 10.1016/j.jhazmat.2021.127080

**Abstract:** Thallium (Tl) is a trace metal with high toxicity. Comprehensive investigation of spatial distribution of Tl and microorganism is still limited in soils from mining area. In this study, 16S rRNA sequencing and network analysis were used for deciphering the co-occurrence patterns of bacterial communities in two different types of soil profiles around a typical Tl-bearing pyrite min...

## Plant-microbial remediation of chlorpyrifos contaminated soil

**Authors:** Wang X, Hou JW, Liu WR, Bao J

**Source:** JOURNAL OF ENVIRONMENTAL SCIENCE AND HEALTH PART B-PESTICIDES FOOD CONTAMINANTS AND AGRICULTURAL WASTES 2021, DOI 10.1080/03601234.2021.1977570

**Abstract:** With the development of modern agriculture, the pollution caused by the use of chemical fertilizers and pesticides has become a serious problem, posing a threat to human health and the living environment. The remediation of plant microorganisms has been seen as an economical, effective, and eco-friendly method of cleaning up soils contaminated with organophosphorus pesticides. In this study, white-rot fungi were immobilized by adsorption method, a plant-microbial remediation met was established...

## Evaluation of the PGPR Capacity of Four Bacterial Strains and Their Mixtures, Tested on Lupinus albus var. Dorado Seedlings, for the Bioremediation of Mercury-Polluted Soils

**Authors:** Gonzalez D, Blanco C, Probanza A and more...

**Source:** Processes 9, 8, 2021, DOI 10.3390/pr9081293

**Abstract:** Soil contamination by mercury, which is one of the most toxic heavy metals due to its bioaccumulative capacity, poses a risk to the environment as well as health. The Almaden mining district in Ciudad Real, Spain is one of the most heavily-polluted sites in the world, making the soils unusable. Bioremediation, and more specifically phyto-rhizoremediation, based on the synergistic interaction established between plant and Plant Growth Promoting Rhizobacteria (PGPR), improves the plant's ability to grow, mobilize, accumulate, and extract contaminants from the soil...

## Bioaugmentation and bioaugmentation-assisted phytoremediation of heavy metal contaminated soil by a synergistic effect of cyanobacteria inoculation, biochar, and purslane (*Portulaca oleracea* L.)

**Authors:** Zanganeh F, Heidari A, Sepehr A, Rohani A

**Source:** Environmental Sciences and Pollution Research 2021, DOI 10.1007/s11356-021-16061-0

**Abstract:** In recent decades, soil contamination with heavy metals has become an environmental crisis due to their long-term stability and adverse biological effects. Therefore, bioremediation is an eco-friendly technology to remediate contaminated soil, which the efficiency requires further research. This study was designed to comparatively investigate two strategies: bioaugmentation by using a cyanobacterial species (Oscillatoria sp.) and bioaugmentation-assisted phytoremediation by using Oscillatoria sp. and purslane (*Portulaca oleracea* L.) for the bioremediation of soil contaminated by heavy metals (Cr (III), Cr (VI), Fe, Al, and Zn)...

## Ectomycorrhizal fungi enhance the tolerance of phytotoxicity and cadmium accumulation in oak (*Quercus acutissima* Carruth.) seedlings: modulation of growth properties and the antioxidant defense responses

**Authors:** Sun W, Yang BS, Zhu YD and more...

**Source:** Environemental Science and Pollution Research 2021, DOI 10.1007/s11356-021-16169-3

**Abstract:** Ectomycorrhizal fungi (EMF), which form symbiotic ectomycorrhiza with tree roots, mediate heavy metal tolerance of host plants. To investigate the roles of EMF in the growth, modulation of oxidative stress, and cadmium (Cd) accumulation and translocation in *Quercus acutissima* seedlings, ectomycorrhizal seedlings inoculated with *Suillus luteus* were treated with different Cd concentrations (0.1, and 5 mg kg (-1)) for 14 days...

## Deciphering the endophytic and rhizospheric microbial communities of a metallophyte commelina communis in different cu-polluted soils

**Authors:** He L, Ren YZ, Zeng WM and more...

**Source:** Microorganisms 9, 8, 2021, DOI 10.3390/microorganisms9081689

**Abstract:** Metallophytes microbiota play a key role in plant growth and resistance to heavy metal stress. Comparing to the well-studied single or some specific plant growth-promoting (PGP) bacterial strains, our current understanding of the structural and functional variations of microbiome of metallophytes is still limited. Here, we systematically investigated the endophytic and rhizosphere bacterial community profiles of a metallophyte Commelina communis growing in different Cu-polluted soils by high-throughput sequencing technology...

## Co-metabolic and biochar-promoted biodegradation of mixed PAHs by highly efficient microbial consortium QY1

**Authors:** Li M, Yin H, Zhu MH and more...

**Source:** Journal of Environmental Sciences 107: 65-76, 2021, DO I10.1016/j.jes.2021.02.002

**Abstract:** Polycyclic aromatic hydrocarbons (PAHs), typical representatives of the persistent organic pollutants (POPs), have become ubiquitous in the environment. In this study, a novel microbial consortium QY1 that performed outstanding PAHs-degrading capacity has been enriched. The degradation characteristics of single and mixed PAHs treated with QY1 were studied...

## Isolation and development of a microbial consortium for the treatment of automobile service station wastewater

**Authors:** Singh P, Kadam V, Patil Y

**Source:** Journal of Applied Microbiology 2021, DOI 10.1111/jam.15257

**Abstract:** This work aims to investigate the nature of waste being generated by automobile service stations (ASS) and to devise a microbial-based formulation for the treatment of ASS wastewater...

## Remediation of Petroleum-Contaminated Soils with Microbial and Microbial Combined Methods: Advances, Mechanisms, and Challenges

**Authors:** Sui Xi, Wang XM, Li YH Ji HB

**Source:** Sustainability 13, 16, 2021, DOI 10.3390/su13169267

**Abstract:** The petroleum industry's development has been supported by the demand for petroleum and its by-products. During extraction and transportation, however, oil will leak into the soil, destroying the structure and quality of the soil and even harming the health of plants and humans. Scientists are researching and developing remediation techniques to repair and re-control the afflicted environment due to the health risks and social implications of petroleum hydrocarbon contamination...

## Isolation, characterization, and evaluation of a high-siderophore-yielding bacterium from heavy metal-contaminated soil

**Authors:** Wang Y, Huang W, Li YaQ and more...

**Source:** Environmental Science and Pollution Research 2021, DOI 10.1007/s11356-021-15996-8

**Abstract:** Heavy metal-resistant siderophore-producing bacteria (SPB) with plant growth-promoting traits can assist in phytoremediation of heavy metal-contaminated soil. We isolated siderophore-producing bacteria from Pb and Zn mine soil in Shangyu, Zhejiang, China...

## Experimental study on treatment of heavy metal-contaminated soil by manganese-oxidizing bacteria

**Authors:** Liu MB, Wang SL, Yang M and more...

**Source:** Environmental Science and Pollution Research 2021, DOI 10.1007/s11356-021-15475-0

**Abstract:** There are many studies on the treatment of heavy metals by manganese-oxidizing bacteria and the reaction is good; the problem of compound pollution of heavy metals in soil has been difficult to solve. In this study, the application of manganese-oxidizing bacteria in soil was studied...

## Lead pollution and bacterial bioremediation: a review

**Authors:** Sevak PI, Pushkar BK, Kapadne PN

**Source:** Environmental Chemistry Letters 2021, DOI1 0.1007/s10311-021-01296-7

**Abstract:** Environmental pollution by lead is an old, still unsolved health issue, calling for advanced remediation strategies. Here, we review lead toxicity, lead bioremediation with bacteria, and topics such as efflux, biosorption, exopolysaccharide, bioprecipitation, biomineralization, bioaccumulation and sequestration...

## Copper (II) Ion Action on Soil Bacteria

**Authors:** Asatiani N, Abuladze M, Kartvelishvili T and more...

**Source:** Water Air and Soil Pollution 232, 9, 2021, DOI 10.1007/s11270-021-05317-7

**Abstract :** Soil contamination with heavy metals causes heavy environmental problems, in particular toxic effects on plants as well as on animals and humans. This article analyzes the effects of copper, a potentially toxic metal and abundant contaminant, on soil bacteria...

https://doi.org/10.15454/bwf7-8m60


## Genetically engineered microbial remediation of soils co-contaminated by heavy metals and polycyclic aromatic hydrocarbons: Advances and ecological risk assessment

**Authors:** Wu C, Li F, Yi SW, Ge F

**Source:** Journal of Environmental Management 296, 2021, DOI 10.1016/j.jenvman.2021.113185

**Abstract:** Soils contaminated with heavy metals (HMs) and polycyclic aromatic hydrocarbons (PAHs) have been becoming a worldwide concerned environmental problem because of threatening public healthy via food chain exposure. Thus soils polluted by HMs and PAHs need to be remediated urgently. Physical and chemical remediation methods usually have some disadvantages, e.g., cost-expensiveness and incomplete removal, easily causing secondary pollution, which are hence not environmental-friendly. Conventional microbial approaches are mostly used to treat a single contaminant in soils and lack high efficiency and specificity for combined contaminants. Genetically engineered microorganisms (GEMs) have emerged as a desired requirement of higher bioremediation efficiency for soils polluted with HMs and PAHs and environmental sustainability, which can provide a more ecofriendly and cost-effective strategy in comparison with some conventional techniques. This review comments...

## Understanding variations in soil properties and microbial communities in bamboo plantation soils along a chromium pollution gradient

**Authors:** Zhang XP, Gai X, Zhong ZK, Bian FY and more...

**Source:** Ecotoxicology and Environmental Safety 222, 2021, DOI 10.1016/j.ecoenv.2021.112507

**Abstract:** With high biomass productivity and resistance to heavy metals (HM) stress, bamboo has strong potential for HM phytoremediation. However, few studies have been conducted under field conditions to explore changes in soil physicochemical and microbial properties of bamboo forests with HM-contaminated soils. This study established bamboo (Phyllostachys praecox) plantations in five Cr-contaminated sites with different pollution levels...

## Differential strategies of two species of arbuscular mycorrhizal fungi in the protection of maize plants grown in chromium-contaminated soils

**Authors:** Beltran-Nambo MD, Rojas-Jacuinde N, Martinez-Trujillo M and more...

**Source:** Biometals 2021, DOI 10.1007/s10534-021-00340-x

**Abstract:** Chromium (Cr) is a nonessential element for plants that is extremely toxic at high concentrations. Zea mays L. is a species of plant that has developed adaptive mechanisms to increase its tolerance and absorption capacity for this metal. One effective mechanism is to form associations with arbuscular mycorrhizal fungi (AMF), which help the plant cope with stress from heavy metals such as Cr. However, it is still not clear which species of AMF are more efficient as bioremediating agents for plants of agricultural importance...

## Draft Genome Sequence of *Stenotrophomonas maltophilia* Strain PE591, a Polyethylene-Degrading Bacterium Isolated from Savanna Soil

**Authors:** Frederico TD, Peixoto J, de Sousa JF, and more...

**Source:** MICROBIOLOGY RESOURCE ANNOUNCEMENTS 10, 32, 2021, DOI 10.1128/MRA.00490-21

**Abstract:** We report the genome sequence of a polyethylene-degrading bacterial strain identified

as Stenotrophomonas maltophilia strain PE591, which was isolated from plastic debris found in savanna soil. The genome was assembled in 16 scaffolds with a length of 4,751,236 bp, a GC content of 66.5%, and 4,432 predicted genes...

## Metal accumulation, growth and nutrition of vernonia polyanthes exposed to lead nitrate and arbuscular mycorrhizal fungi

**Authors:** Morais J, Boechat CL de Oliveira DF and more...

**Source:** Bioscience Journal 37, 2021, DOI 10.14393/BJ-v37n0a2021-53697

**Abstract:** The association between plants and arbuscular mycorrhizal fungi (AMF) can be used to bioremediate areas contaminated by metals. The objectives of this work were to evaluate the lead (Pb2+) phytoaccumulation capacity, morpho-physiology and nutrition responses of Vernonia polyanthes exposed to a solution amended with concentrations of lead nitrate and arbuscular mycorrhizal fungi. The treatments consisted of increasing doses of Pb2+ as lead nitrate [Pb(NO3)(2)], two strains of AMF and an absolute control without lead and AMF...

## Transcriptomics of different tissues of blueberry and diversity analysis of rhizosphere fungi under cadmium stress

**Authors:** Chen SP, Zhuang QQ, Chu XL and more...

**Source:** BMC Plant Biology 21, 1, 2021, DOI 10.1186/s12870-021-03125-z

**Abstract:** Blueberry (Vaccinium ssp.) is a perennial shrub belonging to the family Ericaceae, which is highly tolerant of acid soils and heavy metal pollution. In the present study, blueberry was subjected to cadmium (Cd) stress in simulated pot culture. The transcriptomics and rhizosphere fungal diversity of blueberry were analyzed, and the iron (Fe), manganese (Mn), copper (Cu), zinc (Zn) and cadmium (Cd) content of blueberry tissues, soil and DGT was determined...

## Selection of filamentous fungi that are resistant to the herbicides atrazine, glyphosate and pendimethalin

**Authors:** Barbosa Bravim NPB, Alves AF, Orlanda JFF, Silva PBR

**Source:** Acta Scientiarum Agrnomy 43, 2021, DOI 10.4025/actasciagron.v43i1.51656

**Abstract:** The objective of the present study was to isolate fungi from agricultural soils and evaluate fungal growth in culture medium contaminated with atrazine, glyphosate and pendimethalin. Filamentous fungi were isolated from agricultural soils and cultured in a modified culture medium containing 0, 10, 20, 50, and 100 mu g mL(-1) atrazine, glyphosate and pendimethalin for 14 days at 28 degrees C...

# ERA / PUBLICATIONS SCIENTIFIQUES / PLASTIQUES

## Biofilm-Developed Microplastics As Vectors of Pollutants in Aquatic Environments

**Authors:** Wang JL, Guo X, Xue JM

**Source:** ENVIRONMENTAL SCIENCE & TECHNOLOGY 55:12780-12790, 2021, DOI 10.1021/acs.est.1c04466

**Abstract:** Microplastics are a big and growing part of global pollution, which has aroused increasing concern in recent years because of their large amount, wide distribution, and adverse effects. Microplastics can sorb various pollutants from aquatic environments and act as vectors of pollutants. Most studies mainly focused on the virgin microplastics. However, microplastics in environments can be easily colonized by microorganisms, and form biofilm, which will

influence the behaviors and potential risks of microplastics. The formation of biofilm on microplastics and its effects on their properties have been studied before, but their sorption and transport behaviors, and potential risks for pollutants' transfer have not been reviewed. In this paper, the role of biofilm-developed microplastics as vectors of pollutants was thoroughly analyzed and summarized...

## Dynamics of soil bacteria and fungi communities of dry land for 8 years with soil conservation management

Authors: Yang Y, Tong YA, Liang LY, Li HC et al.

Source: JOURNAL OF ENVIRONMENTAL MANAGEMENT 299: 113544, 2021, DOI 10.1016/j.jenvman.2021.113544

Abstract: Microorganisms play an important role in nutrient cycling and ecosystem stability. This experiment studied the conservation management approaches [control without fertilizer (CK); fertilizer and different mulching based straw mulching (SM), plastic mulching (PM), ridge-furrow with plastic mulching (RFPFM), and green manure (GM)] effects on the soil microbial community structures in spring corn (Zea Mayis) dry land...

## Integrated microbiology and metabolomics analysis reveal plastic mulch film residue affects soil microorganisms and their metabolic functions

Authors: Wu CC, Ma YJ, Wang D, Shan YP et al.

Source: JOURNAL OF HAZARDOUS MATERIALS 423 Part B: 127258, 2022, DOI 10.1016/j.jhazmat.2021.127258

Abstract: Research on microplastic pollution of terrestrial soils is catching up with the aquatic environment, especially agricultural soil systems. Plastic residues have caused various environmental problems in mulch film extensively used agricultural areas. However, studies focusing specifically on the potential influence of mulch film residues on the metabolic cycle of soil systems have yet to be conducted. Here, high-throughput sequencing combined with metabolomics were first used to study the effects of residual mulch on soil microbial communities and related metabolic functions...

## Transcriptome-Guided Insights Into Plastic Degradation by the Marine Bacterium

**Authors:** Kumari A, Bano N, Bag SK et al.

**Source:** FRONTIERS IN MICROBIOLOGY12:751571, DOI 10.3389/fmicb.2021.751571

**Abstract:** Polyethylene terephthalate (PET) is a common single-use plastic that accumulated in the environment because of its non-degradable characteristics. In recent years, microbes from different environments were found to degrade plastics and suggested their capability to degrade plastics under varying environmental conditions. However, complete degradation of plastics is still a void for large-scale implications using microbes because of the lack of knowledge about genes and pathways intricate in the biodegradation process. In the present study, the growth and adherence of marine Bacillus species AIIW2 on PET surface instigating structural deterioration were confirmed through weight loss and hydrophobicity reduction, as well as analyzing the change in bond indexes...

## Microbial Colonization and Degradation of Microplastics in Aquatic Ecosystem: A Review

**Authors:** Mishra S, Swai, S, Sahoo M et al.

**Source:** GEOMICROBIOLOGY JOURNAL Early Access, DOI 10.1080/01490451.2021.198367

**Abstract:** A major apprehension is over microplastic pollution in the aquatic environment. These microplastics particles represent a novel medium in the aquatic environment, providing a substratum for various organic contaminants and for colonization of microorganisms. Microorganisms form a biofilm on the exterior of pollutants, consequential in a region known as a plastisphere, in which they interrelate and

https://doi.org/10.15454/bwf7-8m60


generate acid and different enzymes for microplastic degradation. The use of microbes for microplastic degradation has become a contentious exit indication as society focuses more on environmentally friendly pollution reduction methods. [...] The current review article discusses microbial colonization and degradation of microplastics present in aquatic ecosystems and the processes involved...

## Do microplastic biofilms promote the evolution and co-selection of antibiotic and metal resistance genes and their associations with bacterial communities under antibiotic and metal pressures?

**Authors:** Liu XW, Wang HX, Li LL et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 424:127285, 2022, DOI 10.1016/j.jhazmat.2021.127285

**Abstract:** Microplastic (MP) biofilms with heterogeneous bacterial compositions and structure have become a hotspot of antibiotic resistance genes (ARGs) in aquatic environments. The evolutionary features of ARGs and their related factors including class 1 integron (intI1), metal resistance genes (MRGs), and bacterial communities in MP biofilms under exogenous pressures and how they compared with natural substrates (NS) are unclear. The individual and combined pressures of sulfamethoxazole, tetracycline, and zinc were used to drive the dynamic evolution of ARGs, intI1, MRGs, and bacterial communities in the MP and NS biofilms...

## Influence of polystyrene microplastics on levofloxacin removal by microalgae from freshwater aquaculture wastewater

**Authors:** Wu X, Wu H, Zhang A et al.

**Source:** JOURNAL OF ENVIRONMENTAL MANAGEMENT 301:113865, 2022, DOI 10.1016/j.jenvman.2021.113865

**Abstract:** *Chlorella vulgaris* has attracted widespread attention because of its ability to absorb, enrich, and degrade typical endocrine-disrupting antibiotics (such as levofloxacin) in aquaculture wastewater. However, microplastic pollution in wastewater, which is becoming an increasingly severe problem, will exert a toxic effect on aquatic organisms (such as *C. vulgaris* and other microalgae). Polystyrene microplastics (PS-MPs), which are commonly found in freshwater aquaculture wastewater, are the most harmful. Therefore, clarifying the effects of PS-MPs on the ability of *C. vulgaris* to degrade typical endocrine-disrupting antibiotics in freshwater aquaculture wastewater and determining the mechanism of the effect are particularly important...

## Ageing with algal EPS reduces the toxic effects of polystyrene nanoplastics in freshwater microalgae *Scenedesmus obliquus*

**Authors:** Giri S, Mukherjee A

**Source:** JOURNAL OF ENVIRONMENTAL CHEMICAL ENGINEERING 9:105978, 2021, DOI 10.1016/j.jece.2021.105978

**Abstract:** The increase in the daily usage of the plastics aggravates their risk of accumulation in the freshwater bodies. The extra polymeric substances (EPS) secreted by the freshwater algae can interact with these particles altering their physicochemical behaviour and fate in the process. The effects of the EPS coated polystyrene nanoparticles (EPSPSNPs) in freshwater microalgae are still not very clear. The current work investigates the role of ageing the PSNPs (plain, aminated and carboxylated) with EPS in the freshwater medium in influencing their toxic effects towards a freshwater microalga *Scenedesmus obliquus*...

## Effects of biofilm on metal adsorption behavior and microbial community of microplastics

**Authors:** Wang QJ, Yong Z, Zhang YY et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 424:127340, 2022, DOI 10.1016/j.jhazmat.2021.127340

**Abstract:** In this study, the adsorption behavior of Cu(II) and Pb(II) on the biofilm-developed polystyrene (PS) micro plastics (MPs) was compared with the virgin PS (V-PS) and UV-aged PS (UV-PS)...

