Watercorridors…..

voor schoner water in het landelijke gebied

Symposium Natuurlijke zuiveringstechnieken,
STOWA, 13 november 2019, Wageningen

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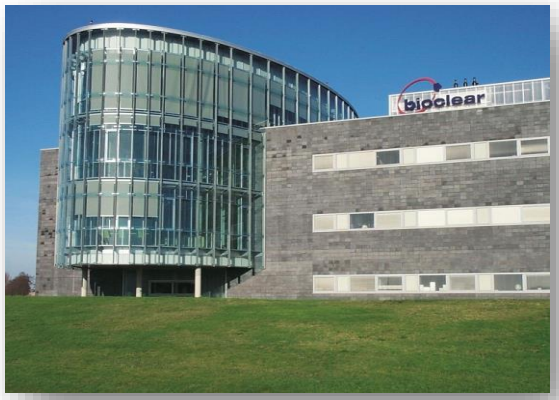
Even voorstellen

- Advies- en innovatiebureau, opgericht in 1988
- 35 medewerkers, multidisciplinair team
- Sterk in ontwikkeling en toepassing van biologische, natuurlijke processen
- Oplossingen bieden op basis van natuurlijke processen voor maatschappelijke uitdagingen:

  - een gezond bodem-water-systeem
  - gezonde en duurzame leefomgeving
  - duurzame energie



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Haalbaarheidsverkenning

In opdracht van Innovatie Veenkoloniën

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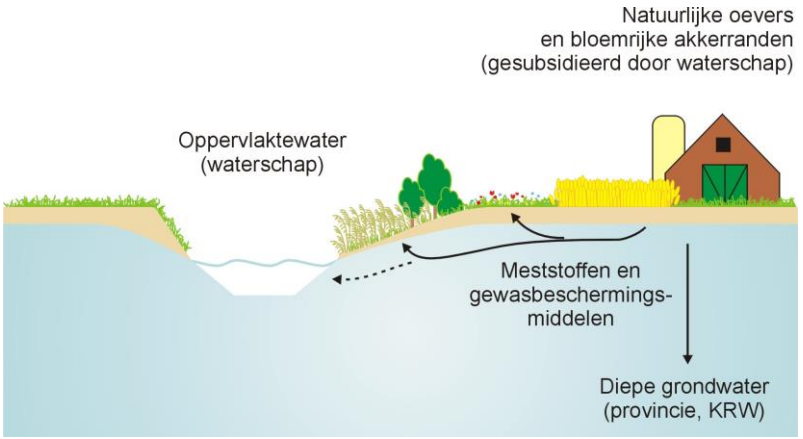
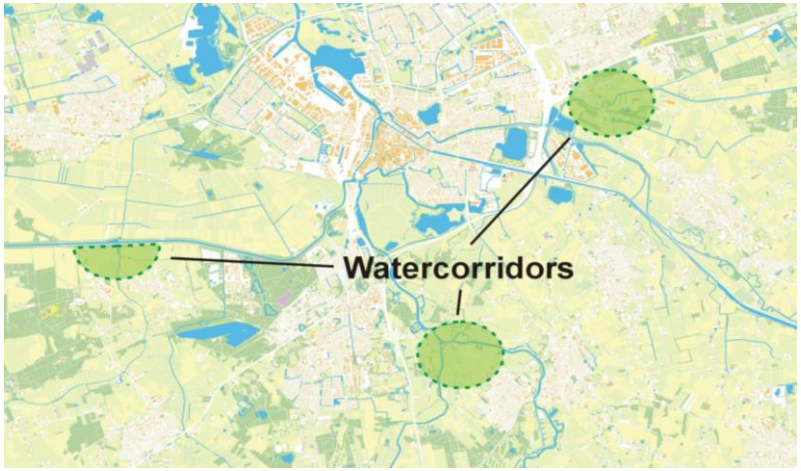
Watercorridor gebiedsgericht





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Watercorridors

Corridors = Ingerichte stroken land op strategische plekken in gebied

- Aangepaste inrichting met bomen, planten, bodemtoevoeging
- Rol voor actieve schimmels en bacteriën
- Verblijftijd creëren voor gewasbeschermingsmiddelen
- Functiecombinatie met waterberging, natuur

De natuur als leermeester

Door alle processen onder te brengen in
een systeem, met naar *behoefte afwisselende zones* met
verschillende procescondities, kan de verwijdering van *nutriënten,
microverontreinigingen en pathogenen en virussen*
door *planten, schimmels en bacteriën* gemaximaliseerd worden.