## Towards understanding the impact of plastics on freshwater and marine microalgae: A review of the mechanisms and toxicity endpoints

**Authors:** Nam SH, Lee J, An YJ

**Source:** JOURNAL OF HAZARDOUS MATERIALS 423: 127174, 2022, DOI 10.1016/j.jhazmat.2021.127174

**Abstract:** Plastics are ubiquitous and persistent in aquatic environments, threatening environmental and human health. This review focused on the effects of plastics (single toxicity) and associated chemicals (combined or leachate toxicities) on freshwater and marine microalgae. Forty-seven publications from 2010 to 2020 were used in this review...

## Microplastics pollution in the ocean: Potential carrier of resistant bacteria and resistance genes

**Authors:** Stenger KS, Wikmark OG, Bezuidenhout CC, Molale-Tom LG

**Source:** ENVIRONMENTAL POLLUTION 291: 118130, 2021, DOI 10.1016/j.envpol.2021.118130

**Abstract:** Microplastics pollution in marine environments is concerning. Microplastics persist and accumulate in various sections of the ocean where they present opportunity for micropollutant accumulation and microbial colonisation. Even though biofilm formation on plastics was first reported in the 1970's, it is only in recent years were plastic associated biofilms have gained research attention. [...] This review explores microplastic waste in the ocean and possible concerns that may arise from the presence of microplastics in conjunction with favourable conditions for the development and dispersal of antibiotic resistance in the ocean and food web...

## Microplastics change soil properties, heavy metal availability and bacterial community in a Pb-Zn-contaminated soil

**Authors:** Feng XY, Wang QL, Sun YH and more...

**Source:** Journal of Hazardous Materials 424, A, 2021, DOI 10.1016/j.jhazmat.2021.127364

**Abstract:** Microplastics (MPs) co-occur widely with diverse contaminants in soils. However, few data are available on their impacts on soil chemical and microbial properties of heavy metal-contaminated soils. For the first time, we investigated the changes in chemical and microbial properties of a Pb-Zn-contaminated soil as induced by six different MPs...

## Analysis and microbial degradation of Low-Density Polyethylene (LDPE) in Winogradsky column

**Authors:** Sridharan R, Krishnaswamy VG, Kumar PS

**Source:** Environemental Research 201, 2021, DOI 10.1016/j.envres.2021.111646e

**Abstract:** Plastic pollution is threatening the world and the life in it. Cost-effective and eco-friendly treatment is the need of the hour. Treating plastics using chemical methods adds up chemicals into the environment with toxic

byproducts. The physical method, a slow and expensive process, is not the better alternative. The process should rely on the environmental sources producing eco-friendly byproducts. The byproducts such as biofuel could be utilized for a sustainable environment, but the conversion of plastics into biofuel is expensive. Hence, biodegradation is the better, sustainable, and cost-effective process for plastic/any other pollutant removal...

## Biodegradable plastics: Effects on functionality and fertility of two different soils

**Authors:** Mazzon M, Gioacchini P, Montecchio D, Rapisarda S et al.

**Source:** APPLIED SOIL ECOLOGY 169: 104216, 2022, DOI 10.1016/j.apsoil.2021.104216

**Abstract:** In agriculture, the use of soil biodegradable mulch films could represent an eco-friendly alternative to conventional plastic films. However, soil biodegradable mulch films incorporated into the soil through tillage, being not only a physical but also a biogeochemical input, is expected to influence the soil quality by affecting its functions. Therefore, the eco-compatibility of these biodegradable plastics needs to be evaluated for their impact on different soil functions. To understand the effect of biodegradable plastics on soil quality (i.e. microbial biomass, nitrogen cycle, and activity of soil enzymes involved in the biochemical processes of carbon and nitrogen), we added increasing quantities of biodegradable plastics in two different soils: a loamy (Cambisol) and sandy (Arenosol) soil…

## Plastic film mulching reduces microbial interactions in black soil of northeastern China

Authors: Luo SS, Wang SJ, Zhang HJ, Zhang et al.

Source: APPLIED SOIL ECOLOGY 169: 104187, 2021, DOI 10.1016/j.apsoil.2021.104187

Abstract: Plastic film mulching (PF) can change soil properties and microbial community structure. However, the effect of PF on soil microbial interactions in different aggregate fractions is still unclear. We conducted a three-year field trial in black soil of northeastern China to evaluate the variation in soil microbial interactions and community structure in different aggregate fractions after PF. Compared with the control (CK), the PF treatment significantly decreased the humification index by 13.9% and chromophoric dissolved organic matter by 36.6% and significantly increased the fractal dimension by 4.8% and electrical conductivity by 22.8% ...

## The Terrestrial Plastisphere: Diversity and Polymer-Colonizing Potential of Plastic-Associated Microbial Communities in Soil

**Authors:** MacLean J, Mayanna S, Benning LG and more…

**Source:** Microorganisms 9, 9, 2021, DOI 10.3390/microorganisms9091876

**Abstract:** The concept of a 'plastisphere microbial community' arose from research on aquatic plastic debris, while the effect of plastics on microbial communities in soils remains poorly understood. Therefore, we examined the inhabiting microbial communities of two plastic debris ecosystems with regard to their diversity and composition relative to plastic-free soils from the same area using 16S rRNA amplicon sequencing...

## The Terrestrial Plastisphere: Diversity and Polymer-Colonizing Potential of Plastic-Associated Microbial Communities in Soil

**Authors:** MacLean J, Mayanna S, Benning LG et al.

**Source:** MICROORGANISMS 9:1876, 2021, DOI 10.3390/microorganisms9091876

**Abstract:** The concept of a 'plastisphere microbial community' arose from research on aquatic plastic debris, while the effect of plastics on microbial communities in soils remains poorly understood. Therefore, we examined the inhabiting microbial communities of two plastic debris ecosystems

with regard to their diversity and composition relative to plastic-free soils from the same area using 16S rRNA amplicon sequencing. Furthermore, we studied the plastic-colonizing potential of bacteria originating from both study sites as a measure of surface adhesion to UV-weathered polyethylene using high-magnification field emission scanning electron microscopy (FESEM)...

## Assessing the risks of potential bacterial pathogens attaching to different microplastics during the summer-autumn period in a mariculture cage

**Authors:** Hou DD, Hong M, Wang YT et al.

**Source:** MICROORGANISMS 9: 1909, 2021, DOI 10.3390/microorganisms9091909

**Abstract:** As microplastic pollution continues to increase, an emerging threat is the potential for microplastics to act as novel substrates and/or carriers for pathogens. This is of particular concern for aquatic product safety given the growing evidence of microplastic ingestion by aquaculture species. However, the potential risks of pathogens associated with microplastics in mariculture remain poorly understood. Here, an in situ incubation experiment involving three typical microplastics including polyethylene terephthalate, polyethylene, and polypropylene was conducted during the summer-autumn period in a mariculture cage...

## Characterization and Molecular Identification of Poly Urethane Degrading Bacteria

**Authors:** Yazhini VS, Prabha ML, Issac R

**Source:** Journal of Pure and Applied Microbiology 15(3): 1291-1300, 2021, DOI 10.22207/JPAM.15.3.19

**Abstract:** Plastics can be considered as the world's largest pollution that is accumulating in the environment. The degradation of these plastics is difficult because they are accumulated over years and also they are dumped in an area which causes more environmental problems. To reduce the environmental pollution under the waste management with the help of microorganism was taken into account...

## Analysis of microbial populations in plastic-soil systems after exposure to high poly(butylene succinate-co-adipate) load using high-resolution molecular technique

**Authors:** Tanunchai B, Juncheed K, Wahdan SFM, and more...

**Source:** Environmental Sciences Europe 33, 1, 2021, DOI 105DOI10.1186/s12302-021-00528-5

**Abstract:** Background Bio-based and biodegradable plastics are considered as plastics of the future owing to their ability to decompose under various environmental conditions. However, their effects on the soil microbiome are poorly characterised. In this study, we aimed to investigate the effects of an important bio-based and biodegradable plastic, polybutylene succinate-co-adipate (PBSA), on soil microbial diversity and community composition using high-resolution molecular technique...

## Polystyrene nanoplastics change the functional traits of biofilm communities in freshwater environment revealed by GeoChip 5.0

**Authors:** Miao LZ, Guo S, Wu J et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 423: 127117, 2022, DOI 10.1016/j.jhazmat.2021.127117

**Abstract:** There is an increasing concern regarding the potential effects of nanoplastics (NPs) on freshwater ecosystems. Considering the functional values of biofilms in freshwater, knowledge on whether and to what extent NPs can

influence the ecosystem processes of biofilms were still limited. Herein, the freshwater biofilms cultured in lab were exposed to 100 nm polystyrene NPs (PS-NPs) of different dosages (1 and 10 mg/L) for 14 days...

## Environmental behaviors of microplastics in aquatic systems: A systematic review on degradation, adsorption, toxicity and biofilm under aging conditions

**Authors:** Luo HW, Liu CY, He DQ et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 423: 126915, 2022, DOI 10.1016/j.jhazmat.2021.126915

**Abstract:** Microplastics (MPs, < 5 mm) in the environment have attracted worldwide attention due to their wide distribution and difficulty in handling. Aging processes such as UV irradiation, biodegradation, physical abrasion and chemical oxidation can affect the environmental behavior of MPs. This review article summarizes different aging processes of MPs and subsequent effects on the adsorption of pollutants, the leaching of additives, and the toxicity of MPs...

## Presence of polyethylene terephthalate (PET) fibers in hyporheic zone alters colonization patterns and seasonal dynamics of biofilm metabolic functioning

**Authors:** Matjasic T, Simcic T, Kanduc T et al.

**Source:** WATER RESEARCH 203: 117455, 2021, DOI 10.1016/j.watres.2021.117455

**Abstract:** Worldwide, the production of plastics is increasing, and plastic pollution in aquatic environments is a major global concern. Under natural conditions, plastic weathers to smaller pieces called microplastics (MP), which come in various shapes, with fibers often being the most common in freshwater sediments. The hyporheic zone, an ecotone between surface and groundwater, is important for the transport and fate of all MP particles. The main metabolic pathways in rivers take place in the hyporheic zone and are driven by a diverse microbial community. The objective of this study was to investigate in situ whether the presence of PET fibers in riverbed sediments affects patterns of colonization and the seasonal dynamics of microbial metabolic activities in the hyporheic zone...

## Aquatic Biofilms-Sink or Source of Microplastics? A Critical Reflection on Current Knowledge-Web of Science Core Collection

**Authors:** Kalcikova G, Bundschuh M

**Source:** ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY Early Access, 2021, DOI 10.1002/etc.5195

**Abstract:** The scientific understanding regarding sources, occurrence, and effects of microplastics in the aquatic environment has advanced rapidly, leaving some meaningful knowledge gaps virtually untouched. One of them is the interactions of microplastics and biofilms, microbial communities ubiquitous in aquatic ecosystems and fundamental for a range of ecosystem-level processes. It is evident that biofilms can quickly develop on the microplastic surface and consequently change particle properties and, as such, its fate and ecotoxicity. Moreover, microplastics interact with ubiquitous biofilms that are developed on any surfaces in aquatic ecosystems. Although the knowledge about these interactions is at best limited, it is expected that microplastics attach to the water-biofilm interface or penetrate the biofilm matrix. Microplastics can accumulate and ab- or adsorb to those biofilms where they are subjected to transformation processes such as fragmentation. Thus, biofilms may function as a sink...

## Biogeography rather than substrate type determines bacterial colonization dynamics of marine plastics

**Authors:** Coons AK, Busch K, Lenz M et al.

**Source:** PEERJ 9: e12135, 2021, DOI 10.7717/peerj.12135

**Abstract:** Since the middle of the 20th century, plastics have been incorporated into our everyday lives at an exponential rate. In recent years, the negative impacts of plastics, especially as environmental pollutants, have become evident. Marine plastic debris represents a relatively new and increasingly abundant substrate for colonization by microbial organisms, although the full functional potential of these organisms is yet to be uncovered. In the present study, we investigated plastic type and incubation location as drivers of marine bacterial community structure development on plastics, i.e., the Plastisphere, via 16S rRNA amplicon analysis. Four distinct plastic types: high density polyethylene, linear low-density polyethylene, polyamide, polymethyl methacrylate, and glass-slide controls were incubated for five weeks in the coastal waters of four different biogeographic locations (Cape Verde, Chile, Japan, South Africa) during July and August of 2019...

## The structure and assembly mechanisms of plastisphere microbial community in natural marine environment

**Authors:** Zhang SJ, Zeng YH, Zhu JM et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 421: 126780, 2022, DOI 10.1016/j.jhazmat.2021.126780

**Abstract:** The microbial colonization profiles on microplastics (MPs) in marine environments have recently sparked global interest. However, many studies have characterized plastisphere microbiomes without considering the ecological processes that underly microbiome assembly. Here, we carried out a three-timepoint exposure experiment at 1-, 4-, and 8-week and investigated the colonization dynamics for polyethylene, polypropylene, polystyrene, polyvinyl chloride, and acrylonitrile-butadiene-styrene MP pellets in natural coastal water...

## The plastic Trojan horse: Biofilms increase microplastic uptake in marine filter feeders impacting microbial transfer and organism health

**Authors:** Fabra M, Williams L, Watts JEM et al.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 797:149217, 2021, DOI 10.1016/j.scitotenv.2021.149217

**Abstract:** Microplastic pollution has become a major source of concern, with a large body of literature surrounding the impacts of microplastic ingestion by biota. However, many of these studies utilise virgin microbeads, which are not reflective of environmental microplastics that are rapidly colonised with microbial communities (plastisphere) in marine ecosystems. It is a concern therefore that current evidence of the impacts of microplastics on biota are unrepresentative of the environmental microplastic pollution. In this study, uptake and bioaccumulation of both virgin and Escherichia colt coated microplastics, by European native oysters (Ostrea edulis) were compared, and the physiological responses of oysters to the exposure were investigated...

## Microbial colonizers of microplastics in an Arctic freshwater lake

**Authors:** Gonzalez-Pleiter M, Velazquez D, Casero MC et al.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 795:148640, 2021, DOI 10.1016/j.scitotenv.2021.148640

**Abstract:** Microplastics (MPs) have been found everywhere as they are easily transported between environmental compartments. Through their transport, MPs are quickly colonized by microorganisms; this microbial community is known as the plastisphere. Here, we characterized the plastisphere of three MPs, one biodegradable (PHB) and two non-biodegradables

(HDPE and LDPE), deployed in an Arctic freshwater lake for eleven days...

## Parental exposure to sulfamethazine and nanoplastics alters the gut microbial communities in the offspring of marine madaka (*Oryzias melastigma*)

**Authors:** He SQ, Li D, Wang FPet al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 423A: 127003, 2021, DOI 10.1016/j.jhazmat.2021.127003

**Abstract:** The individual and combined toxicity of antibiotics and nanoplastics in marine organisms has received increasing attention. However, many studies have been mostly focused on the impacts on the directly exposed generation (F0). In this study, intergenerational effects of sulfamethazine and nanoplastic fragments (polystyrene) on the growth and the gut microbiota of marine medaka (*Oryzias melastigma*) were investigated...

## Soil pH has a stronger effect than arsenic content on shaping plastisphere bacterial communities in soil

**Authors:** Li HQ, Shen YJ, Wang WL and more...

**Source:** Environmental Pollution 287, 2021, DOI 10.1016/j.envpol.2021.117339

**Abstract:** Microplastic (MP) pollution is widespread in various ecosystems and is colonized by microbes that form biofilms with compositions and functions. However, compared with aquatic environments, the soil environment has been poorly studied in terms of the taxonomic composition of microbial communities and the factors influencing the community structure of microbes in the plastisphere. In the present study, a microcosm experiment was conducted to investigate the plastisphere bacterial communities...

## Deciphering the diversity and functions of plastisphere bacterial communities in plastic-mulching croplands of subtropical China

**Authors:** Luo GW, Jin T, Zhang HR and more...

**Source:** Journal of Hazardous Material 22, 2022, DOI 10.1016/j.jhazmat.2021.126865

**Abstract:** Considering the inhomogeneity of plastisphere and surrounding soil, it is plausible that the microbial community colonizing it also varies, affecting soil services and sustainability. Herein, we analyzed the soil and film residue from fifty-five plastic-mulching croplands in the subtropical areas of China...

## Assessing the presence of microplastic particles in Tunisian agriculture soils and their potential toxicity effects using *Eisenia andrei* as bioindicator

Authors: Boughattas I, Hattab S, Zitouni N, Mkhinini M et al.

Source: SCIENCE OF THE TOTAL ENVIRONMENT 796: 148959, 2021, DOI 10.1016/j.scitotenv.2021.148959

Abstract: In the present study, we investigated microplastics (MPs) in agricultural soils with different agronomic practices (organic farming, soil under greenhouses, soil under mulching and soil irrigated with treated wastewater (TWW)). Plastic particles from each site were collected and characterized by FTIR and Raman microspectroscopy. Plastic particles were then ground and added (size rage under 100 mu m) at a concentration of 100 mu g kg(-1) to soils from organic farming containing *Eisenia andrei* for 7 and 14 days. MPs accumulation in earthworms was quanti-fied and characterized. Oxidative stress was assessed by evaluating the activities of catalase, glutathione-S-trans-ferase, and acetylcholinesterase as well as malondialdehyde accumulation...

https://doi.org/10.15454/bwf7-8m60


## Cross-Hemisphere Study Reveals Geographically Ubiquitous, Plastic-Specific Bacteria Emerging from the Rare and Unexplored Biosphere

**Authors:** Scales BS, Cable RN, Duhaime MB et al.

**Source:** MSPHERE 6: e00851-20, 2021, DOI 10.1128/mSphere.00851-20

**Abstract:** While it is now appreciated that the millions of tons of plastic pollution travelling through marine systems carry complex communities of microorganisms, it is still unknown to what extent these biofilm communities are specific to the plastic or selected by the surrounding ecosystem. To address this, we characterized and compared the microbial communities of microplastic particles, non plastic (natural and wax) particles, and the surrounding waters from three marine ecosystems (the Baltic, Sargasso and Mediterranean seas) using high-throughput 16S rRNA gene sequencing...

## Microbial biofilm composition and polymer degradation of compostable and non-compostable plastics immersed in the marine environment

**Authors:** Delacuvellerie A, Benali S, Cyriaque V et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 419: 126526, 2021, DOI 10.1016/j.jhazmat.2021.126526

**Abstract:** Different plastic types considered as compostable are found on the market such as petro-based (e.g., polybutylene adipate terephthalate (PBAT)) or bio-based plastics (e.g., polylactic acid, (PLA)). Even if their degradation has been confirmed in industrial compost conditions, investigation of their degradation in natural marine environment has been limited. To better understand biodegradation into natural marine environment, commercial compostable (PBAT, semi-crystalline and amorphous PLA) and non-compostable polymers (low density polyethylene, polystyrene, polyethylene terephthalate, polyvinyl chloride) were submerged in situ on the sediment and in the water column in the Mediterranean Sea. These samples were studied by chemical and microbiological approaches...

## Biodegradation of low-density polyethylene (LDPE) sheet by microalga, *Uronema africanum* Borge

**Authors:** Sanniyasi E, Gopal RK, Gunasekar DK, Raj PP

**Source:** SCIENTIFIC REPORTS 11: 17233, 2021, DOI 10.1038/s41598-021-96315-6

**Abstract:** Plastic (polyethylene) pollution is a severe cause of deterioration of a healthy environment. For example, ingestion of plastics in the animal gut, clogging of water canals and retarded solid waste management. Many conventional methods of polyethylene degradation include UV photooxidation, thermal oxidation, incineration, chemical oxidation and landfill are being practiced. However, these methods are not feasible, costlier and not a complete solution for this global issue. Therefore, plausible, alternative solution for this issue is biodegradation. Microbes such as bacteria, fungi and algae are involved in polyethylene degradation in its natural habitat. Among them, algae were given very less importance. In our present study, a potential microalga, morphologically identified as *Uronema africanum* Borge, isolated from a waste plastic bag collected from a domestic waste dumping site in a freshwater lake. This microalga was further treated with the LDPE sheet in BBM culture medium...

## The effect of salinity on the interaction between microplastic polyethylene terephthalate (PET) and microalgae Spirulina sp.

**Authors:** Hadiyanto H, Muslihuddin M, Khoironi A et al.

https://doi.org/10.15454/bwf7-8m60


**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, 2021, DOI 10.1007/s11356-021-16286-z

**Abstract:** The increasing use of plastic over the last few decades has had an impact of plastic pollution in aquatic ecosystems. Plastic pollutions may be in the form of microplastics either from primary or secondary sources. These microplastics will indirectly affect human health through the food chain. This research was aimed at evaluating the interaction between microplastic and microalgae that are a source of food supplements. The experiment was conducted by investigating the impact of microplastic polyethylene terephthalate (PET) on microalga Spirulina sp. cultivated in fresh water and saline water (7 ppt salinity) for 14 days. The growth rate and morphology of Spirulina sp. and PET were evaluated...

## Polystyrene microplastics induce microbial dysbiosis and dysfunction in surrounding seawater

**Authors:** Ye GZ, Zhang X, Yan CZ et al.

**Source:** ENVIRONMENT INTERNATIONAL 156: 106724, 2021, DOI 10.1016/j.envint.2021.106724

**Abstract:** Microplastics are ubiquitously present in the environment, accumulate in aquaculture water, and cause toxicological effects on aquatic organisms. Besides, microplastics provide ecological niches for microorganisms in aquatic environments. However, the effects of microplastics on microbial balance and function in surrounding water are still unclear, especially for aquaculture water. Therefore, 16S rRNA gene sequencing was employed to uncover polystyrene microplastics (PS)-induced microbial dysbiosis in surrounding seawater cultivating marine medaka (*Oryzias melastigmas*) and to screen related potential bacterial biomarkers ...

## Deep-sea plastisphere: Long-term colonization by plastic-associated bacterial and archaeal communities in the Southwest Atlantic Ocean

**Authors:** Agostini L, Moreira JCF, Bendia AG et al.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 793: 148335, 2021, DOI 10.1016/j.scitotenv.2021.148335

**Abstract:** Marine plastic pollution is a global concern because of continuous release into the oceans over the last several decades. Although recent studies have made efforts to characterize the so-called plastisphere, or microbial community inhabiting plastic substrates, it is not clear whether the plastisphere is defined as a core community or as a random attachment of microbial cells. Likewise, little is known about the influence of the deep-sea environment on the plastisphere. In our experimental study, we evaluated the microbial colonization on polypropylene pellets and two types of plastic bags: regular high density polyethylene (HDPE) and HDPE with the oxo-biodegradable additive BDA. Gravel was used as control. Samples were deployed at three sites at 3300 m depth in the Southwest Atlantic Ocean and left for microbial colonization for 719 days. For microbial communities analysis, DNA was extracted from the biofilm on plastic and gravel substrates, and then the 16S rRNA was sequenced through the Illumina Miseq platform. Cultivation was performed to isolate strains from the plastic and gravel substrates...

## The ecology of the plastisphere: Microbial composition, function, assembly, and network in the freshwater and seawater ecosystems

**Authors:** Li CC, Wang LF, Ji SP et al.

**Source:** WATER RESEARCH 202: 117428, 2021, DOI 10.1016/j.watres.2021.117428

**Abstract:** Microplastics provide a unique habitat for microorganisms, forming the plastisphere. Yet the ecology of the plastisphere, including the microbial composition, functions, assembly processes, and interaction networks, needs to be understood. Here, we collected microplastics and their surrounding water samples in freshwater and seawater ecosystems. The bacterial and fungal communities of the plastisphere and the aquatic environment were studied based on 16S and

https://doi.org/10.15454/bwf7-8m60


internal transcribed spacer (ITS) high-throughput sequencing...

## Low-Density Polyethylene Film Biodegradation Potential by Fungal Species from Thailand

**Authors:** Khruengsai S, Sripahco T, Pripdeevech P

**Source:** JOURNAL OF FUNGI 7: 594, 2021, DOI 10.3390/jof7080594

**Abstract:** Accumulated plastic waste in the environment is a serious problem that poses an ecological threat. Plastic waste has been reduced by initiating and applying different alternative methods from several perspectives, including fungal treatment. Biodegradation of 30 fungi from Thailand were screened in mineral salt medium agar containing low-density polyethylene (LDPE) films. *Diaporthe italiana, Thyrostroma jaczewskii, Collectotrichum fructicola, and Stagonosporopsis citrulli* were found to grow significantly by culturing with LDPE film as the only sole carbon source compared to those obtained from Aspergillus niger. These fungi were further cultured in mineral salt medium broth containing LDPE film as the sole carbon source for 90 days. The biodegradation ability of these fungi was evaluated from the amount of CO2 and enzyme production...

## Conditioning Film and Early Biofilm Succession on Plastic Surfaces

**Authors:** Rummel CD, Lechtenfeld OJ, Kallies R et al.

**Source:** ENVIRONMENTAL SCIENCE & TECHNOLOGY 55: 11006-11018, 2021, DOI 10.1021/acs.est.0c07875

**Abstract:** In the context of environmental plastic pollution, it is still under debate if and how the "plastisphere", a plastic-specific microbial community, emerges. In this study, we tested the hypothesis that the first conditioning film of dissolved organic matter (DOM) sorbs selectively to polymer substrates and that microbial attachment is governed in a substrate-dependent manner. We investigated the adsorption of stream water-derived DOM to polyethylene terephthalate (PET), polystyrene (PS), and glass (as control) including UV-weathered surfaces by Fourier-transform ion cyclotron mass spectrometry...

## Biofilm growth on buoyant microplastics leads to changes in settling rates: Implications for microplastic retention in the Great Lakes

**Authors:** Semcesen PO, Wells MG

**Source:** MARINE POLLUTION BULLETIN 170: 112573, 2021, DOI 10.1016/j.marpolbul.2021.112573

**Abstract:** Buoyant microplastic pollution disperses widely from sources via strong wind-driven water currents in lakes and oceans. This ability for dispersal depends critically upon the particle's density, which can change over time due to microbial growth (biofilm). This study quantifies biofilm-induced sinking rates of irregularly-shaped polypropylene granules (~125-2000 mu m) via ex-situ experiments emulating a Great Lakes freshwater environment. Biofilm development increases particle density and lowers microplastic rise velocities, eventually causing sinking...

## Contribution of stochastic processes to the microbial community assembly on field-collected microplastics

**Authors:** Sun YZ, Zhang MJ, Duan CX et al.

**Source:** ENVIRONMENTAL MICROBIOLOGY Early Access, 2021, DOI 10.1111/1462-2920.15713

**Abstract:** A growing body of evidence suggests that microplastics may be colonized with a unique microbiome, termed 'plastisphere', in aquatic environments. However, the deep mechanisms (deterministic and/or stochastic processes) underlying the community assembly on microplastics are still poorly understood. Here, we took the estuary of Hangzhou Bay (Zhejiang, China) as an example and examined the assembly mechanisms of bacterial communities in water and microplastic samples...

https://doi.org/10.15454/bwf7-8m60



## Polyethylene film mulching enhances the microbial carbon-use efficiency, physical and chemical protection of straw-derived carbon in an Entisol of the Loess Plateau

**Authors:** Mo F, Zhu Y, Wang ZY, Deng HL et al.

**Source:** SCIENCE OF THE TOTAL ENVIRONMENT 792: 148357, 2021, DOI 10.1016/j.scitotenv.2021.148357

**Abstract:** The global use of agricultural polyethylene mulches has emerged as a widespread farming practice, however, its effects on the fate and dynamics of crop straw-derived C in soil microbial biomass C (MBC), aggregate-associated and chemical recalcitrance-related C fractions are rarely assessed in situ. A two-year field experiment using C-13-labeled maize stem was carried out to quantify the allocation and dynamics of straw-C in an Entisol with and without plastic mulching. The results indicated that across the treatments, from 49.2% to 56.4% of straw-C-13 was released as CO2-C, from 34.9% to 43.1% was sequestrated as SOC pool, and from 6.7% to 9.7% remained undecomposed at the end of the experiment...

# DROIT ET POLITIQUE DE L'ENVIRONNEMENT

## La commission européenne enregistre une initiative citoyenne pour que les États membres tiennent compte de l'environnement

**Europa.eu 27/10/21**

La commission européenne enregistre l'initiative citoyenne européenne intitulée "Appel à l'action". - Protection de l'environnement dans toutes les politiques" conformément au règlement (UE) 2019/788 du Parlement européen et du Conseil.

Accès au document

## Lancement de l'appel à projets national Écophyto 2021-2022

**Ministère de la transition Ecologique 26/10/21**

Dans le cadre du plan Écophyto II+, des appels à projets nationaux sont lancés chaque année pour soutenir des projets en faveur d'une réduction de l'utilisation des produits phytopharmaceutiques, et de la limitation des risques et des impacts qui y sont liés. L'appel à projets pour les années 2021-2022 est lancé par l'OFB en lien avec les ministères pilotes du plan Écophyto. Il est doté d'une enveloppe indicative de 5,3 millions d'euros. [...]

Accès au document

## La liste des substances soumises à la redevance pour pollutions diffuses est mise en consultation

**Ministère de la Transition Ecologique**

La redevance pour pollutions diffuses est perçue par les agences et offices de l'eau lors de l'achat de produits phytopharmaceutiques ou de semences traitées avec les produits phytopharmaceutiques. Les redevables sont les distributeurs de ces produits, et les assujettis sont les acheteurs finaux (agriculteurs, personnes commandant d'une prestation de traitement de semence…).

Le projet de texte soumis à la présente consultation du public établit la liste actualisée des substances classées dans l'arrêté du 22 novembre 2010 établissant la liste des substances soumises à la redevance pour pollutions diffuses tel que défini dans l'article L.213-10-8 du code de l'environnement.

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Lancement de l'étude PestiRiv : une étude inédite sur l'exposition aux pesticides des personnes vivant en zone viticole

**Santé publique France 19/10/21**

En France, une partie importante de la population rurale vit dans des régions viticoles. Ces personnes sont-elles particulièrement exposées aux produits utilisés pour les traitements phytopharmaceutiques et, si oui, comment ?

Pour répondre à ces questions, Santé publique France et l'Anses lancent ce jour PestiRiv, première étude de grande ampleur [mesures réalisées auprès de 3 350 personnes dans 6 régions françaises] visant à mieux connaître et comprendre l'exposition aux pesticides des personnes vivant près de cultures viticoles. [...]

Accès au document

Cette étude est saluée par Générations Futures

## Second appel à candidatures d'experts pour la constitution du comité scientifique et technique du plan Écophyto II+

**Ministère de l'agriculture 05/10/21**

Le Gouvernement ainsi que l'OFB, l'INRAE et l'Anses lancent un second appel à candidatures d'experts afin de finaliser la constitution du comité scientifique et technique (CST) du plan Écophyto II+.

Ce comité a vocation à assurer le suivi régulier des indicateurs du plan Écophyto II+ (notamment le NODU, les quantités de produits phytopharmaceutiques vendues, etc. …) et à apporter une interprétation plus complète de leur évolution dans le temps. [...]

Accès au document

## A new approach for simulating potential impacts of fungal, insect and mammal pests on European forest ecosystems

**ec europa 23/09/21**

Science for Environment policy, 23rd September 2021 Issue 567

Global forest disturbance patterns — or events which disrupt the structure and composition of forests — are altering as a result of climate change. Changes, such as more severe insect outbreaks, cannegatively impact forests and the ecosystem services they provide to society. This study presents a new model that simulates the impacts of forest disturbance from biotic agents such as fungi, insects or large mammals.

Accès au document

## Qualité de l'air : l'Organisation mondiale de la santé (OMS) communique de nouvelles lignes directrices

**INERIS 22/09/21**

L'OMS publie aujourd'hui de nouvelles lignes directrices relatives à la qualité de l'air, établies sur la base des dernières données scientifiques disponibles relatives aux effets des polluants atmosphériques sur la santé. Elles fixent des seuils de références pour les six principaux polluants atmosphériques qu'il est recommandé de ne pas dépasser pour limiter l'exposition des populations au niveau mondial et protéger leur santé. L'Ineris propose de premières analyses de l'impact de ces nouvelles lignes directrices sur l'exposition de la population française à la pollution atmosphérique. [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Les nouvelles lignes directrices mondiales de l'OMS sur la qualité de l'air visent à éviter des millions de décès dus à la pollution atmosphérique

**OMS 22/09/21**

Avec les changements climatiques, la pollution atmosphérique est l'une des principales menaces environnementales pour la santé.

Les nouvelles lignes directrices mondiales de l'Organisation mondiale de la Santé (OMS) sur la qualité de l'air présentent des données montrant clairement les effets néfastes de la pollution atmosphérique sur la santé, à des concentrations encore plus faibles qu'on ne le croyait auparavant. De nouveaux seuils de qualité de l'air y sont recommandés pour protéger la santé des populations. Il s'agit en effet de réduire les concentrations des principaux polluants atmosphériques, dont certains contribuent également aux changements climatiques. [...]

Accès au document

## Les indicateurs de risque harmonisés établis au niveau européen

**Ministère de l'agriculture 21/09/21**

La directive européenne 2009/128 instaure « un cadre d'action communautaire pour parvenir à une utilisation des pesticides compatible avec le développement durable ». Elle pose les bases de plusieurs dispositifs réglementaires visant la réduction de l'utilisation, des risques et des impacts des produits phytopharmaceutiques (le certiphyto, l'inspection des matériels de pulvérisation, les restrictions d'usages dans les zones sensibles, l'interdiction de la pulvérisation aérienne, l'obligation de mettre en œuvre la protection intégrée des cultures…). [...]

L'article 15 de la directive prévoit en outre la mise en place d'indicateurs de risque harmonisés (HRI) au niveau communautaire. [...]

Accès au document

## Consultation publique - Contrôle des matériels de pulvérisation des produits phytopharmaceutiques

**Ministère de l'agriculture 20/09/21**

Le ministère de l'Agriculture et de l'Alimentation a préparé un projet de décret portant révision du dispositif de contrôle périodique obligatoire des matériels destinés à l'application de produits phytopharmaceutiques. Ce projet vise à assurer une mise en conformité avec la directive 2009/128/CE du 21 octobre 2009 instaurant un cadre d'action communautaire pour parvenir à une utilisation des pesticides, compatible avec le développement durable. [...]

Accès au document

## Ranking the potential health risks of engineered nanoparticles in Europe

**ec europa 24/09/21**

*Science for Environment Policy*, 16th August 2021 **Issue 566**

**Source:** Li, Y. and Cummins, E. (2021). A semi-quantitative risk ranking of potential human exposure to engineered nanoparticles (ENPs) in Europe. *Science of the Total Environment*, 778: 146232.

Developments in nanotechnology mean that engineered nanoparticles (ENPs) are found in increasingly large quantities on the European market. To manage any potential human health hazards, comprehensive risk-assessment tools and protocols are required. A novel model for the human health assessment of ENPs has been developed that ranks ENPs by risk, enabling the prioritisation of the most potentially hazardous ENPs in Europe.

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Consultation publique: projet de décret en Conseil d'Etat sur les règles relatives aux certificats d'économie de produits phytopharmaceutiques (CEPP)

**Ministère de l'agriculture 20/09/21**

[…] Le décret soumis à la consultation du public [du 20 septembre au 10 octobre 2021] vient préciser le dispositif en métropole et en Outre-mer pour les années 2022 et suivantes. […]

Accès au document

## 2ème appel à candidatures d'experts pour finaliser la constitution du comité scientifique et technique du plan Écophyto II+

**Ministère Transition écologique 16/09/21**

[…] Le Gouvernement ainsi que l'OFB, INRAE et l'Anses lancent un appel à candidatures d'experts afin de finaliser la constitution du comité scientifique et technique (CST) du plan Ecophyto II+.

Missions du comité :

- Assurer le suivi régulier des indicateurs du plan Écophyto II+ (notamment le NODU, les quantités de produits phytopharmaceutiques vendues, etc. …)
- Mieux évaluer les réalisations, les résultats et les impacts des actions du plan en termes de réduction d'utilisation des produits phytopharmaceutiques. […]

Accès au document

## Consultation publique : projet d'ordonnance relative aux variétés rendues tolérantes aux herbicides

**Ministère de l'agriculture 9/09/21**

Le projet d'ordonnance vise à créer dans le code rural et de la pêche maritime la base législative nécessaire pour réglementer les conditions de culture des variétés rendues tolérantes aux herbicides (VRTH).

Le Conseil d'Etat demande au gouvernement de mettre en œuvre la procédure (directive 2002/53/CE du 13 juin 2002, a.16), pour être autorisé à prescrire des conditions de culture appropriées pour les VRTH issues de la mutagénèse utilisée en France. […]

Suite à l'avis de l'ANSES du 26 novembre 2019, qui identifie notamment des facteurs de risque quant au développement de résistances des adventices aux herbicides et à l'augmentation des usages d'herbicides.

Accès au document

# REGLEMENTATION / DROIT

## Glyphosate : le crédit d'impôt entre en vigueur par décret

Décret n° 2021-1414 du 29 octobre 2021 relatif à l'entrée en vigueur des dispositions relatives au crédit d'impôt destiné aux entreprises agricoles qui n'utilisent plus de glyphosate prévues par l'article 140 de la loi n° 2020-1721 du 29 décembre 2020 de finances pour 2021NOR : AGRS2128073D

ELI:https://www.legifrance.gouv.fr/eli/decret/2021/10/29/AGRS2128073D/jo/texte

Alias:https://www.legifrance.gouv.fr/eli/decret/2021/10/29/2021-1414/jo/texte

JORF n°0254 du 30 octobre 2021 Texte n° 46

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Date d'expiration reportée de l'approbation de la créosote utilisée dans les produits biocides

DÉCISION D'EXÉCUTION (UE) 2021/1839 DE LA COMMISSION du 15 octobre 2021 reportant la date d'expiration de l'approbation de la créosote en vue de son utilisation dans les produits biocides relevant du type de produits 8

Numéro officiel : UE/2021/1839
Date de signature : 15/10/2021

Accès au document

## LMR de 6-benzyladénine et d'aminopyralide

REGLEMENT (UE) 2021/1841 DE LA COMMISSION du 20 octobre 2021 modifiant les annexes II et III du règlement (CE) n°396/2005 du Parlement européen et du Conseil en ce qui concerne les limites maximales applicables aux résidus de 6-benzyladénine et d'aminopyralide présents dans ou sur certains produits

Numéro officiel : UE/2021/1841
Date de signature : 20/10/2021
Liens juridiques : Modification Règlement CE/396/2005 23/02/2005

Accès au document

## LMR de flupyradifurone et d'acide difluoroacétique

REGLEMENT (UE) 2021/1842 DE LA COMMISSION du 20 octobre 2021 modifiant les annexes II et III du règlement (CE) n° 396/2005 du Parlement européen et du Conseil en ce qui concerne les limites maximales applicables aux résidus de flupyradifurone et d'acide difluoroacétique présents dans ou sur certains produits

Numéro officiel : UE/2021/1842
Date de signature : 20/10/2021
Liens juridiques : Modification Règlement CE/396/2005 23/02/2005

Accès au document

## Limites maximales applicables aux résidus de pesticides présents dans ou sur certains produits

Rectificatif au règlement (CE) n° 839/2008 de la Commission du 31 juillet 2008 modifiant le règlement (CE) n° 396/2005 du Parlement européen et du Conseil en ce qui concerne ses annexes II, III et IV relatives aux limites maximales applicables aux résidus de pesticides présents dans ou sur certains produits

Numéro officiel : CE/839/2008
Date de signature : 07/10/2021
Lien juridique : Rectification Règlement CE/839/2008 31/07/2008

Accès au document

## LMR aclonifène, d'acrinathrine, de Bacillus pumilus QST 2808, d'éthirimol, de penthiopyrade, de piclorame et de Pseudomonas

RÈGLEMENT (UE) 2021/1531 DE LA COMMISSION du 17 septembre 2021 modifiant les annexes II, III et IV du règlement (CE) no 396/2005 du Parlement européen et du Conseil en ce qui concerne les limites maximales applicables aux résidus d'aclonifène, d'acrinathrine, de Bacillus pumilus QST 2808, d'éthirimol, de penthiopyrade, de piclorame et de Pseudomonas sp. souche DSMZ 13134, présents dans ou sur certains produits

Numéro officiel : UE/2021/1531
Date de signature : 17/09/2021
Liens juridiques : Modification Règlement CE/396/2005 23/02/2005

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Rectification du numéro CAS de la substance de base «chlorhydrate de chitosane

RÈGLEMENT D'EXÉCUTION (UE) 2021/1446 DE LA COMMISSION du 3 septembre 2021 rectifiant les règlements d'exécution (UE) n° 540/2011 et (UE) n° 563/2014 en ce qui concerne le numéro CAS de la substance de base «chlorhydrate de chitosane »

Numéro officiel : UE/2021/1446
Date de signature : 03/09/2021
Liens juridiques : Modification Règlement d'exécution 540/2011 25/05/2011 Modification Règlement d'exécution UE/563/2014 23/05/2014

Accès au document

## Approbation renouvelée de la substance active à faible risque «carbonate de calcium»

RÈGLEMENT D'EXÉCUTION (UE) 2021/1448 DE LA COMMISSION du 3 septembre 2021 renouvelant l'approbation de la substance active à faible risque «carbonate de calcium» conformément au règlement (CE) n° 1107/2009 du Parlement européen et du Conseil concernant la mise sur le marché des produits phytopharmaceutiques, et modifiant l'annexe du règlement d'exécution (UE) n° 540/2011 de la Commission

Numéro officiel : UE/2021/1448
Date de signature : 03/09/2021
Liens juridiques : Modification Règlement d'exécution UE/540/2011 25/05/2011

Accès au document

## Approbation prolongée des substances actives amidosulfuron, bifénox, chlorméquat, chlorotoluron, clofentézine, clomazone, cyperméthrine, daminozide, deltaméthrine, dicamba, difénoconazole, diflufénican, diméthachlore, étofenprox, fenoxaprop-P, fenpropidine, fludioxonyl, flufénacet, fosthiazate, huile de paraffine, huiles de paraffine, hydroxy-8-quinoléine, indoxacarbe, lénacile, MCPA, MCPB, nicosulfuron, penconazole, phénylphénol-2