Creëer robuust ecosysteem met ontwikkelpotentie !

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Watercorridors

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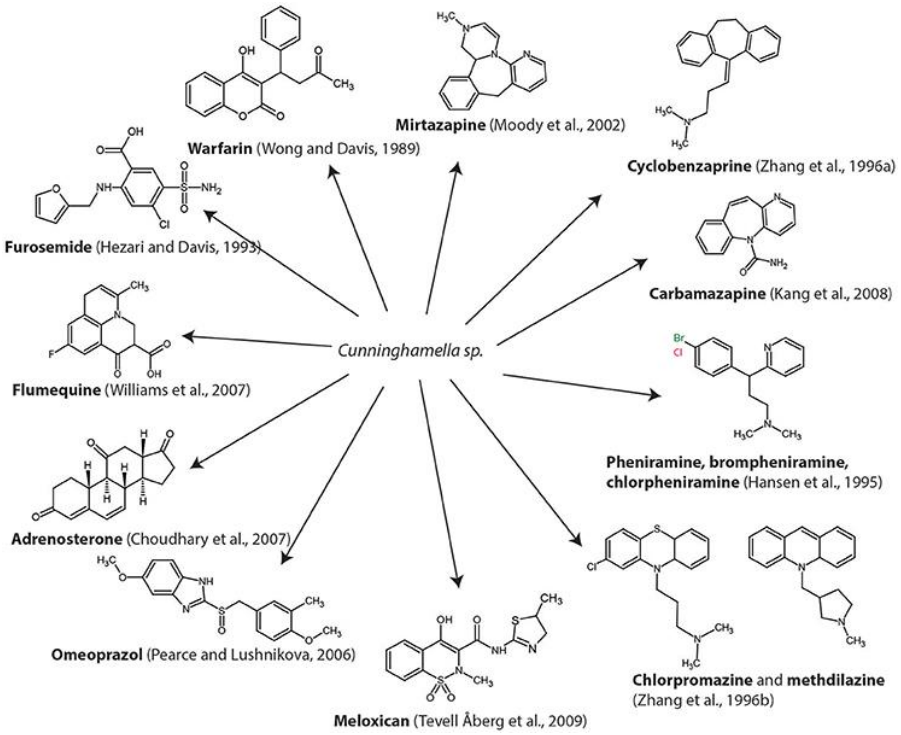
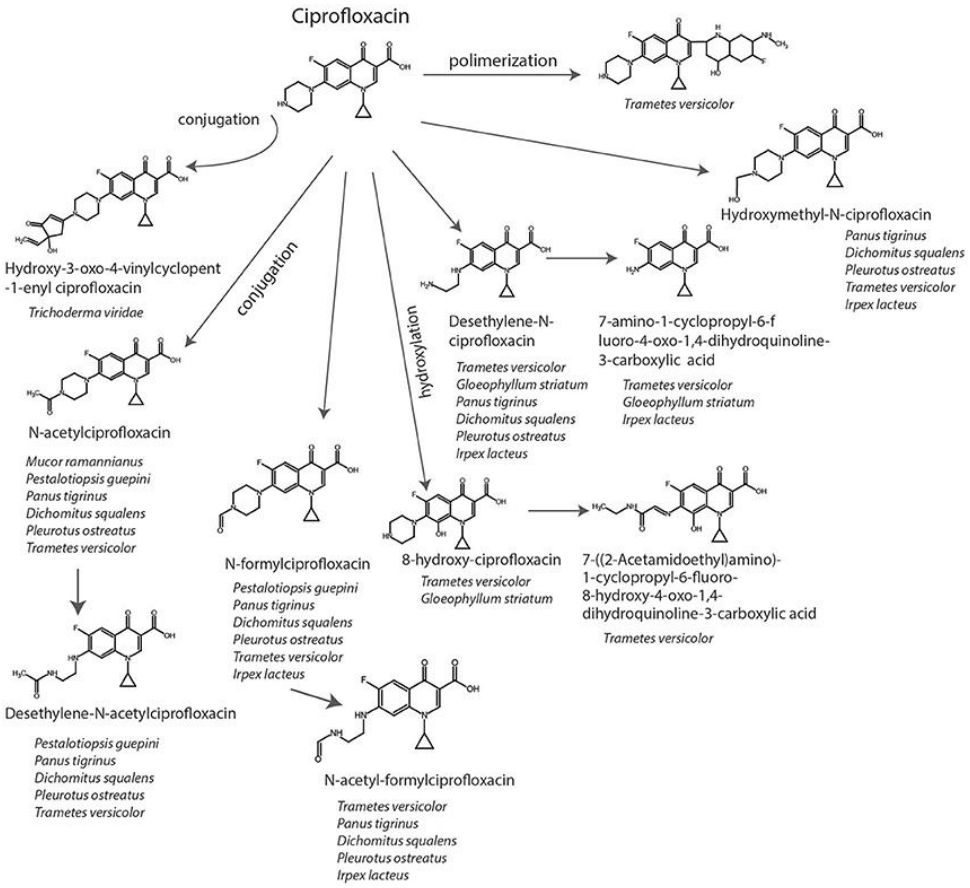
Medicijnresten en schimmels