RÈGLEMENT D'EXÉCUTION (UE) 2021/1449 DE LA COMMISSION du 3 septembre 2021 modifiant le règlement d'exécution (UE) no 540/2011 en ce qui concerne la prolongation de la validité de l'approbation des substances actives amidosulfuron, bifénox, chlorméquat, chlorotoluron, clofentézine, clomazone, cyperméthrine, daminozide, deltaméthrine, dicamba, difénoconazole, diflufénican, diméthachlore, étofenprox, fenoxaprop-P, fenpropidine, fludioxonyl, flufénacet, fosthiazate, huile de paraffine, huiles de paraffine, hydroxy-8-quinoléine, indoxacarbe, lénacile, MCPA, MCPB, nicosulfuron, penconazole, phénylphénol-2 (y compris ses sels comme le sel de sodium), piclorame, propaquizafop, prosulfocarbe, quizalofop-P-éthyle, quizalofop-P-téfuryle, soufre, tétraconazole, triallate, triflusulfuron et tritosulfuron

Numéro officiel : UE/2021/1449
Date de signature : 03/09/2021
Liens juridiques : Modification Règlement d'exécution UE/540/2011 25/05/2011

Accès au document

## Substances actives «acrinathrine» et «prochloraz» : période d'approbation modifiée

RÈGLEMENT D'EXÉCUTION (UE) 2021/1450 DE LA COMMISSION du 3 septembre 2021 modifiant le règlement d'exécution (UE) no 540/2011 en ce qui concerne la période d'approbation des substances actives «acrinathrine» et «prochloraz»

Numéro officiel : UE/2021/1450
Date de signature : 03/09/2021

https://doi.org/10.15454/bwf7-8m60

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

Accès au document

## Approbation renouvelée de la substance active «hydrogénocarbonate de potassium» en tant que substance à faible risque

RÈGLEMENT D'EXÉCUTION (UE) 2021/1452 DE LA COMMISSION du 3 septembre 2021 renouvelant l'approbation de la substance active «hydrogénocarbonate de potassium» en tant que substance à faible risque conformément au règlement (CE) n° 1107/2009 du Parlement européen et du Conseil concernant la mise sur le marché des produits phytopharmaceutiques, et modifiant l'annexe du règlement d'exécution (UE) n° 540/2011 de la Commission

Numéro officiel : UE/2021/1452
Date de signature : 03/09/2021
Liens juridiques : Modification Règlement d'exécution UE/540/2011 25/05/2011

Accès au document

## Non-approbation du sulfure de diméthyle en tant que substance de base

RÈGLEMENT D'EXÉCUTION (UE) 2021/1451 DE LA COMMISSION du 3 septembre 2021 portant non-approbation du sulfure de diméthyle en tant que substance de base conformément au règlement (CE) n° 1107/2009 du Parlement européen et du Conseil concernant la mise sur le marché des produits phytopharmaceutiques

Numéro officiel : UE/2021/1451
Date de signature : 03/09/2021

Accès au document

## Approbation de la substance active à faible risque «Bacillus amyloliquefaciens souche AH2»

RÈGLEMENT D'EXÉCUTION (UE) 2021/1455 DE LA COMMISSION du 6 septembre 2021 portant approbation de la substance active à faible risque «Bacillus amyloliquefaciens souche AH2» conformément au règlement (CE) n° 1107/2009 du Parlement européen et du Conseil concernant la mise sur le marché des produits phytopharmaceutiques et modifiant le règlement d'exécution (UE) n° 540/2011 de la Commission

Numéro officiel : UE/2021/1455
Date de signature : 06/09/2021
Liens juridiques : Modification Règlement d'exécution UE/540/2011 25/05/2011

Accès au document

# REGLEMENTATION / DEBAT

## Seuils des polluants organiques persistants : appel à consultation de la commission

**EC Europa**

Les polluants organiques persistants (POP) sont des produits chimiques toxiques qui se dégradent lentement et se retrouvent dans la chaîne alimentaire, ce qui nuit à l'environnement et à notre santé.

Les déchets contenant des POPs sont particulièrement préoccupants. L'UE fixe donc des limites de concentration pour ces produits chimiques, qu'elle réexamine régulièrement pour tenir compte des résultats des travaux de recherche les plus récents. Période de contribution : 28 octobre 2021 - 23 décembre 2021 (minuit, heure de Bruxelles)

Accès au document

https://doi.org/10.15454/bwf7-8m60

## New EU farm to fork strategy to make our food healthier and more sustainable

**Europarl 20/10/21**

Parliament welcomes the Farm to Fork strategy and underlines the importance of producing sustainable and healthy food to achieve the goals of the European Green Deal, including on climate, biodiversity, zero pollution and public health.

MEPs highlighted the need for enhanced sustainability at every step of the food supply chain and reiterated that everyone - from farmer to consumer - has a role to play in this. To ensure that farmers can earn a fair share of the profit made from sustainably produced food, MEPs want the Commission to reinforce efforts - including through the adaptation of competition rules - to strengthen the position of farmers in the supply chain. [...]

Accès au document

## Rapport sur une stratégie «De la ferme à la table» pour un système alimentaire équitable, sain et respectueux de l'environnement - A9-0271/2021

**Parlement européen 30/09/21**

Rapport sur une stratégie « De la ferme à la table» pour un système alimentaire équitable, sain et respectueux de l'environnement (2020/2260(INI)

Accès au document

# AVIS / EXPERTISES / NORMES

## Non-conformités dans les eaux destinées à la consommation humaine dues aux métabolites du métolachlore

**ANSES 08/10/21**

Signalement n° 82

Extrait du rapport d'analyse et d'interprétation d'un signalement transmis à l'Anses au titre de la phytopharmacovigilance.

Accès au document

## New dual screening method for emerging pollutant chemicals in urban wastewater, Lyon, France

**EC 23/09/21**

Urban wastewaters contain a number of chemical contaminants — including plasticisers, flame retardants, pharmaceuticals and pesticides.

These chemicals are often ecotoxic — for example, those which disrupt hormones in organisms — and are a potential threat to aquatic life. This study aimed to establish a large-scale, environmental risk assessment (ERA) on emerging chemical pollutants continually released in effluent into local watercourses from 10 urban waste-water treatment plants (WWTP) in France.

SCIENCE FOR ENVIRONMENT POLICY, Environment, 23rd September 2021 Issue 567

Accès au document

## Identifier les voies de transfert de l'AMPA vers un captage AEP pour mieux gérer la contamination

**BRGM 06/10/21**

Le BRGM, en collaboration avec le Syndicat d'Eau du Roumois et du Plateau du Neubourg (SERPN) cherche à identifier les voies de transfert de l'AMPA (Acide Aminométhylphosphonique), un contaminant détecté de manière récurrente dans les eaux brutes du captage des Varras, en Seine-Maritime. [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Les chiffres clés de la Haute Valeur Environnementale (HVE)

**Ministère Agriculture 07/10/21**

La Haute Valeur Environnementale correspond au troisième niveau, le plus élevé, de la certification environnementale des exploitations agricoles. Cette certification d'exploitation est une démarche volontaire, accessible à toutes les filières et construite autour de quatre thématiques environnementales : la protection de la biodiversité, la réduction des produits phytosanitaires, la gestion de la fertilisation et la gestion de la ressource en eau. [...]

Accès au document

## Avis délibéré de l'Autorité environnementale sur le plan stratégique national de la politique agricole commune 2023-2027

**CGEDD 22/10/2021**

Le plan stratégique national (PSN) de la politique agricole commune (Pac) mettra en œuvre un règlement européen, proposé par la Commission européenne en juin 2018 et non encore adopté. Il a pour objectif de préciser comment la France prévoit de mobiliser les instruments de la Pac (paiements directs, interventions sectorielles et développement rural) pour contribuer notamment à l'ambition du Pacte vert.Cet avis porte sur la qualité de l'évaluation environnementale présentée par la personne responsable, et sur la prise en compte de l'environnement par le plan ou le programme.

Accès au document

# PUBLICATIONS DU RESEAU ECOTOX

## Molecular Epidemiology of Azole-Resistant *Aspergillus fumigatus* in France Shows Patient and Healthcare Links to Environmentally Occurring Genotypes

**Authors:** Rocchi S, Sewell TR, Valot B, Godeau C et al.

**Source:** FRONTIERS IN CELLULAR AND INFECTION MICROBIOLOGY 11: 729476, 2021, DOI 10.3389/fcimb.2021.729476

**Abstract:** Resistance of the human pathogenic fungus Aspergillus fumigatus to antifungal agents is on the rise. However, links between patient infections, their potential acquisition from local environmental sources, and links to global diversity remain cryptic. Here, we used genotyping analyses using nine microsatellites in A. fumigatus, in order to study patterns of diversity in France. In this study, we genotyped 225 local A. fumigatus isolates, 112 azole susceptible and 113 azole resistant, collected from the Bourgogne-Franche-Comte region (Eastern France) and sampled from both clinical (n = 34) and environmental (n = 191) sources…

## Silicon (Si) Alleviates Iron Deficiency Effects in Sea Barley (Hordeum marinum) by Enhancing Iron Accumulation and Photosystem Activities

**Authors:** Ksiaa M, Farhat N, Rabhi M, Elkhouni A et al.

**Source:** SILICON 20509, 2021, DOI 10.1007/s12633-021-01376-x

**Abstract:** Purpose Silicon (Si) is a ubiquitous element and the second most abundant after oxygen in the Earth's crust. Although silicon is not yet listed among the essential nutrients for higher plant growth, its beneficial impact on improving crop development and yield, especially under stressful environments such as iron deficiency, was well documented. Iron deficiency is a major concern for crop production mainly observed in calcareous soils all over the world. The objective of this study was to investigate the effects of silicon on sea barley (Hordeum marinum ssp. marinum) under iron deficiency…

## Bt cotton area contraction drives regional pest resurgence, crop loss, and pesticide use

**Authors:** Lu YH, Wyckhuys KAG, Yang L, Liu B et al.

**Source:** PLANT BIOTECHNOLOGY JOURNAL 20509, 2021, DOI 10.1111/pbi.13721

**Abstract:** Genetically-modified crops expressing *Bacillus thuringiensis* (Bt) proteins have been widely cultivated, permitting an effective non-chemical control of major agricultural pests. While their establishment can enable an area-wide suppression of polyphagous herbivores, no information is available on the impact of Bt crop abandonment in entire landscape matrices. Here, we detail a resurgence of the cosmopolitan bollworm *Helicoverpa armigera* following a contraction of Bt cotton area in dynamic agro-landscapes over 2007-2019 in North China Plain…

## Assessment of exposure to ionizing radiation in Chernobyl tree frogs (*Hyla orientalis*)

**Authors:** Burraco P, Car C, Bonzom JM, Orizaola G

**Source:** SCIENTIFIC REPORTS 11(1): 20509, 2021, DOI 10.1038/s41598-021-00125-9

**Abstract:** Ionizing radiation can damage organic molecules, causing detrimental effects on human and wildlife health. The accident at the Chernobyl nuclear power plant (1986) represents the largest release of radioactive material to the environment. An accurate estimation of the current exposure to radiation in wildlife, often reduced to ambient dose rate assessments, is crucial to understand the long-term impact of radiation on living organisms. Here, we present an evaluation of the sources and variation of current exposure to radiation in breeding Eastern tree frogs (Hyla orientalis) males living in the Chernobyl Exclusion Zone…

## Emerging concepts and opportunities for endocrine disruptor screening of the non-EATS modalities

**Authors:** Martyniuk CJ, Martinez R, Navarro-Martin L, Kamstra JH et al.

**Source:** ENVIRONMENTAL RESEARCH 204 Part A: 111904, 2022, DOI 10.1016/j.envres.2021.111904

**Abstract:** Endocrine disrupting chemicals (EDCs) are ubiquitous in the environment and involve diverse chemical-receptor interactions that can perturb hormone signaling. The Organization for Economic Co-operation and Development has validated several EDC-receptor bioassays to detect endocrine active chemicals and has established guidelines for regulatory testing of EDCs. Focus on testing over the past decade has been initially directed to EATS modalities (estrogen, androgen, thyroid, and steroidogenesis) and validated tests for chemicals that exert effects through non-EATS modalities are less established. Due to recognition that EDCs are vast in their mechanisms of action, novel bioassays are needed to capture the full scope of activity…

## A cross-species comparative approach to assessing multi- and transgenerational effects of endocrine disrupting chemicals

**Authors:** Robaire B, Delbes G, Head JA, Marlatt VL et al.

**Source:** ENVIRONMENTAL RESEARCH 204 Part B: 112063, 2021, DOI 10.1016/j.envres.2021.112063

**Abstract:** A wide range of chemicals have been identified as endocrine disrupting chemicals (EDCs) in vertebrate species. Most studies of EDCs have focused on exposure of both male and female adults to these chemicals; however, there is clear evidence that EDCs have dramatic effects when mature or developing gametes are exposed, and consequently are associated with in multigenerational and transgenerational effects. Several publications have reviewed such actions of EDCs in subgroups of species, e.g., fish or rodents. In this review, we take a holistic

approach synthesizing knowledge of the effects of EDCs across vertebrate species, including fish, anurans, birds, and mammals, and discuss the potential mechanism(s) mediating such multi- and transgenerational effects…

## Development of an exposure protocol for toxicity test (FEET) for a marine species: the European sea bass (*Dicentrarchus labrax*)

**Authors:** Soloperto S, Aroua S, Jozet-Alves C, Minier C et al.

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early access: 100867, 2021, DOI 10.1007/s11356-021-16785-z

**Abstract:** Regulatory assessment of the effects of chemicals requires the availability of validated tests representing different environments and organisms. In this context, developing new tests is particularly needed for marine species from temperate environments. It is also important to evaluate effects that are generally poorly characterized and seldom included in regulatory tests. In this study, we designed an exposure protocol using European sea bass (Dicentrarchus labrax) larvae. We examined classical toxicological values (LCx) as well as behavioral responses...

## Miniaturization of an extraction protocol for the monitoring of pesticides and polar transformation products in biotic matrices

**Authors:** Dufour V, Wiest L, Slaby S, Le Cor F et al.

**Source:** CHEMOSPHERE 284: 131292, 2021, DOI 10.1016/j.chemosphere.2021.131292

**Abstract:** Monitoring pesticides in the environment requires the use of sensitive analytical methods. However, existing methods are generally not suitable for analyzing small organisms, as they require large matrix masses. This study explores the development of a miniaturized extraction protocol for the monitoring of small organisms, based on only 30 mg of matrix. The miniaturized sample preparation was developed using fish and macroinvertebrate matrices. It allowed the characterization of 41 pesticides and transformation products (log P from-1.9 to 4.8) in small samples with LC-MS/MS, based on European guidelines (European Commission DG-SANTE, 2019)…

## Deciphering Differential Life Stage Radioinduced Reproductive Decline in *Caenorhabditis elegans* through Lipid Analysis

**Authors:** Dufourcq-Sekatcheff E, Cuine S, Li-Beisson Y, Quevarec L et al.

**Source:** INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES 22(19): 10277, 2021, DOI 10.3390/ijms221910277

**Abstract:** Wildlife is chronically exposed to various sources of ionizing radiations, both environmental or anthropic, due to nuclear energy use, which can induce several defects in organisms. In invertebrates, reproduction, which directly impacts population dynamics, has been found to be the most radiosensitive endpoint. Understanding the underlying molecular pathways inducing this reproduction decrease can help in predicting the effects at larger scales (i.e., population). In this study, we used a life stage dependent approach in order to better understand the molecular determinants of reproduction decrease in the roundworm *C. elegans*…

## The combination of chemical, structural, and functional indicators to evaluate the anthropogenic impacts on agricultural stream ecosystems

**Authors:** Jabiol J, Chauvet E, Guerold F, Bouquerel J et al.

Source: ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, 2021, DOI 10.1007/s11356-021-16925-5

Abstract: Freshwater contamination by pesticides in agricultural landscapes is of increasing concern worldwide, with strong pesticide impacts on biodiversity, ecosystem functions, and ultimately human health (drinking water, fishing). In addition, the excessively large number of substances, as well as their low - and temporally variable - concentrations in water, make the chemical monitoring by grab sampling very demanding and not fully representative of the actual contamination. Tools that integrate temporal variations and that are ecologically relevant are clearly needed to improve the monitoring of freshwater contamination and assess its biological effects. Here, we studied pesticide contamination and its biological impacts in 10 stream sections (sites) belonging to 3 agricultural catchments in France…

## Short- and long-term impacts of anaerobic digestate spreading on earthworms in cropped soils

**Authors:** Moinard V, Redondi C, Etievant V, Savoie A et al.

**Source:** APPLIED SOIL ECOLOGY 168: 104149, 2021, DOI 10.1016/j.apsoil.2021.104149

**Abstract:** Anaerobic digestion is increasingly used in Europe to treat organic substrates and produce biogas as a renewable energy source. The residual matter (digestate) is used in agriculture as an organic fertilizer. The study aims at assessing the impact of digestate application in the field on earthworms from the short term (few hours) to the long term (two years), and at investigating under laboratory conditions the role of ammonia and earthworm behavior on digestate toxicity in the short term. First, we studied earthworm communities in fields fertilized with digestates, cattle effluents, or chemical fertilizers for two years...

## Experimental evolution supports the potential of neonicotinoid-pyrethroid combination for managing insecticide resistance in malaria vectors

**Authors:** Zoh MG, Bonneville JM, Tutagata J, Laporte F et al.

**Source:** SCIENTIFIC REPORTS 11(1): 19501, 2021, DOI 10.1038/s41598-021-99061-x

**Abstract:** The introduction of neonicotinoids for managing insecticide resistance in mosquitoes is of high interest as they interact with a biochemical target not previously used in public health. In this concern, Bayer developed a combination of the neonicotinoid clothianidin and the pyrethroid deltamethrin (brand name Fludora Fusion) as a new vector control tool. Although this combination proved to be efficient against pyrethroid-resistant mosquitoes, its ability to prevent the selection of pyrethroid and neonicotinoid resistance alleles was not investigated. In this context, the objective of this work was to study the dynamics and the molecular mechanisms of resistance of An. gambiae to the separated or combined components of this combination…

## Toxic effects of a mixture of five pharmaceutical drugs assessed using *Fontinalis antipyretica* Hedw.

**Authors:** Alaoui KS, Tychon B, Joachim S, Geffard A et al.

**Source:** ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY 225: 112727, 2021, DOI 10.1016/j.ecoenv.2021.112727

**Abstract:** The potential health risks associated with the pharmaceuticals released into the environment through effluents from sewage treatment plants have become a major cause for concern. Owing to the lack of effective indicators, monitoring the concentration of these pollutants in the aquatic environment is challenging. The aim of this study was to assess the toxicity of a mixture of five pharmaceutical drugs (paracetamol, carbamazepine, diclofenac, irbesartan, and naproxen) using the aquatic moss *Fontinalis antipyretica* as a bioindicator and bioaccumulator. We examined the effects of the drug mixture on the cellular antioxidant system,

chlorophyll content, and morphological traits of *F. antipyretica*…

## Direct photodegradation of 36 organic micropollutants under simulated solar radiation: Comparison with free-water surface constructed wetland and influence of chemical structure

**Authors:** Mathon B, Ferreol M, Coquery M, Choubert JM et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 407: 124801, 2021, DOI 10.1016/j.jhazmat.2020.124801

**Abstract:** Micropollutants such as pharmaceuticals and pesticides are still found in treated municipal effluent and are discharged into the natural environment. Natural direct photodegradation may be one pathway for removing these micropollutants in treatment processes such as free-water surface constructed wetlands (CW). This work was set out to evaluate the half-life (t(1/2)) of direct photodegradation of 36 micropollutants under controlled conditions of light exposure close to solar radiation. The results allowed to classify the micropollutants into three groups (fast, medium and slow)…

## An integrated metabolomics and proteogenomics approach reveals molecular alterations following carbamazepine exposure in the male mussel *Mytilus galloprovincialis*

**Authors:** Dumas T, Courant F, Almunia C, Boccard J et al.

**Source:** CHEMOSPHERE 286(2): 131793, 2022, DOI 10.1016/j.chemosphere.2021.131793

**Abstract:** Carbamazepine is one of the most abundant pharmaceutical active compounds detected in aquatic systems. Based on laboratory exposures, carbamazepine has been proven to adversely affect aquatic organisms. However, the underlying molecular events remain poorly understood. This study aims to investigate the molecular mechanisms potentially associated with toxicological effects of carbamazepine on the mussel Mytilus galloprovincialis exposed for 3 days at realistic concentrations encountered in coastal environments (80 ng/L and 8 µg/L). An integrated metabolomics and proteogenomics approach, including data fusion strategy, was applied to gain more insight in molecular events and cellular processes triggered by carbamazepine exposure...

## A review of the effects of contamination and temperature in *Solea solea* larvae. Modeling perspectives in the context of climate change

**Authors:** Sardi, AE, Begout ML, Cousin X, Labadie P et al.

**Source:** JOURNAL OF SEA RESEARCH 176: 102101, 2021, DOI 10.1016/j.seares.2021.102101

**Abstract:** The flatfish species Solea solea has been the subject of research for supporting their management in fisheries, restocking natural populations, domestication in aquaculture, and ecotoxicology research. Soles undergo a metamorphosis with drastic morphological and physiological changes and settlement, processes that make them potentially more vulnerable to pollutants than other fish. Up to date, efforts made to develop its aquaculture production in Europe have been limited. In the context of climate change (CC), this review aims i) to gather research conducted in S. solea larvae that summarizes the effects of increased temperature and contaminant exposures during larval development; and ii) to provide a summarized and synergistic view about its larval development…

## Comparative developmental toxicity of conventional oils and diluted bitumen on early life stages of the rainbow trout (*Oncorhynchus mykiss*)

**Authors:** Di Lombo MS, Weeks-Santos S, Clerandeau C, Triffault-Bouchet G et al.

**Source:** AQUATIC TOXICOLOGY 239: 105937, 2021, DOI 10.1016/j.aquatox.2021.105937

**Abstract:** Petroleum hydrocarbons are widely used and transported, increasing the risks of spills to the environment. Although conventional oils are the most commonly produced, the production of unconventional oils (i.e. diluted bitumen or dilbit) is increasing. In this study, we compared the effects of conventional oils (Arabian Light and Lloydminster) and dilbits (Bluesky and Clearwater) on early life stages of a salmonid. To this end, aqueous fractions (WAF: water accommodated fraction) of these oils were extracted using mountain spring water. Rainbow trout (*Oncorhynchus mykiss*) larvae were exposed to 10 and 50% dilutions of these WAFs from hatching (340 DD; degree days) until yolk sac resorption (541 DD)…

## Biochar Effects on Soil-Plant Properties after Six Month Adaptation in Soil

**Authors:** Mikajlo I, Louvel B, Zahora J, Zalmanova A et al.

**Source:** COMMUNICATIONS IN SOIL SCIENCE AND PLANT ANALYSIS Early Access, 2021, DOI 10.1080/00103624.2021.1984505

**Abstract:** Biochar (BCH) is one of the most promising amendments to improve soil quality and store carbon in soils. Vast majority of the studies utilized freshly produced materials and assess BCH effects immediately after soil amendment. The aim of this study was to investigate the influence of biochars aged six months with two soil types on soil physicochemical and biological properties along with plant growth. Soils from a protection zone of water sources and from an agricultural area were mixed with three different types of BCH…

## The toxicity of cadmium-copper mixtures on daphnids and microalgae analyzed using the Biotic Ligand Model

Authors: Clement B, Felix V, Bertrand V

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, 2021, DOI 10.1007/s11356-021-16516-4

**Abstract:** For the prediction of metal mixture ecotoxicity, the BLM approach is promising since it evaluates the amount of metals accumulated on the biotic ligand on the basis of water chemistry, i.e., species (major cations) competing with metals, and related toxicity. Based on previous work by Farley et al. (2015) (MMME research project), this study aimed at modeling toxicity of Cd:Cu mixtures (0:1 - 1:1 - 1:0 - 1:2 - 1:3 - 2:1 - 3:1 - 4:1 - 5:1 - 6:1) to the crustacean Daphnia magna(48-h immobilization tests) and the microalga *Pseudokirchneriella subcapitata* (72-h growth inhibition tests). The 2012 version of the USGS model was chosen, assuming additivity of effects and accumulation of metals on a single site…

## Can *Lumbricus terrestris* be released in forest soils degraded by compaction? Preliminary results from laboratory and field experiments

**Authors:** Ducasse V, Darboux F, Auclerc A, Legout A et al.

**Source:** APPLIED SOIL ECOLOGY 168: 104131, 2021, DOI 10.1016/j.apsoil.2021.104131

**Abstract:** Compaction is an important and increasing threat for forest soils. In addition to preventive approaches, remediation solutions are needed. Among them, the release of anecic earthworms is thought to be a promising approach. However, most previous attempts in compacted forest soils failed to retrieve the introduced earthworms. To gain more insight on the feasibility of releasing *Lumbricus terrestris* adults, we performed both a laboratory and a field study. Under laboratory conditions, the *L.*

*terrestris* behavior was assessed in repacked soil cores with increasing soil bulk density (1.3, 1.4, 1.5 and 1.6 g cm(-3) for a silt-loam soil)…

## Editorial: Invertebrate UDP-Glycosyltransferases: Nomenclature, Diversity and Functions

**Authors:** Ahn SJ, Chertemps T, Maibeche M, Marygold SJ et al.

**Source:** FRONTIERS IN PHYSIOLOGY 12: 748290, 2021, DOI 10.3389/fphys.2021.748290

**Edito:** Glycoside conjugation is one of the important mechanisms in xenobiotic detoxification in living organisms (Smith, 1955). It increases water solubility making the compounds more easily excretable, thereby protecting the cellular system from damage by toxic compounds, well-known as an important component of Phase II detoxification in human (Meech et al., 2019). Plants can conjugate growth hormones, pigments, and secondary metabolites, maintaining homeostasis in their growth and physiological functions (Bowles et al., 2006). Macrolide antibiotics such as vancomycin are synthesized through glycoside conjugation in some bacteria (Quirós et al., 2000). However, little is known about the glycoside conjugation in invertebrates, a highly diverse group of animals. Recent work on chemo-ecological interactions among different living organisms and environments, such as arthropod-plant interactions, chemical arms-races, and pesticide resistance, have revisited the significance of glycoside conjugation fromecological roles tomolecular functions (Heckel, 2018)…

## Increasing the power of interpretation for soil metaproteomics data

**Authors:** Jouffret V, Miotello G, Culotta K, Ayrault S et al.

**Source:** MICROBIOME 9(1): 195, 2021, DOI 10.1186/s40168-021-01139-1

**Abstract:** Background: Soil and sediment microorganisms are highly phylogenetically diverse but are currently largely under-represented in public molecular databases. Their functional characterization by means of metaproteomics is usually performed using metagenomic sequences acquired for the same sample. However, such hugely diverse metagenomic datasets are difficult to assemble ; in parallel, theoretical proteomes from isolates available in generic databases are of high quality. Both these factors advocate for the use of theoretical proteomes in metaproteomics interpretation pipelines. Here, we examined a number of database construction strategies with a view to increasing the outputs of metaproteomics studies performed on soil samples…

## The science behind the ban: the outstanding impact of ecotoxicological research on the regulation of neonicotinoids

**Author:** Demortain D

**Source:** CURRENT OPINION IN INSECT SCIENCE 46(78-82): 117530, 2021, DOI 10.1016/j.cois.2021.02.017

**Abstract:** The restrictions and bans imposed on insecticides of the neonicotinoid family in Europe were legitimized by emerging knowledge about their impact on the health of bee populations. That such knowledge was articulated and acted upon in the regulatory space is puzzling, given the standard forms of regulatory science, and the ways in which scientific knowledge is used in this very space. This short article reviews research in social science about regulation and regulatory knowledge, to help understand how research on bee decline opened the possibility of wide regulatory restrictions on neonicotinoids…

## Water table fluctuations affect dichloromethane biodegradation in lab-scale aquifers contaminated with organohalides

**Authors:** Prieto-Espinoza M, Weill, S, Belfort B, Muller EEL, Masbou J et al.

**Source:** WATER RESEARCH 203: 117530, 2021, DOI 10.1016/j.watres.2021.117530

**Abstract:** Dichloromethane (DCM) is a toxic industrial solvent frequently detected in multi-contaminated aquifers. It can be degraded biotically or abiotically, and under oxic or anoxic conditions. The extent and pathways of DCM degradation in aquifers may thus depend on water table fluctuations and microbial responses to hydrochemical variations. Here, we examined the effect of water table fluctuations on DCM biodegradation in two laboratory aquifers fed with O-2-depleted DCM-spiked groundwater from a well-characterized former industrial site. Hydrochemistry, stable isotopes of DCM (delta C-13 and delta Cl-37), and bacterial community composition were examined to determine DCM mass removal and degradation pathways under steady-state (static water table) and transient (fluctuating water table) conditions…

## Combined influences of transgenerational effects, temperature and insecticide on the moth *Spodoptera littoralis*

**Authors:** Massot M, Bagni T, Maria A, Couzi P, Drozdz T et al.

**Source:** ENVIRONMENTAL POLLUTION 289 : 117889, 2021, DOI 10.1016/j.envpol.2021.117889

**Abstract:** Climate warming is expected to impact the response of species to insecticides. Recent studies show that this interaction between insecticides and temperature can depend on other factors. Here, we tested for the influence of transgenerational effects on the Insecticide x Temperature interaction in the crop pest moth Spodoptera littoralis. Specifically, we analysed reaction norms among experimental clutches based on a split-plot design crossing the factors temperature, insecticide and clutch. The study was performed on 2280 larvae reared at four temperatures (23, 25, 27 and 29 degrees C), and their response to the insecticide deltamethrin (three concentrations and a control group) was tested…

## Glyphosate-degrading behavior of five bacterial strains isolated from stream biofilms

**Authors:** Rossi F, Carles L, Donnadieu F Batisson I et al.

**Source:** JOURNAL OF HAZARDOUS MATERIALS 420: 126651, 2021, DOI 10.1016/j.jhazmat.2021.126651

**Abstract:** The present study investigates the individual degrading behavior of bacterial strains isolated from glyphosatedegrading stream biofilms. In this aim, biofilms were subjected to enrichment experiments using glyphosate or its metabolite AMPA (aminomethyl phosphonic acid) as the sole phosphorus source. Five bacterial strains were isolated and taxonomically affiliated to Ensifer sp. CNII15, Acidovorax sp. CNI26, Agrobacterium tumefaciens CNI28, Novosphingobium sp. CNI35 and Ochrobactrum pituitosum CNI52. All strains were capable of completely dissipating glyphosate after 125-400 h and AMPA after 30-120 h, except for Ensifer sp. CNII15 that was not able to dissipate glyphosate but entirely dissipated AMPA after 200 h…

## Effects of metals and persistent organic pollutants on the fitness and health of juveniles of the endangered european sturgeon *Acipenser sturio* Exposed to W1ater and sediments of the Garonne and Dordogne rivers

**Authors:** Lucas J, Lefrancois C, Gesset C, Budzinski H et al ;

**Source:** ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY 225: 112720, 2021, DOI 10.1016/j.ecoenv.2021.112720

**Abstract:** The last remaining population of European sturgeon (*Acipenser sturio*) lives in the Gironde-Garonne-Dordogne (France) catchment (GGD). Captive young individuals are released into the GGD hydrosystem each year, as part of a restocking programme. This study aims to assess

the health status of juveniles A. sturio to current conditions in the GGD hydrosystem, to evaluate their capacity to survive and grow in a moderately anthropized ecosystems. 3-month-old farmed sturgeons were exposed for one month in experimental conditions that mimic the environmental conditions in the Garonne and Dordogne rivers, followed by five months of depuration…

## Conflicts of interest and improvement through peer review: the case of IPBES report on pollinators

**Author:** Arnold G

**Source:** CURRENT OPINION IN INSECT SCIENCE 46(57-63): 103698, 2021, DOI 10.1016/j.cois.2021.02.011

**Abstract:** To understand the real causes of disorders and abnormal mortalities of bees (honeybees and wild bees) in the world, the scientific method requires that each category of potential stressors be analyzed in a balanced manner. In this article, I show that the first version of the section dealing with the evaluation of the toxic effects of pesticides on bees, in the IPBES assessment report on pollinators and pollination, revealed an incomplete and biased literature review in many places, especially downplaying the risks that pesticides in general, and neonicotinoids in particular, pose for pollinating insects…

## Characterization and quantification of chlordecone elimination in ewes

**Authors:** Saint-Hilaire M, Fourcot A, Bousquet-Melou A, Rychen G etal.

**Source:** ENVIRONMENTAL TOXICOLOGY AND PHARMACOLOGY 87: 103698, 2021, DOI 10.1016/j.etap.2021.103698

**Abstract:** To reduce the exposure of the French West Indies population to the organochlorine insecticide chlordecone (Kepone; CLD), the contamination of currently consumed foodstuffs must be reduced. Depuration of contaminated animals before slaughter could be a strategy to obtain safe animal products. The aim of this study was to characterize and quantify CLD elimination in contaminated ewes during depuration process. Experiments A and B consisted in a single intravenous (i.v.) administration of CLD (n = 5) and CLDOH (chlordecol; n = 3) followed by a 84-d and 3-d depuration period respectively with collection of blood, faeces and urine samples…

## Quantification of multi-scale links of anthropogenic pressures with PAH and PCB bioavailable contamination in French freshwaters

**Authors:** Sarkis N, Meymy C, Geffard O, Souchon Y et al.

**Source:** WATER RESEARCH 203: 117546, 2021, DOI 10.1016/j.watres.2021.117546

**Abstract:** Aquatic ecosystems are exposed to multiple environmental pressures including chemical contamination. Polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) are persistent organic pollutants (POPs) known as preoccupying substances for the environment. Active biomonitoring (ABM) is a surveillance method for polluted aquatic ecosystems measuring bioavailable contamination. In this work, the aim was to quantify the total links between environmental pressures and bioavailable contamination (for PAHs and PCBs) at the French national scale…

## Subchronic Exposure to Environmental Concentrations of Chlorpyrifos Affects Swimming Activity of Rainbow Trout Larvae

**Authors:** Santos SW, Gonzalez P, Cormier B, Mazzella N et al.

**Source:** ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY 867, 2021, DOI 10.1002/etc.5183

**Abstract:** Chlorpyrifos (CPF), an organophosphorous pesticide, can be found in

aquatic ecosystems at concentrations of up to several hundred nanograms per liter because of water runoff from treated crops. While some studies have shown that low concentrations of CPF may have adverse effects on aquatic species, comparatively little is known about its effect on fish embryos and larvae. To investigate the developmental effects of CPF, rainbow trout (Oncorhynchus mykiss) eyed-stage embryos were exposed in semistatic conditions to 0.3 and 3 mu g/L of CPF up to the end of the sac-fry stage, 3 weeks, at 12 degrees C. Several endpoints were analyzed including survival, hatching delay, hatching success, biometry, swimming activity, DNA damage, lipid peroxidation, protein carbonyl content, acetylcholinesterase (AChE) activity, and gene expression…

## Discovery and characterization of UipA, a uranium- and iron-binding PepSY protein involved in uranium tolerance by soil bacteria

**Authors:** Gallois N, Alpha-Bazin B, Bremond N, Ortet P et al.

**Source:** ISME JOURNAL 867, 2021, DOI 10.1038/s41396-021-01113-7

**Abstract:** Uranium is a naturally occurring radionuclide. Its redistribution, primarily due to human activities, can have adverse effects on human and non-human biota, which poses environmental concerns. The molecular mechanisms of uranium tolerance and the cellular response induced by uranium exposure in bacteria are not yet fully understood. Here, we carried out a comparative analysis of four actinobacterial strains isolated from metal and radionuclide-rich soils that display contrasted uranium tolerance phenotypes…

## Fluorescence excitation/emission matrices as a tool to monitor the removal of organic micropollutants from wastewater effluents by adsorption onto activated carbon

**Authors:** Guillossou R, Le Roux J, Goffin A, Mailler R et al.

**Source:** WATER RESEARCH 190: 116749, 2021, DOI 10.1016/j.watres.2020.116749

**Abstract:** Monitoring the removal of organic micropollutants (OMPs) in advanced wastewater treatment facilities requires expensive and time-consuming analytical methods that cannot be installed online. Spectroscopic techniques such as fluorescence excitation/emission spectroscopy were demonstrated to offer the potential for monitoring OMPs removal in conventional wastewater treatment plants or ozonation pilots but their application to activated carbon (AC) adsorption processes was only investigated at lab scale and not in real treatment facilities. In this study, indexes from fluorescence emission/excitation matrices (EEMs) were used to find correlations with the removal of 28 OMPs from a large-scale AC pilot in fluidized bed employed for wastewater advanced treatment, as well as from batch experiments…

## Do DOM optical parameters improve the prediction of copper availability in vineyard soils?

**Authors:** Ouedraogo F, Cornu JY, Janot N, Nguyen C et al.

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, 2021, DOI 10.1007/s11356-021-16361-5

**Abstract:** Accumulation of copper (Cu) in soils due to the application of fungicides may be toxic for organisms and hence affect winegrowing sustainability. Soil parameters such as pH and dissolved organic matter (DOM) are known to affect the availability of Cu. In this study, we investigated the contribution of chromophoric and fluorescent DOM properties to the prediction of Cu availability in 18 organic vineyard soils in the Bordeaux winegrowing area (France). The DOM parameters, assessed through absorbance and fluorescence analyses, and proxies for Cu

availability (total soluble Cu and free ionic Cu2+) were measured in 0.01 M KCl extracts…

## Abundance of insects and aerial insectivorous birds in relation to pesticide and fertilizer use

**Authors:** Møller A.P., Czeszczewik D., Flensted-Jensen E., Erritzoe J. et al…

**Source:** Avian Res 12: 43, 2021, DOI: 10.1186/s40657-021-00278-1

**Abstract:** Background The abundance of insects has decreased considerably during recent decades, resulting in current abundance showing 70-80% reductions in more than 15 studies across temperate climate zones. Dramatic reductions in the abundance of insects are likely to have consequences for other taxa at higher trophic levels such as predators and parasites. Pesticides, fertilizers and agricultural land use are likely candidates accounting for such reductions in the abundance of insects…

## Polyethylene microplastic toxicity to the terrestrial snail *Cantareus aspersus*: size matters

**Authors:** Colpaert R, Grezeriat, LPD, Louzon M, de Vaufleury A et al…

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, 2021, DOI 10.1007/s11356-021-15824-z

**Abstract:** Plastic has become the most widespread human-made material and small fragments (< 5mm, so called microplastics, MPs) accumulate in all the ecosystems. It is now admitted that the terrestrial environment represents an important sink for MPs and it has only recently become the focus of research, notably in ecotoxicology. In spite of a growing body of evidence regarding the potential effects of MPs on soil biota, more efforts are needed to address issues in this field. The aim of our study was to measure, at different levels of biological organization, the responses of *Cantareus aspersus* snail to low-density polyethylene (LDPE) particles dispersed in their food…

## Transgenerational Effects of a Neonicotinoid and a Novel Sulfoximine Insecticide on the Harlequin Ladybird

**Authors:** Dai CC, Ricupero M, Wang ZQ, Desneux N et al…

**Source:** INSECTS 12(8): 681, 2021, DOI 10.3390/insects12080681

**Abstract:** Simple Summary The coccinellid *Harmonia axyridis* is an important natural enemy of various agricultural pests, including aphids. Agrochemicals can negatively affect the performance of arthropod natural enemies and, thus, the ecological services they provide. In this context, we assessed the lethal and sublethal effects of two neuroactive compounds with different chemical structures: the long-established neonicotinoid insecticide, imidacloprid, and the novel, sulfoximine insecticide, sulfoxaflor, both of which act on nicotinic acetylcholine receptors against adult and developmental stages of *H. axyridis*…

## Environmentally Relevant Mixture of Pesticides Affect Mobility and DNA Integrity of Early Life Stages of Rainbow Trout (*Oncorhynchus mykiss*)

**Authors:** Santos SW, Cachot J, Cormier B, Mazzella N et al…

**Source:** TOXICS 9(8):174, 2021, DOI 10.3390/toxics9080174

**Abstract:** The aim of this study was to analyze the impact of three concentrations of a pesticide mixture on the first development stages of rainbow trout (*Oncorhynchus mykiss*). The mixture was made up of three commonly used pesticides in viticulture: glyphosate (GLY), chlorpyrifos (CPF) and copper sulfate (Cu). Eyed stage embryos were exposed for 3 weeks to three concentrations of the pesticide mixture. Lethal and sub-lethal effects were assessed through a number of phenotypic and molecular endpoints

including survival, hatching delay, hatching success, biometry, swimming activity, DNA damage (Comet assay), lipid peroxidation (TBARS), protein carbonyl content and gene expression…

## Photodegradation of methotrexate in aqueous solution: degradation kinetics and identification of transformation products

**Authors:** Espinosa A, Nelieu S, Lieben P, Skarbek C et al…

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early Access, 2021, DOI 10.1007/s11356-021-15820-3

**Abstract:** Methotrexate is an antineoplastic folate analog of high environmental concern, due to its low biodegradability and toxicological properties. This study focused on its photodegradation under two irradiation conditions, aiming to be representative of environment (300-450 nm) and drinking water treatment (254 nm). The photodegradation experiments were conducted at two pH, to vary the methotrexate ionization state and to produce a large variety of transformation products (TPs)…

## Seasonal diet-based resistance to anticoagulant rodenticides in the fossorial water vole (*Arvicola amphibius*)

**Authors:** Khalil RA, Barbier B, Fafournoux A, Mahamat AB et al…

**Source:** ENVIRONMENTAL RESEARCH 200:111422, 2021, DOI 10.1016/j.envres.2021.111422

**Abstract:** Anticoagulant rodenticides (AR) resistance has been defined as "a major loss of efficacy due to the presence of a strain of rodent with a heritable and commensurately reduced sensitivity to the anticoagulant". The mechanism that supports this resistance has been identified as based on mutations in the Vkorc1 gene leading to severe resistance in rats and mice. This study evaluates the validity of this definition in the fossorial water vole and explores the possibility of a non-genetic diet-based resistance in a strict herbivorous rodent species…

## Phytomanagement of Metal(loid)-Contaminated Soils: Options, Efficiency and Value

**Authors:** Moreira H, Pereira SIA, Mench M, Garbisu C et al…

**Source:** FRONTIERS IN ENVIRONMENTAL SCIENCE 9:661423, 2021, DOI 10.3389/fenvs.2021.661423

**Abstract:** The growing loss of soil functionality due to contamination by metal(loid)s, alone or in combination with organic pollutants, is a global environmental issue that entails major risks to ecosystems and human health. Consequently, the management and restructuring of large metal(loid)-polluted areas through sustainable nature-based solutions is currently a priority in research programs and legislation worldwide. Over the last few years, phytomanagement has emerged as a promising phytotechnology, focused on the use of plants and associated microorganisms, together with ad hoc site management practices, for an economically viable and ecologically sustainable recovery of contaminated sites…

## Assessment of heavy metal pollution transfer and human exposure risks from the consumption of chicken grown in mining-surrounding areas

**Authors:** Elkribi-Boukhris S, M'hamdi N, Boughattas I, Helaoui S et al…

**Source:** ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH Early access, 2021, DOI 10.1007/s11356-021-15995-9

**Abstract:** The purpose of this study was to assess heavy metal contamination in soil, plants, earthworms, and chicken in farmlands adjacent to an old mining site and to evaluate the potential

exposure risks to humans through the consumption of chicken. For this purpose, soil, earthworms, plant, chickens, and eggs were sampled from 5 sites following a gradient of contamination. All samples were analyzed for heavy metals (Pb, Cd, Cu, and Zn). A food chain model was used in order to characterize heavy metal transfer between soil-plant-earthworm and chicken organs. Furthermore, target hazard quotient (THQ), estimated daily intake (EDI), and hazard index (HI) were employed to assess human health risks posed by heavy metal contamination…

## Comment on 'Ecotoxicity of copper input and accumulation for soil biodiversity in vineyards' by Karimi et al. (2021)

**Authors:** Imfeld G, Duplay J, Payraudeau S

**Source:** ENVIRONMENTAL CHEMISTRY LETTERS Early access, 2021, DOI 10.1007/s10311-021-01259-y

## Lethal and sublethal effects of diluted bitumen and conventional oil on fathead minnow (Pimephales promelas) larvae exposed during their early development

**Authors:** Berube R, Gauthier C, Bourdin T, Bouffard M et al…

**Source:** AQUATIC TOXICOLOGY 237:105884, 2021, DOI 10.1016/j.aquatox.2021.105884

**Abstract:** The increasing extraction of bitumen from the oil sands region in Canada is creating a need for transport. Spills from current and projected pipelines represent a significant environmental risk, especially for freshwater ecosystems. The toxicity of diluted bitumen (dilbit) on freshwater fish is largely unknown. This study assessed the toxicity of two dilbits (Clearwater McMurray and Bluesky) and compared their toxicity to a conventional oil (Lloydminster Heavy) on fathead minnow (Pimephales promelas) larvae. Larvae were exposed to various concentrations of the water-accommodated fraction (WAF) of the oils during 7 days from hatching…

## Early life neonicotinoid exposure results in proximal benefits and ultimate carryover effects

**Authors:** Zgirski T, Legagneux P, Chastel O, Regimbald L et al…

**Source:** SCIENTIFIC REPORTS 11(1):15252, 2021, DOI 10.1038/s41598-021-93894-2

**Abstract:** Neonicotinoids are insecticides widely used as seed treatments that appear to have multiple negative effects on birds at a diversity of biological scales. Adult birds exposed to a low dose of imidacloprid, one of the most commonly used neonicotinoids, presented reduced fat stores, delayed migration and potentially altered orientation. However, little is known on the effect of imidacloprid on birds growth rate despite studies that have documented disruptive effects of low imidacloprid doses on thyroid gland communication. We performed a 2x2 factorial design experiment in Zebra finches, in which nestling birds were exposed to a very low dose (0.205 mg kg body mass-1) of imidacloprid combined with food restriction during posthatch development…

## One and multi-compartments toxico-kinetic modeling to understand metals' organotropism and fate in *Gammarus fossarum*

**Authors:** Gestin O, Lacoue-Labarthe T, Coquery M, Delorme N et al…

**Source:** ENVIRONMENT INTERNATIONAL 156:106625, 2021, DOI 10.1016/j.envint.2021.106625

**Abstract:** The use of freshwater invertebrates for biomonitoring has been increasing for several decades, but little is known about relations between external exposure concentration of

metals and their biodistribution among different tissues. One and multi-compartments toxicokinetic (TK) models are powerful tools to formalize and predict how a contaminant is bioaccumulated. The aim of this study is to develop modeling approaches to improve knowledge on dynamic of accumulation and fate of Cd and Hg in gammarid's organs. Gammarids were exposed to dissolved metals (11.1 +/- 1.2 mu g.L-1 of Cd or 0.27 +/- 0.13 µg.L-1 of Hg) before a depuration phase…

## Development in the European flounder (*Platichthys flesus*) of a q-PCR assay for the measurement of telomere length, a potential biomarker of pollutant effects for biomonitoring studies

**Authors:** Akcha F, Cahuc C, Rouxel J, Munschy C et al…

**Source:** MARINE POLLUTION BULLETIN 170:112610, 2021, DOI 10.1016/j.marpolbul.2021.112610

**Abstract:** Telomeres protect the coding sequence of chromosome ends and Telomere Length (TL) has been proposed as a biomarker of cellular aging, cumulative stress exposure and life-span in humans. With the aim to propose new biomarkers, a q-PCR protocol was adapted for the measurement of TL in the European flounder Platichthys flesus. The protocol was then applied in 2-year-old flounders from the Seine Estuary…

## *In vitro* study to evaluate the antimicrobial activity of various multifunctional cosmetic ingredients and chlorphenesin on bacterial species at risk in the cosmetic industry

**Authors:** Youenou B, Chauviat A, Ngari C, Poulet V et al…

**Source:** JOURNAL OF APPLIED MICROBIOLOGY Early Access, 2021, DOI 10.1111/jam.15245

**Abstract:** Aims We evaluated the activity of the preservative chlorphenesin and of four antimicrobial cosmetic multifunctional ingredients against various strains of gram-negative and gram-positive human opportunistic pathogens. Methods and Results Growth kinetics, modelling growth parameters and statistical analyses enabled comparing bacterial behaviour in the presence and in the absence of the compound. Whatever compound tested (i.e. chlorphenesin, phenylpropanol, hexanediol, ethylhexylglycerin, hydroxyacetophenone) and strain origin (i.e. clinical versus industrial), the growth of 42 strains belonging to Acinetobacter spp., *Burkholderia cepacia* complex and *Stenotrophomonas maltophilia*, was totally inhibited…

## Profiling metal contamination from ultramafic sediments to biota along the Albanian shoreline of Lake Ohrid (Albania/Macedonia)

**Authors:** Minguez L, Gross EM, Vignati DAL, Freire AR et al…

**Source:** JOURNAL OF ENVIRONMENTAL MANAGEMENT 291:112726, 2021, DOI 10.1016/j.jenvman.2021.112726

**Abstract:** Ultramafic sediments exhibit high levels of geogenically-derived and potentially toxic metals, with Ni, Cr and Co often exceeding benchmark values. As yet, a holistic understanding of the bioavailability, mobility, potential ecotoxicity and trophic transfer of trace elements in both benthic and pelagic food chains in aquatic ultramafic environments (UME) is lacking. We investigated potential environmental health issues due to metal contamination by jointly implementing chemical, ecological and toxicological tools, along the Albanian shoreline of Lake Ohrid. It is an aquatic system of worldwide importance, representative of temperate UME with a legacy of Ni and Cr contamination from mining activities. Levels of Ni, Cr, Cd, Cu, Co, Fe, Mn and Zn were determined in waters, sediments and native biota…

https://doi.org/10.15454/bwf7-8m60



## Subcellular Distribution of Dietary Methyl-Mercury in *Gammarus fossarum* and Its Impact on the Amphipod Proteome

**Authors:** Cosio C, Degli-Esposti D, Almunia C, Gaillet V, Sartelet H et al…

**Source:** ENVIRONMENTAL SCIENCE & TECHNOLOGY 55(15):10514-10523, 2021, DOI 10.1021/acs.est.1c02385

**Abstract:** The transfer of methyl-Hg (MeHg) from food is central for its effects in aquatic animals, but we still lack knowledge concerning its impact on invertebrate primary consumers. In aquatic environments, cell walls of plants are particularly recalcitrant to degradation and as such remain available as a food source for long periods. Here, the impact at the proteomic level of dietary MeHg in Gammarus fossarum was established and linked to subcellular distribution of Hg. Individuals of G. fossarum were fed with MeHg in cell wall or intracellular compartments of Elodea nuttallii…

# OUVRAGES / RAPPORTS / ACTES DE CONGRES

## Polluants chimiques dans les milieux aquatiques : l'Ineris et l'OFB publient les résultats de la surveillance de nouvelles substances à l'échelle nationale

**INERIS 21/10/21**

L'Ineris, en collaboration avec l'Office français de la biodiversité (OFB), publie les résultats de deux exercices de surveillance prospective nationale de contaminants chimiques dans l'eau, réalisés avec le concours des agences de l'eau. Ces exercices concernent des substances surveillées réglementairement et des substances d'intérêt émergent. [...]

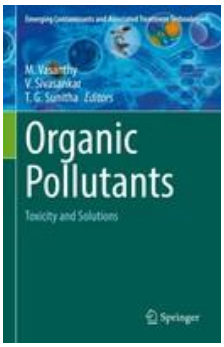
Rapports :

https://www.ineris.fr/fr/substances-pertinentes-surveiller-spas

https://www.ineris.fr/fr/campagne-emergents-nationaux-2018-emnat-2018-resultats-recherche-contaminants-emergents-eaux

Accès au document

## Organic Pollutants: Toxicity and Solutions

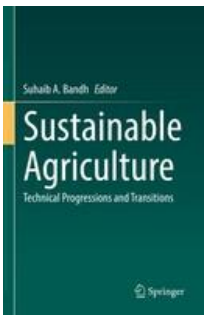



**Springer:** This volume describes the identification of emerging organic pollutants, mainly from industrial sources, their associated toxicological threats, and the latest green methods and biotechnological solutions to abate harmful impacts on people and the environment. The chapters present reviews on current applied toxicology research, occupational health hazards and green remedial solutions for pollution control in terrestrial and aquatic environments, with the aim of raising public awareness of these issues and providing chemists, toxicologists and environmental scientists with the knowledge to combat organic pollutants through sustainable means. [...]

https://doi.org/10.1007/978-3-030-72441-2

Accès au document

## Sustainable Agriculture




**Springer:** This book discusses a number of recent technological and methodological progressions in achieving sustainable agriculture. [...] The key topics addressed include the increasing role of biofertilizers in sustainable agriculture, green synthesized nanoparticles for higher crop production rates, eco-friendly plant-based pesticides as alternatives to synthetic/chemical pesticides, use of genomics for improved plant breeding practices, and the use of biochar to increase the water-holding capacity in soil. The book concludes with an overview of satellite-based soil erosion practices to monitor and control the harmful impacts of land degradation, and a discussion of long-term strategies to reduce crop losses due to pest and insecticide damage.

https://doi.org/10.1007/978-3-030-83066-3

Accès au document

## Étude d'exposition aux pesticides chez les riverains de zones viticoles et non viticoles. Bilan de l'étude pilote


**Santé publique France 18/10/21**

Santé publique France et l'Anses réalisent l'étude PestiRiv qui a pour principal objectif de savoir s'il existe une différence entre l'exposition aux pesticides des personnes vivant près de vignes et de celles vivant loin de toute culture.

Accès au document

## Pharmaceuticals and endocrine disruptors - transfer from water to land ecosystems

**EC Science for environment policy 14/10/21**

[…] New research provides direct evidence of their [Pharmaceuticals and endocrine disruptors] transfer from aquatic to terrestrial ecosystems via the consumption of aquatic insects by terrestrial predators such as spiders, birds and bats. This exposure may have negative impacts on the physiology and population dynamics of predators, suggesting a need for improved risk-assessment guidelines and practices. [...]

Previsïc, A., Vilenica, M., Vuckovic, N., Petrovic, M. and Rozman, M. (2021) Aquatic Insects Transfer Pharmaceuticals and Endocrine Disruptors from Aquatic to Terrestrial Ecosystems. Environmental Science & Technology, 55: 3736−3746.

https://dx.doi.org/10.1021/acs.est.0c07609?ref=pdf

Accès au document

## Une BD pour informer sur les perturbateurs endocriniens

**Notre-environnement.gouv 06/10/21**

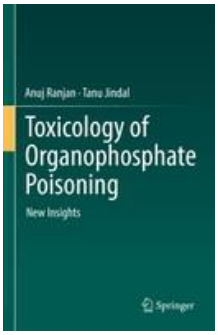
L'Inrae (Institut national de recherche pour l'agriculture, l'alimentation et l'environnement) publie une bande dessinée, dans le cadre du programme de recherche INDICA, pour alerter le grand public sur les dangers des perturbateurs endocriniens. [...]

Au travers d'interviews d'un agriculteur, d'un médecin et d'un chercheur, les jeunes reporters nous font découvrir les actions menées pour mieux comprendre les perturbateurs endocriniens et relaient des conseils pratiques pour limiter notre exposition à ces produits. [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

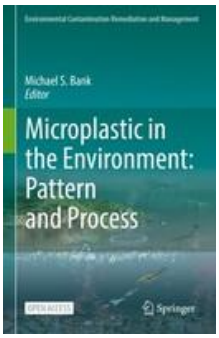
## Toxicology of Organophosphate Poisoning




**Springer:** This book addresses the consequences of high agricultural pesticide use over the last few decades in the form of organophosphate poisoning. The authors provide a background overview of organophosphate compounds, their environmental toxicity, non-target exposures and cases of human poisoning. The authors also compile and analyze data from the last two decades to demonstrate the toxicological aspects of organophosphates, and how they can pose a threat to human health. Readers will learn about the clinical manifestation of organophosphate exposure in humans, as well as the enzymatic pathways and mechanisms by which organophosphates are processed in the body and cause harm. The book concludes by providing techniques, practices and recommendations for how to manage organophosphate exposure and poisoning. [...]

Accès au document

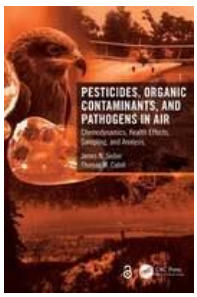
## Microplastic in the Environment: Pattern and Process




**Springer:** This open access book examines global plastic pollution, an issue that has become a critical societal challenge with implications for environmental and public health. This volume provides a comprehensive, holistic analysis on the plastic cycle and its subsequent effects on biota, food security, and human exposure. Importantly, global environmental change and its associated, systems-level processes, including atmospheric deposition, ecosystem complexity, UV exposure, wind patterns, water stratification, ocean circulation, etc., are all important direct and indirect factors governing the fate, transport and biotic and abiotic processing of plastic particles across ecosystem types. [...]

Accès au document

## Pesticides, Organic Contaminants, and Pathogens in Air: Chemodynamics, Health Effects, Sampling, and Analysis




1st Edition, CRC Press,

Published October 8, 2021, 260 p., 73 B/W Illustrations, ISBN 9780367485672

**CRC Press 08/10/21**

- Assesses exposures of people and wildlife to airborne chemicals

- Includes case study applications, with relevant data summarized for pesticides and contaminants in air

- Discusses approaches to modeling pesticides' and contaminants' dispersion and fate in air

- Includes an assessment of the physicochemical properties of pesticides and contaminants that influence sampling and atmospheric mobility and fate

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Projet #MacroPLAST

**GIP Seine-Aval 24/09/21**

Le projet MacroPLAST porte sur l'estimation des flux de macrodéchets, issus du bassin de la Seine et rejetés à la mer. L'étude s'est focalisée sur les macrodéchets plastiques aussi appelés « macroplastiques », du fait de la forte proportion de plastique parmi les macrodéchets. Cette étude, qui s'est déroulée d'octobre 2017 à septembre 2019, a été commandée par le Ministère de la Transition Ecologique et Solidaire (MTES) et s'inscrit dans le cadre de la mise en oeuvre de la Directive Cadre de Surveillance du Milieu Marin. [...]

Télécharger le rapport et les annexes

Tramoy R., Gasperi J., Tassin B., Rognrard F., 2019. Projet MACROPLAST : Estimation des flux de macrodéchets sur le bassin de la Seine. Projet financé par le Ministère de la Transition Ecologique et Solidaire, 96p.

Accès au document

## Regulatory Governance in the Pesticide Sector in Mexico


**OECD ILibrary 24/09/21**

[…] This report identifies the gaps, barriers, implementation flaws and inefficiencies that affect the regulatory framework of pesticides in Mexico. It takes stock of the regulatory framework and recent reforms, and identifies both the areas that pose the greatest challenge for the effective regulation of pesticides and those where regulation – or lack of it – in pesticides most affects policy objectives and economic activity. These challenges and practices are assessed in view of OECD principles and country experiences, and recommendations are provided to support better regulation efforts. The report finds that Mexico would benefit from adopting a comprehensive, mutually-agreed policy strategy for pesticides, recognising that pesticide management is a shared responsibility across national and local governments, the pesticide industry, pesticide users, as well as the general public.

Accès au document

## New Frontiers in Environmental Toxicology


**Springer 24/09/21**

- Discusses toxic pollutants in the environment and their harmful effects on human health and nature

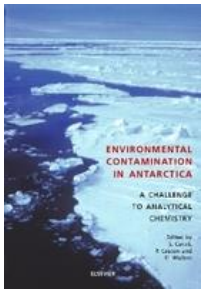
- Covers features, applications, dispersion routes, nanotoxicity, ecotoxicity and genotoxicity of nanomaterials

- Explores the role of nanoparticles in environmental toxicology

DOI https://doi.org/10.1007/978-3-030-72173-2

Accès au document

## Environmental Contamination in Antarctica - 1st Edition: a challenge to anlytical chemistry




Edited by S. Caroli P. Cescon D.W.H. Walton

Elsevier Science, 19th July 2001, 420 p., **ISBN:**9780080531076

**Elsevier 24/09/21**

https://doi.org/10.15454/bwf7-8m60


This thought-provoking and ambitious volume surveys the causes and extent of environmental contamination in Antarctica, and looks critically at future prospects. It highlights the key role that modern techniques of analytical chemistry play in achieving reliable empirical data in this field and their impact on shaping legal provisions.

[...] Empirical studies and regulatory issues are evaluated in context with the goal of providing a model approach to more polluted areas of the world.

Accès au document

## A chemical category-based approach for selecting and screening pfas for toxicity and toxicokinetic testing (presentation)

**EPA 23/09/21**

This product will report the insights gained from the data generated, as well as from the literature in a manner that more directly supports screening, prioritization and risk assessment. ORD is producing a large data set of PFAS chemicals using a variety of New Approach Methodologies (NAMs) in support of EPA mission to manage and regulate per and polyfluorinated substances (PFAS). This work will provide additional context to complement the data being surfaced in PFAS Dashboard Project 8.1 that can be used by Program Offices in meeting their statutory goals. Further, making the information available in the public domain provides for use by a broader constituency and affords transparency of EPA research.

https://doi.org/10.23645/epacomptox.16619758

Accès au document

## La santé-environnement : recherche, expertise et décision publiques

**Ministère de l'Agriculture 20/09/21**

Selon l'OMS, près du quart des décès et des pathologies chroniques dans le monde peuvent être imputés à des facteurs environnementaux. Ce rapport inter-inspections formule plusieurs recommandations pour renforcer la prise en compte des facteurs environnementaux sur la santé et la confiance en matière de santé-environnement, en agissant sur la recherche, l'expertise et la décision publiques aux niveaux français et européen.

Accès au document

## Drivers of and pressures arising from selected key water management challenges: a European overview

**European Environment Agency 23/09/21**

The EEA Report No 9/2021 aims to give a European overview of the main drivers and pressures that are at the core of key water management challenges and which put European water bodies most at risk of not achieving key environmental objectives. Identifying the pressures from and drivers of key water management challenges at the European level can help in prioritising the main issues that should be tackled with measures.

Accès au document

# REVUE DE PRESSE / ALTERNATIVES / BIOPESTICIDES

## Proliant : première solution de biocontrôle pour un démarrage sécurisé du maïs

**Terre-Net 18/10/21**

La solution de biocontrôle Proliant vient de recevoir une AMM pour usage sur maïs, « afin d'aider la culture à gagner en vigueur et mieux supporter les stress abiotiques, et ce, dès les stades précoces », présente Philagro.

« Issue de la recherche Valent Biosciences Corporation, filiale de Sumitomo Chemical, actionnaire majoritaire de Philagro, Proliant permet un bon démarrage du maïs, même en

https://doi.org/10.15454/bwf7-8m60

conditions limitantes de sol, ou en cas de stress climatique, notamment durant les épisodes de sécheresse désormais récurrents dans l'Hexagone. » [...]

Accès au document

## Essais encourageants pour un futur produit de biocontrôle en céréales

**Cultivar 27/08/21**

Déjà bien éprouvé sur le marché des cultures spécialisées. Le secteur du bicontrôle ne cache pas ses ambitions : il représente déjà 11 % du CA total du marché de ...

Accès au document

# REVUE DE PRESSE / ASSOCIATIONS

## NGO group opposes the renewal of two endocrine disrupting pesticides at the PAFF meeting on 21-22 October !

PAN 1510/21

On 21 and 22 October, the national representatives of the PAFF committee are invited to vote on the renewal of two active substances with well-known disruptive properties (Cypermethrin) or highly suspected (Flumioxazin).

Salome Roynel, campaigner at PAN Europe said, "These two substances clearly do not meet the approval criteria to remain on the European market. With these two proposals, DG SANTE is flouting both its legal and political commitments." [...]

Accès au document

## Women in agricultural work at increased risk for skin and blood cancers from pesticide exposure

**Beyond Pesticides, October 21, 2021**

A study published in Environment International finds higher rates of various cancers among agricultural workers, with multiple myeloma (blood cancer) and melanoma (skin cancer) disproportionately impacting female farmers. Although research studies link cancer risk to genetic and external factors (e.g., cigarette smoke), there is increasing evidence that pesticide exposure augments the risk of developing common cancers like melanoma and less common cancers like multiple myeloma. [...]

Accès au document

## EPA to Create Advisory Councils to Restore Scientific Integrity in Pesticide/Chemicals Division

**Beyond Pesticides, October 20, 2021**

The U.S. Environmental Protection Agency (EPA) announced last week plans to establish a new position and two advisory councils in order to enhance scientific integrity within the agency's Office of Chemical Safety and Pollution Prevention (OCSPP). The move is being widely seen as a response to recent reporting over how EPA has allowed the chemical industry to distort and unduly influence its process for reviewing and approving toxic pesticides and other chemicals. [...]

Accès au document

## Common insecticide malathion linked to chronic kidney disease

**Beyond Pesticides, October 19, 2021**

Exposure to the insecticide malathion increases risk of developing chronic kidney disease (CKD),

https://doi.org/10.15454/bwf7-8m60


according to a study recently published in the International Journal of Environmental Research and Public Health. According to study co-author Nicholas Osborne, PhD, CKD is on the rise in developing countries in Southeast Asia and Central America, and, "[n]early one in 10 people in high income countries show signs of CKD, which is permanent kidney damage and loss of renal function." Although CKD risk increases with age, and is associated with other health factors like smoking, heart disease, and diabetes, cases without clear cause are increasingly common, indicating the that environmental factors are likely playing a role. [...]

Accès au document

## Générations Futures fantasme sur des études « manquantes »

Agriculture et Environnement 18/10/21

Sitôt l'étude des agences sanitaires de France, des Pays-Bas, de Suède et de Hongrie concernant le glyphosate rendue publique, Générations Futures tente une ridicule mise en cause, estimant que ces agences n'auraient pas pris en considération toutes les bonnes études. [...]

Accès au document

## Climate pollution from plastics to outpace coal emissions in US by 2030, report finds

**EHN 22/10/21**

With dozens of new plastics manufacturing and recycling facilities in the works, the U.S. plastics industry will release more greenhouse gas emissions than coal-fired power plants by 2030, say the authors of a new report. [...]

Accès au document

## Exposed: How big farm lobbies undermine EU's green agriculture plan

**DW 20/10/21**

Farmers and lobby groups are split on an EU agricultural reform that may increase farmers' incomes and consumers' prices. A DW joint report reveals a rift between farmers and the groups purporting to represent them. [...]

Accès au document

## Pacte Vert et Farm to fork La stratégie de l'UE, une trajectoire « réaliste » pour l'agriculture (Iddri)

**Terre-Net 20/10/21**

Menée par le Centre commun de recherche de la Commission européenne, l'étude d'impact de la stratégie européenne Farm to Fork, conclut à des baisses de production allant jusqu'à 15 %, une augmentation des importations et un renchérissement des coûts de l'alimentation. Cependant, pour l'Iddri, […] une approche plus systémique « permet au contraire de renforcer la pertinence, la cohérence et le réalisme de la stratégie de la Commission ». [...]

Accès au document

## L'Europe défend sa stratégie De la ferme à la fourchette

**Agri-Mutuel 19/10/21**

Bruxelles défend farouchement sa stratégie pour la sécurité alimentaire qui vise notamment à sabrer l'usage des pesticides, face à l'hostilité de la puissante organisation agricole Copa-Cogeca, qui craint, comme Paris, un effondrement des rendements.

La stratégie « De la ferme à la fourchette », dévoilée en mai 2020 par la Commission européenne, devrait être validée mardi 19 octobre dans ses grandes lignes par les eurodéputés à Strasbourg.

Avec plusieurs objectifs à échéance 2030 : réduire de moitié l'usage de pesticides [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

## In utero exposure to a mixture of the perfluoroalkyl pesticide pyrifluquinazon and dibutyl phthalate disrupt male rat reproductive development in a dose additive manner.

**EPA 21/10/21**

Abstract for a Oct FLUOROS Global 2021 Meeting on PFAS to be held at the University of Rhode Island. I presented a poster virtually. We have in vivo/in utero dose effect data on the in utero effects of mixing perfluoro isopropyl pesticide with a phthalate on male reproductive development.

Gray, E. In utero exposure to a mixture of the perfluoroalkyl pesticide pyrifluquinazon and dibutyl phthalate disrupt male rat reproductive development in a dose additive manner. FLUROS Global 2021-Virtual, Providence, Rhode Island, October 03 - 08, 2021.

Accès au document

## Labels alimentaires et signes de qualité : promesses non tenues, une révision s'impose !

**Greenpeace 28/09/21**

Les signes de qualité, labels et démarches alimentaires sont censés donner aux consommateurs des garanties en termes d'origine des produits, de préservation de l'environnement ou des terroirs, et devraient également être exemplaires au regard des critères de consommation responsable. Néanmoins, deux analyses publiées aujourd'hui et produites par Greenpeace France, le WWF France et le BASIC d'une part et l'UFC-Que Choisir d'autre part montrent de grands écarts entre les promesses et la réalité. [...]

Consultez l'étude Greenpeace / WWF France
Accès au document

## Bt cotton area contraction drives regional pest resurgence, crop loss and pesticide use

**Wiley online Library 06/10/21**

Genetically-modified crops expressing Bacillus thuringiensis (Bt) proteins have been widely cultivated, permitting an effective non-chemical control of major agricultural pests. While their establishment can enable an area-wide suppression of polyphagous herbivores, no information is available on the impact of Bt crop abandonment in entire landscape matrices. Here we detail a resurgence of the cosmopolitan bollworm *Helicoverpa armigera* following a contraction of Bt cotton area in dynamic agro-landscapes over 2007-2019 in North China Plain. [...]

Accès au lien

## Glyphosate : 41 ONG demandent à la Commission européenne de mettre fin à l'utilisation d'études industrielles non fiables

**Générations futures 13/10/21**

41 organisations de la société civile, dont plusieurs des organisateurs de l'initiative citoyenne européenne réussie #StopGlyphosate, exhortent la commissaire européenne à la santé, Stella Kyriakides, à garantir que l'évaluation en cours du glyphosate repose sur des preuves scientifiques indépendantes actualisées et reste exempte d'intérêts particuliers [1] [2]. [...]

Article similaire de HEAL En finir avec le glyphosate en Europe… enfin ! [Pétition de GF] 14/10/21

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Weeds are now developing resistance to herbicides they've never been exposed to

**Beyond Pesticides, October 13, 2021**

Pesticide use in conventional chemical-intensive farming is so pervasive that weeds are developing resistance to herbicides they have never encountered before. According to research published in Plant and Cell Physiology and New Phytologist, the notoriously difficult-to-control weed waterhemp (Amaranthus tuberculatus) is outpacing commercial crops in its ability to detoxify after herbicide exposure. [...]

Accès au document

## Ag Secretary Vilsack pushes petroleum farming inputs, fights EU's climate-friendly organic "Food to Fork' Initiative

**Beyond Pesticides, October 8, 2021**

Taking a page from the playbook of Trump Administration Secretary of Agriculture Sonny Perdue, the current secretary, Tom Vilsack, used a September G20 summit in Italy to target the European Union's "Farm to Fork" (F2F) strategy, a part of its European Green Deal. Mr. Perdue had said that F2F is "more . . . 'political science' than demonstrated agricultural science"; Secretary Vilsack called it "a path very different from the one the U.S. is pursuing." The F2F initiative aims to transition the EU to a sustainable food system such that it also achieves significant mitigation of climate change. But Mr. Vilsack chose to counter the F2F efforts by promoting an "alternative strategy" — under the moniker "Coalition for Productivity Growth" — through which "other nations pledge not to follow the European path on farm policy." He has described this alternative, U.S.-led strategy as "a market-oriented, incentive-based, voluntary system [that] is effective" at slashing agricultural carbon emissions. [...]

Accès au document

## La « faim » serait-elle au bout de la Farm-to-Fork ?

**Générations futures 11/10/21**

C'est la question qu'on pourrait être amenés à se poser si on prenait au mot une étude financée par … l'agro-industrie !

Cette «croyance » pourrait être renforcée […] à la lecture d'articles alarmistes de certains médias libéraux droitiers comme Valeurs actuelles, l'Opinion… qui n'ont pas hésité à diffuser […] une soi-disant « étude d'impacts » qui montrerait que l'application de la réforme Farm-To-Fork (F2F) aurait des « conséquences désastreuses », conséquences soi-disant « cachées » par la Commission européenne qui seraient «[…] la chute conséquente des volumes de nourriture, mettant ainsi l'Europe dans une situation de dépendance alimentaire ». Tremblez braves gens… voici le retour de la famine ! [...]

Accès au document

## Il est temps de moderniser les données européennes sur les pesticides

**Générations futures 08/10/21**

Générations Futures et 20 organisations environnementales et de santé à travers l'Europe ainsi que l'organisation européenne IFOAM Europe, demandent aux représentants des états membres (au sein du comité agriculture) de rejeter certaines propositions faites par la Commission au sujet des statistiques portant sur les pesticides et autres produits chimiques utilisés en agriculture. [...]

Accès au document

## Mesdames et messieurs les représentants des Etats membres, votez contre la ré-autorisation de l'herbicide Flumioxazine

**Générations futures 08/10/21**

https://doi.org/10.15454/bwf7-8m60

Le flumioxazine est un herbicide approuvé depuis 2003 Directive 91/414/CEE, autorisé dans les produits « phytosanitaires » dans 14 États membres. Son autorisation arrive à expiration en juin 2022 après avoir bénéficié de 7 dérogations (conduisant à une prolongation de son autorisation de 9 ans !).

Pourtant cette substance n'est pas sans danger, ni pour la santé humaine ni pour l'environnement ! [...]

Accès au document

## Water contamination with pesticides goes unmonitored as problem escalates

**Beyond Pesticides, October 7, 2021**

The state Arizona State Auditor General reports a lack of groundwater monitoring for pesticides and other contaminants by the Arizona Department of Environmental Quality (ADEQ). For over six years, the agency failed to monitor groundwater and soil for agricultural pesticide contamination. Furthermore, the agency did not implement key groundwater monitoring processes over four years, despite law requirements. This lack of waterway monitoring resulted in an increased number of impaired surface waters across the state. [...]

Accès au document

## Monoculture agriculture leads to poor soil health

Beyond Pesticides, October 6, 2021

Agricultural soils under monoculture cropping systems are not as healthy as soils with diverse plantings, finds research recently published in the journal Agrosystems, Geosciences and Environment. Soil and soil quality are declining rapidly in the United States and around the world, with recent data indicating that the U.S. Corn Belt has lost 35% of its topsoil. Advocates say it is critical that the response to this problem focus on practices that conserve and improve the soil health by building organic matter and healthy microbial populations. "Understanding the management practices that lead to healthier soils will allow farmers to grow the same crops while reducing costly chemical inputs (fertilizers, pesticides, herbicides) and protecting the environment," said study coauthor Lori Phillips, PhD. [...]

Accès au document

## Nouveau bras de fer entre l'interprofession et une association anti-phytos

**Agri-mutuel 13/10/21**

Une association anti-phytos condamnée en février pour avoir « dénigré » des vins de Bordeaux a défendu mercredi devant la justice son « droit » à faire appel, auquel s'oppose l'interprofession au motif qu'elle n'a pas payé les dommages et continue ses critiques « illicites ».

« Cette nouvelle procédure est une tentative pour me faire taire à tout jamais, c'est une intimidation », a affirmé Valérie Murat, la porte-parole de l'association Alerte aux toxiques devant le palais de justice de Bordeaux où la question de son appel sera tranchée le 10 novembre. [...]

Accès au document

## « France 2030 » Macron annonce 2 Mds d'€ dans des innovations de « rupture », dont la robotique

**Terre-Net 12/10/21**

Emmanuel Macron a annoncé mardi 2 milliards d'euros d'investissements dans des innovations de « rupture » dans l'agriculture, en particulier dans la robotique, sur les 30 milliards du plan « France 2030 ».

La France doit entrer dans une « nouvelle révolution de l'alimentation saine, durable et traçable » à cet horizon et, pour cela, « investir dans trois révolutions qui vont en quelque sorte être la suite de la révolution mécanique et de la révolution chimique qu'on a connues : le numérique, la robotique, la génétique », a-t-il décrit devant quelque 200 chefs d'entreprises et d'étudiants à l'Elysée.

Ces investissements doivent permettre de « décarboner la production » agricole, « sortir de

certains pesticides », « améliorer la productivité » et le « traçage des aliments » et développer « des productions plus résilientes et plus solides dans les bio-solutions », a-t-il détaillé. [...]

Accès au document

## Health risks posed by the use of mercury

**The Citizen 11/10/21**

Artisanal and Small-Gold Miners (ASGM) in Tanzania continue to use mercury without using protective gear, despite the health hazards posed by the toxic substance. Over 30 percent of small gold miners have been badly affected by mercury. [...]

Accès au document

## Higher estimated pesticide exposures linked to ALS risk

**EHN 08/10/21**

Every year, approximately 5,000 people in the U.S. are diagnosed with amyotrophic lateral sclerosis (ALS), or Lou Gehrig's disease.

The malady extinguishes firing nerve cells, severing the highways between our brain and muscles. People progressively lose their ability to walk, talk, […] within two to five years. No one knows the causes, no one knows the cure.

But a study published in September in the journal Neurotoxicology sheds light on a potential contributor to the disease: pesticide exposure. By synthesizing available national data on ALS patients and pesticide uses, researchers found new supporting evidence that potential neurotoxic pesticide exposures could be risk factors for ALS. [...]

Accès au document

## Study adds to 40 year analysis linking brain cancer to pesticide exposure

**Beyond Pesticides, September 23, 2021**

A study by Claremont Graduate University finds exposure to agricultural pesticides increases brain cancer risk up to 20 percent. This study expands on a 1998 study evaluating brain cancer risk among the farm population using epidemiologic studies. [...]

Accès au document

## La santé-environnement : un sujet au cœur d'un nouveau rapport tout à fait passionnant des inspections générales !

**Générations futures 22/09/21**

Générations Futures appelle les ministères concernés à suivre les recommandations formulées dans ce document et ne pas laisser ce dernier au fin fond d'un tiroir comme cela fut trop souvent le cas par le passé (cf. les précédents rapports des inspections sur les pesticides ou les perturbateurs endocriniens).

A la demande de 5 ministères (écologie, santé, économie, enseignement supérieur et agriculture), un rapport intitulé « La santé-environnement : recherche, expertise et décision publiques », rédigé par les inspections générales (CGEDD, IGAS, IGF, IGESR, et CGAAER) vient d'être rendu public (rapport daté de décembre 2020). [...]

Accès au document

## Glyphosate : de nombreuses études scientifiques manquantes dans le dossier d'évaluation

**Générations futures 21/09/21**

Demande de ré-homologation du glyphosate en Europe : le dossier de l'industrie ignore plus de la moitié des études universitaires publiées les 10 dernières années précédant sa demande !

Alors que seront lancées ce 24 septembre des consultations publiques sur le dossier du glyphosate, Générations Futures dénonce un système qui permet à l'industrie de retirer une

majorité d'études scientifiques indépendantes du dossier qui sera évalué ! [...]

Lire le dossier complet: Ré-homologation du glyphosate: les études universitaires largement ignorées!

Accès au document

## ONG : Encore une action en justice opportuniste contre l'État

**Alerte-Environnement 20/09/21**

À l'occasion du Congrès de l'Union internationale pour la conservation de la nature (UICN) qui se tient à Marseille, les association Notre Affaire à Tous et Pollinis tentent de faire le buzz en lançant « la première étape d'une action en justice sans précédent contre l'État français » pour « manquement à ses obligations de protection de la biodiversité ». Les deux associations visent notamment « les défaillances notoires du processus d'autorisation et de mise sur le marché des pesticides, cause majeure du déclin massif de la biodiversité ». Tant pis si l'utilisation des phytos est en baisse depuis 20 ans : [...]

Accès au document

## Persistent organic pollutants, including banned pesticides, remain present in all fetal organs regardless of maternal chemical contamination

**Beyond Pesticides, September 16, 2021**

A study published in Chemosphere finds persistent organic pollutants (POPs), including organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), and polybrominated diphenyl ethers (PBDEs), are present in the serum and placenta of pregnant mothers, as well as multiple fetal organs. Many studies indicate prenatal and early-life exposure to environmental toxicants increases susceptibility to diseases, from learning and developmental disabilities to cancer. However, this study is one of the first to demonstrate the presence of chemical toxicants in fetal tissue that are not present in maternal serum or placental samples. [...]

Accès au document

## « Dénigrement des vins de Bordeaux » Appel à mobilisation

**Générations futures 15/09/21**

A la suite de la publication, le 15 septembre 2020, des résultats d'analyses de 22 vins labelisés HVE, l'association Alerte Aux Toxiques et sa Porte-parole, Valérie Murat, avaient solidairement été condamnées à 125 000 euros d'amende au profit du CIVB et 25 acteurs de la filière par le tribunal de Libourne. Cette condamnation inédite est la plus lourde d'Europe selon le classement établi par l'ONG the-Case.eu qui répertorie les procès bâillons. [...]

Accès au document

## Studies show how pesticides harm organisms that form the foundation of freshwater ecosystems

**Beyond Pesticides, September 15, 2021**

Toxic pesticide use, and glyphosate in particular, degrades the health of freshwater ecosystems by harming species that form the basis of aquatic food chains, according to research published by scientists at McGill University. In a series of studies, scientists investigated how freshwater bacteria and zooplankton were affected by varying levels the weed killer glyphosate, the neonicotinoid insecticide imidacloprid, and nutrient levels. [...] "Our research shows that the structure of these [plankton] communities can be impaired under currently acceptable North American water quality guidelines." [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Produits alimentaires : pour un affichage de leur impact environnemental

**FNE, 13/09/21**

Engagée dès 2009 dans le cadre du Grenelle de l'environnement, la réflexion autour d'un affichage environnemental clair et fiable sur les produits alimentaires met du temps à aboutir. [...] un tel indicateur est toutefois particulièrement difficile à mettre en œuvre tant les paramètres à prendre en compte sont nombreux et complexes à évaluer.

A la fin de l'année, un rapport d'évaluation des différentes modalités d'affichage, s'appuyant sur un bilan des travaux de groupes thématiques et de vingt projets expérimentaux, sera remis au Parlement. Il devrait répondre à la question suivante : « Selon quelles modalités est-il possible de fournir au consommateur une information environnementale lisible, fiable et objective, afin de lui permettre d'orienter ses choix vers une consommation alimentaire plus respectueuse de l'environnement ? ».

Quels sont les enjeux liés à l'information environnementale des produits alimentaires ? Pourquoi est-elle si complexe à définir ? Quels sont les critères à prendre en compte ? France Nature Environnement fait le point. [...]

Accès au document

## Lettre ouverte : pour une réorientation du Plan National de la PAC

**FNE 10/09/21** (info relayée par Générations futures)

A l'occasion d'un déplacement d'Emmanuel Macron à la 7e édition des rencontres Terres de Jim organisée par les Jeunes Agriculteurs, 28 organisations paysannes, de protection de l'environnement, de solidarité et de consommateurs ont adressé ce jour un courrier au Président de la République lui demandant de traduire en action la promesse faite vendredi dernier lors du congrès mondial de l'UICN. [...]

Accès au document

## More scientific evidence that endocrine-disrupting pesticides disrupt thyroid function

**Beyond Pesticides, September 10, 2021**

Research conducted in Thailand shows that exposures to pesticides, even at low levels, can impact the human endocrine system and distort thyroid function. The study looked specifically at interactions of genetics and environment: it investigated associations between variations in genes involved in pesticide metabolism and altered thyroid hormone concentrations in agricultural workers. This research underscores some of the complexity and difficulty of determining human vulnerability to impacts of pesticide exposures, given genetic variables. [...]

Accès au document

## Endocrine (Hormone) Disrupting Chemicals, Including Pesticides, Also Effect the Nervous System

Beyond Pesticides, September 9, 2021

A new study published in Toxicology Reports finds the same chemicals that disrupt the endocrine (hormone) system also disrupt the nervous system. Endocrine disruptors are xenobiotics (i.e., chemical substances like toxic pesticides foreign to an organism or ecosystem) present in nearly all organisms and ecosystems. The World Health Organization (WHO), European Union (EU), and endocrine disruptor expert (deceased) Theo Colborn, Ph.D., classify over 55 to 177 chemical compounds as endocrine disruptors, including various household products like detergents, disinfectants, plastics, and pesticides. [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Endangered Species Likely To Be Hard Hit by Neonicotinoid Insecticides, EPA Finds

**Beyond Pesticides, September 8, 2021**

The U.S. Environmental Protection Agency (EPA) last month released a long-overdue biological evaluation of the three most commonly used neonicotinoid (neonic) insecticides, finding that the chemicals are likely to adversely affect the lion's share of endangered species and their habitat. While the public may be most familiar with the damage neonics cause to pollinator populations, EPA's evaluation highlights the widespread, indiscriminate harm scientists throughout the world have been sounding the alarm about for years. Advocates say the findings make it clear that neonicotinoids must be immediately banned from use. [...]

Accès au document

# REVUE DE PRESSE / RECHERCHE ET MEDIAS

## Nanoplastics found in the Alps were transported by air from Frankfurt, Paris and London

**Phys.org 01/11/21**

A team of researchers have found nanoplastics at the pristine high-altitude Sonnblick Observatory in the Alps. This is the first time that nanoplastics have been found in this area. The researchers were originally looking for certain organic particles, but found nanoplastics by chance, discovering a new analysis method for detecting nanoplastics in the process. The research is published today in Environmental Pollution. [...]

Accès au document

## Upper ocean layer contains 24 trillion pieces of microplastics

**Earth.com 1/11/21**

[...] While studies to measure and monitor the presence of microplastics in regions of the world's oceans have been conducted for the past 50 years, they have made use of disparate methods of collection and analysis [...]. Large data sets to help follow the trends in microplastic pollution have thus not been available to researchers in general.

This is what prompted a global team of oceanographers, led by researchers from Kyushu University, to review the data from previous published and unpublished expeditions to sample microplastics in the oceans. They calibrated and processed these data in order to build a publicly available dataset [...]

The research is published in the journal Microplastics and Nanoplastics.

Accès au document

## Foetuses can be affected by microplastics, scientists find

**Euronews 27/10/21**

Microplastics could be harming unborn babies, concerning new research has found.

Large polystyrene particles - around the size of a cloud or fog droplet at 10 micrometres - can make their way into the placenta, according to scientists at Utrecht University.

Presenting her research at the Plastic Health Summit in Amsterdam last week, lead scientist Hanna Dusza said more work is urgently needed to determine what effect the tiny pieces of plastic are having on foetal health. [...]

Accès au document

## Plastic pollution found in Taiwan's high mountain Jiaming Lake

**FocusTaiwan, Oct. 31**

Microplastic contamination has been found in 100 percent of water samples collected from Jiaming Lake in Taitung, the second highest mountain lake in Taiwan and a main source of drinking water for

the Formosan sambar deer, a protected species, according to a research report issued Sunday.

Meanwhile, the positive detection rate of microplastics in water samples collected from other sources along the hiking trail to Jiaming Lake, at an elevation of 3,310-m above sea level, was up to 80 percent, the international environmental organization Greenpeace said in a statement when publishing the report. [...]

Accès au document

## Fish are being increasingly exposed to endocrine disrupters

**PHYS.Org 26/10/21**

Microplastics, owing to their chemical properties, can carry micropollutants into a fish's digestive system where they are subsequently released through the action of its gastric and intestinal fluids. EPFL scientists, working in association with other research institutes, have studied this process by looking specifically at progesterone—often pointed to as an endocrine disrupter.

When fish ingest microplastics, they often also ingest progesterone. [...]

Accès au document

## Into the 'plastisphere': Scientists comb Japan waters to study new eco threat

**PHYS.Org 25/10/21**

A boat's crew casts a net into the seemingly clean waters off Japan's Izu peninsula, [...] —they are scooping up microplastics to learn more about the pollution's impact on marine life.

Tiny floating fragments from plastic packaging, synthetic clothing and fishing nets have proliferated over the past four decades, and are now found in every part of the world's oceans—even the deepest trench.

The planet's seafloor is littered with an estimated 14 million tonnes of microplastics, according to a study released last year, and scientists say more research on them is urgently needed, including their effect on ecosystems, the food chain and human health. [...]

Accès au document

## Long-anticipated plan to regulate PFAS chemicals unveiled in US

**Chemistry world 22/10/21**

The White House has taken a major step in implementing the US's first-ever strategy to tackle the family of highly fluorinated and toxic chemicals known as per- and polyfluoroalkyl substances (PFASs). President Biden came to power promising to tackle PFASs during his election campaign as, to date, there has never been decisive federal action on the problem. [...]

On 18 October, the US Environmental Protection Agency (EPA) released a new strategic roadmap to address PFAS contamination across the US, including a new testing strategy requiring PFAS manufacturers to provide toxicity data ; it also commits the EPA to quickly setting enforceable drinking water limits. [...]

Accès au document

## Microplastics in belugas worked their way up food chain, researchers find

**PHYS.org 19/10/21**

Microplastics are being found in even the most remote waters, say Simon Fraser University researchers who studied how the particles ended up in the stomachs of beluga whales through prey.

A new study published in the journal Science of the Total Environment looked at five species of Arctic fish known to be eaten by beluga whales.

Of the fish studied, 21 percent were found to have microplastic particles in their gastrointestinal tracts. [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Mieux prévenir les résistances « Une information encore plus transparente » sur les étiquettes des phytos

**Terre-Net 26/10/21**

Face aux risques de résistances aux herbicides, fongicides et insecticides, l'UIPP [l'Union des industries de la protection des plantes] et ses adhérents ont annoncé mi-octobre leur volonté de clarifier encore les étiquetages des produits phytosanitaires. [...]

Accès au document

## Réchauffement climatique et pollution au plastique « sont interconnectés et nécessitent des solutions communes »

**Futura planète 26/10/21**

La pollution plastique et le réchauffement climatique apparaissent comme deux fléaux de nos sociétés modernes. Et des chercheurs confirment aujourd'hui à quel point les deux problématiques sont intimement liées. À l'origine des deux, notre manière de surconsommer des ressources pourtant finies. Pour sortir de l'impasse, nous devrons trouver des solutions communes. [...]

Accès au document

## Les apiculteurs inquiets

**Agri-Mutuel 22/10/21**

Le gouvernement s'apprêterait à publier un « plan pollinisateurs » qui ne protège pas suffisamment les abeilles aux yeux des apiculteurs, s'est inquiété vendredi le président de l'Union nationale de l'apiculture française (Unaf), Christian Pons, auprès de l'AFP. [...]

Les agriculteurs auraient toujours la possibilité de traiter avec des produits portant la mention « abeilles » censés, lors de leur application, ne pas intoxiquer ces insectes. Pour l'Unaf, cette mention n'est pas assez claire. « [...]

Accès au document

## Des rivières françaises polluées aux détergents, insecticides

**Agri-Mutuel 22/10/21**

Des rivières françaises sont polluées par des détergents, insecticides, herbicides et médicaments, avec des impacts possibles sur les milieux naturels et la santé humaine, selon deux études communes de l'Ineris et de l'office français de la biodiversité (OFB).

[...] Il en ressort que « la grande majorité des contaminats (122 sur 141) ne présentait pas de dépassement de seuils écotoxicologiques, ou de façon exceptionnelle sur un nombre limité de sites [...].

Pour autant, « pour les 19 contaminants restants, des impacts chroniques ou des effets sub-létaux sur les populations aquatiques ne peuvent pas être exclus ». « Ces contaminants sont essentiellement des résidus de détergents (jusqu'à 95 % des sites avec dépassement des seuils), d'insecticides (jusque 40 %), d'herbicides (jusque 25 %) ou de médicaments (jusque 20 %) », précise le communiqué. [...]

Accès au document

## How airborne microplastics affect climate change

**Scientific American 20/10/21**

Microplastics - [...] - are influencing Earth's climate as they circulate through the atmosphere. Like other aerosol particles, both natural and synthetic, microplastics seem to have an overall cooling effect (albeit a small one), according to the first study to look at the possible climate effects of airborne microplastics. The study's authors and other researchers say the findings, [...], show the urgent need to get a better handle on how much plastic debris is in the air, where it is and what it is made of in order to better pin down its climatic influence. [...]

Accès au document

https://doi.org/10.15454/bwf7-8m60

## Exposure to a mixture of PFOA and PFOS during pregnancy produces cumulative effects on F1 bodyweight, liver weight, and survival in the Sprague-Dawley rat

**EPA 21/10/21**

[...] Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are two of the most widely detected and extensively studied PFAS [Per- and poly-fluoroalkyl substance] ; however the literature does not contain a single published study addressing a hypothesis of additivity for these two compounds in laboratory animals. [...] the present abstract addresses the combined developmental toxicity of PFOA and PFOS in the Sprague-Dawley rat. This is the first data generated from a rigorous experimental examination of the combined effects of PFOA and PFOS in a laboratory animal model. [...]

Accès au document

## Managing and treating per- and polyfluoroalkyl substances (PFAS) in membrane concentrates

**EPA publications 18/10/21**

This manuscript describes the state of the science for treating reverse osmosis and nanofiltration membrane system concentrates containing PFAS. Academicians, consultants, utility personnel, and regulators will benefit from the discussion about the potential concentrate management approaches and the research needs that remain in this critical area of work.

https://doi.org/10.1002/aws2.1233

## Les eurodéputés adoptent la Stratégie de « la ferme à la table »

**Actu-environnement 21/10/21**

Le 20 octobre, le Parlement européen, a adopté, en session plénière, le projet de Stratégie européenne de « la ferme à la table ». Pour rappel, en mai 2020, la Commission européenne a présenté cette stratégie qui vise à mettre en place un système alimentaire plus durable à l'horizon 2030. Quatre objectifs ont été fixés d'ici cette échéance : réduire de 50 % l'utilisation des pesticides et des risques qui leur sont associés, diminuer d'au moins 20 % l'utilisation de fertilisants et de 50 % les ventes d'antimicrobiens utilisés pour les élevages et l'aquaculture. [...]

Accès au document

## Pollution au chlordécone : la collectivité territoriale de Martinique se porte partie civile

**Francetvinfo 13/10/21**

La collectivité territoriale de Martinique (CTM) a annoncé, mardi 12 octobre, qu'elle allait se porter partie civile dans le procès pour empoisonnement au chlordécone, un pesticide qui a causé une importante pollution dans l'île ainsi qu'en Guadeloupe. "Par ce geste historique, la Collectivité de Martinique, en tant que corps constitué, se saisit d'un dossier qui a impacté des générations de Martiniquaises et de Martiniquais", a précisé la CTM dans un communiqué. [...]

Accès au document

## Opinion: The need for chemical simplification as a logical consequence of ever-increasing chemical pollution

**ACS 12/10/21**

Widespread presence of synthetic chemicals throughout the natural environment, [...] and improved analytical techniques now demonstrate the presence of mixtures of hundreds, if not thousands, of synthetic chemicals and their transformation products in the environment. For most of these chemicals, data on their effects on humans, animals, or plants are missing. [...]

https://doi.org/10.15454/bwf7-8m60

What is the consequence of the above outlined state of the environment, regulation, and science in our field and how can we achieve a more positive future trajectory ? We propose that we need to seriously consider "chemical simplification" as a future goal of innovation in chemical science and industry for the problem to become tractable. [...]

Accès au document

## L'intense lobbying de l'agro-industrie contre « Farm to Fork », le volet agricole du Pacte vert européen

**Le Monde 12/10/21**

[...] L'agro-industrie veut faire dérailler la stratégie européenne « de la ferme à la fourchette » (« Farm to Fork »), le volet agricole du Pacte vert (Green Deal) annoncé en décembre 2019 [...]. Plusieurs documents internes du Comité des organisations professionnelles agricoles de l'Union européenne (COPA-Cogeca), dont *Le Monde* a obtenu copie, mettent en avant les « lignes rouges » considérées comme franchies par le projet européen. [...]

La première, définie comme cruciale, concerne les objectifs, contraignants, de baisse de l'utilisation des pesticides et des antibiotiques dans l'élevage (50 % de réduction d'ici à 2030), [...]. Selon ses documents internes, le COPA-Cogeca souhaite que ces objectifs soient retirés du texte.

*Article réservé aux abonnés*

Accès au document

## Photos show Manila Bay mangroves 'choking' in plastic pollution

**The Guardian 11/10/21**

[…] The Navotas mudflats and mangroves in Manila Bay are buried in a thick layer of rubbish.

It is "almost choking the mangrove roots," Diuvs de Jesus, a marine biologist in the Philippines who photographed the area on a recent visit, said.

The wetlands are of huge environmental significance. They provide a crucial feeding ground for migratory birds, offer protection against floodwater and help tackle climate change by absorbing far greater levels of carbon dioxide than mountain forests. [...]

Accès au document

## Protection des abeilles : les députés veulent en faire une « grande cause nationale » en 2022

**Terre-net 07/10/21**

L'Assemblée nationale a demandé jeudi au gouvernement de faire de la sauvegarde des abeilles, gravement menacées par les insecticides, les maladies et la prolifération du frelon asiatique, une « grande cause nationale » en 2022.

Les députés ont adopté à l'unanimité une résolution en ce sens, non contraignante, présentée par le groupe LR dans le cadre de sa journée dite de « niche », réservée à un groupe minoritaire. L'auteur de la résolution, le député Robert Therry, apiculteur, a souligné que ce combat était « une nécessité pour la survie de notre écosystème », en plus du poids économique de la filière. [...]

Accès au document

## Produits phytosanitaires : les CEPP peinent à être appliqués

**Réussir 30/09/21**

Les distributeurs ont des objectifs à remplir en termes de Certificats d'économie de produits phyto (CEPP) se rapportant au recours aux solutions alternatives aux produits. L'évolution est lente.

**Depuis 2016, les entreprises distribuant des phytos doivent favoriser des solutions alternatives** à ces produits, donnant lieu à des certificats d'économie de produits phytopharmaceutiques (CEPP). Les distributeurs se voient fixer des objectifs à atteindre, sous peine d'encourir des sanctions. Selon le bilan publié par le ministère de l'Agriculture, 20 %

d'entre elles seulement ont réussi à atteindre ces obligations en 2020. Ce chiffre recule à 9 % pour les 50 premières entreprises (représentant 54 % des obligations de certificats). [...]

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## Desulfonation and defluorination of 6:2 fluorotelomer sulfonic acid (6:2 FTSA) by *Rhodococcus jostii* RHA1: Carbon and sulfur sources, enzymes, and pathways

**EPA**

The compound 6:2 FTSA (6:2 Fluorotelomer Sulfonic Acid) is an important PFAS as is is used in a majority of contemporary products including AFFF formulations and chromium plating anti-mist solutions. It is a commonly found PFAS impacted by both of these industries. The microbial degradation and pathways to metabolites is important in defining the co-occuring PFAS that may be associated. This study shows that the used microorganisms are able to completely degrade the 6:2 FTSA rapidly leading to a series of PFAS terminal metabolites.

https://doi.org/10.1016/j.jhazmat.2021.127052

## EPA announces updates on its efforts to address pfas in pesticide packaging

**Pesticide blog 04/10/21**

On September 29, 2021, the U.S. Environmental Protection Agency (EPA) announced developments in its efforts to address per- and polyfluoroalkyl substances (PFAS) in the environment. In particular, EPA provided an update on its progress in testing pesticide products and containers for PFAS. [...]

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## Bat guts become less healthy through diet of 'fast food' from banana plantations

**PHYS.ORG 23/09/21**

Nectar-feeding bats foraging in intensively managed banana plantations in Costa Rica have a less diverse set of gut microbes in comparison to bats feeding in their natural forest habitat or organic plantations, reveals new research published today in Frontiers in Ecology and Evolution. This the first study to show an association between habitat alteration, sustainable agriculture and the gut microbiota of wildlife. [...]

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## Infants have more microplastics in their feces than adults, study finds

**PHYS.ORG 22/09/21**

Microplastics—tiny plastic pieces less than 5 mm in size—are everywhere, from indoor dust to food to bottled water. So it's not surprising that scientists have detected these particles in the feces of people and pets. Now, in a small pilot study, researchers reporting in ACS' Environmental Science & Technology Letters discovered that infants have higher amounts of one type of microplastic in their stool than adults. Health effects, if any, are uncertain. [...]

Accès au document

## River research reveals scale of macroplastic pollution

**PHYS.ORG 22/09/21**

Plastic pollution clogs river systems for considerably longer than previously thought, new research from the University of Leicester shows.

Macroplastics—or plastic litter more than 5mm in size—travel much slower through river systems than previously believed, at an average speed of less than 0.01 km per hour, and can remain in place for significant periods of time.

If not removed, not only may this pollution eventually emerge in the ocean, but it is also likely to negatively impact marine wildlife and human uses of river systems. [...]

Accès au document

## Insecticide and climate warming impact stream insect communities

**PHYS.ORG 16/09/21**

New research highlights the impact of one of the world's most widely used insecticides on stream macroinvertebrate communities in the context of climate change.

The research is the first to study the combined effects of the neonicotinoid insecticide imidacloprid and raised water temperatures due to climate-change on experimental stream communities, using the award-winning ExStream System developed by University of Otago researchers. [...]

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## Ouverture au public du site Geod'air

**Ineris 20/09/21**

La base de données Geod'air s'est enrichie de nouvelles fonctionnalités et s'ouvre au public ce lundi 20 septembre 2021, avec une nouvelle interface graphique.

Geod'air est le site national compilant les données de référence de qualité de l'air, développé et géré par l'Ineris dans le cadre de ses activités pour le Laboratoire central de surveillance de la qualité de l'air (LCSQA).

Les données de mesure concernent les polluants réglementés et les polluants d'intérêt national, produites dans chaque région administrative de métropole et d'outre-mer par les Associations agréées de surveillance de la qualité de l'air (AASQA), soit plus de 550 stations. [...]

Accéder au site : https://www.geodair.fr

Accès au document

## Humpback whales as bioindicators of Antarctic mercury pollution

**PHYS.ORG 16/09/21**

A Griffith University-led study provided the first evidence of mercury accumulation in humpback whales and screened levels in other marine megafauna foraging in the Southern Ocean.

Conducted in collaboration with the Australian Antarctic Division, the British Antarctic Survey and the University of Southern Demark, the study found mercury levels increased along the Antarctic food chain, however relatively low levels were found in whales' skin and blubber. [...]

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## Data from 29,798 clean-ups around the world uncovers some of the worst litter hotspots

**PHYS.ORG 16/09/21**

Coastal litter is a big environmental problem. But how does this litter differ around the world, and why? In the first global analysis of its kind, we set out to answer those questions using data collected by thousands of citizen scientists.

Our analysis, released today, discovered litter hotspots on every inhabited continent, including Australia. This finding busts two persistent myths: that most of the world's plastic pollution comes from just a few major rivers, and that countries in the Global South are largely to blame for the marine plastic problem. [...]

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## Bluefin tuna reveal global ocean patterns of mercury pollution

**PHYS.ORG 14/09/21**

Bluefin tuna, a long-lived migratory species that accumulates mercury as it ages, can be used as a global barometer of the heavy metal and the risk

posed to ocean life and human health, according to a study by Rutgers and other institutions.

The study appears in the journal PNAS.

[...] But how mercury accumulation varies among bluefin tuna distributed around the world isn't well understood.

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## New report highlights link between air pollution and infant mortality

**PHYS.ORG 10/09/21**

A new report out today calls for an urgent collaborative effort to reduce air pollution around the globe.

The report, led by Save the Children International, outlines the sources of air pollution, its effects on children and young people, and highlights the work being done to address the issue. [...]

One of the report authors Dr. Cressida Bowyer, Deputy Lead for Revolution Plastics at the University of Portsmouth has worked with communities in the Global South, investigating the huge impact the unregulated burning of plastic waste has on air pollution. [...]

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## Sunlight can break down marine plastic into tens of thousands of chemical compounds

**PHYS.ORG 08/09/21**

[...] Scientists more recently have learned that sunlight also chemically transforms plastic into a suite of polymer-, dissolved-, and gas-phased products.

Now, a new study finds that this chemical reaction can produce tens of thousands of water-soluble compounds, or formulas. The breakdown into this many formulas, in a matter of weeks, is at least ten-fold more complex than previously understood. [...]

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## Définition des nanomatériaux : un petit pas vers une révision ?

**Actu-environnement 10/09/21**

La révision de la recommandation de définition du terme nanomatériau, très attendue, pourrait être prochainement lancée : la Commission européenne a réalisé un petit pas dans ce sens. Retour sur les propositions d'évolutions. [...]

Source sur abonnement

Accès au document

## First ever study finds microplastics in northeast Lapland

**The Barents Observer 31/08/21**

A research project, led by non-profit organisation Snowchange Cooperative, has found large amounts of microplastics in Näätämöjoki river and Lake Inari. The project's aim was to track the impacts of climate change in Näätämö, Vuonnijavr, Voronye and Ponoi waters, and they conducted first ever surveys on microplastics in northeast Lapland. The research has shown that the amount of microplastics in Lake Inari is similar to samples taken from lakes in Southern Finland. [...]

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## Nano/microparticles in conjunction with microalgae extract as novel insecticides against Mealworm beetles, *Tenebrio molitor*

**Nature 24/08/21**

The intensive use of insecticides in global agricultural production has attracted much attention due to its many adverse effects on human health and the environment. In recent years, the utilization of nanotechnology has

emerged as a tool to overcome these adverse effects. The aim of this work was to test different microparticles (zinc oxide (ZnO MPs) and silicon dioxide microparticles (SiO2 MPs)), and silver nanoparticles (Ag NPs) and to study their toxicity on a model organism, *Tenebrio molitor*. A comprehensive comparative study, which included more than a thousand mealworms divided into nine separate groups, was conducted. In addition to pure nano/microparticle solutions, the effect of particles mixed with the microalgae extract *Chlamydomonas reinhardtii* was also observed. [...]

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## Les viticulteurs pourront déroger à la réglementation sur les traitements à base de cuivre pour lutter contre le mildiou

Le Monde 08/08/21

L'ensemble des viticulteurs, que ce soit en viticulture biologique ou conventionnelle, est concerné par cet arrêté « en vigueur pour une période de cent vingt jours ...

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