1 soort schimmel kan meerdere componenten afbreken

Meerdere afbraakroutes voor 1 component
→ Meerdere soorten schimmels bij betrokken

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Medicijnresten bacteriën en schimmels

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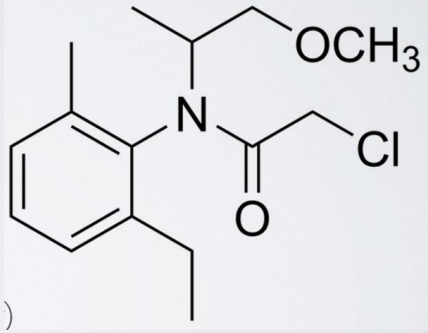
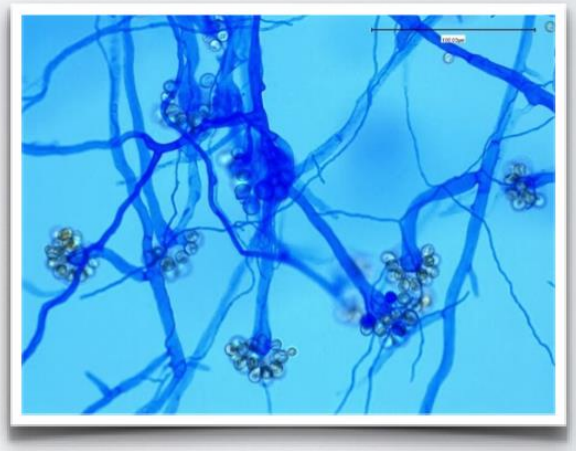
pharmaceuticals	organisms	Other removal	Removal efficiency	Retention time
Diclofenac	Labrys portucalensis F11 (gram negative aerobic bacterium)	fluoxetine and fluoroquinolone	70 % - 100%	12 - 25 days
	Brevibacterium sp. D4 (aerobic) (bacterium)	-	90,0%	4w 2d (10 mg/L)
	flax (linum usitatissimum) suspension (plant)	ibuprofen, acetaminophen	100%	6 days (0,2 mM = 59 mg/L)
	Phanerochaete sordida YK-624 (fungus)	bisphenol A, nonylphenol, 4-tertoctylphenol,17b-estradiol, ethinylestradiol, genistein, isobutylparaben and n-butylparaben	90,0%	3 days (0,1 mM = 30 mg/L)
	Phanerochaete chrysosporium (fungus)	ibuprofen, naproxen	94%	18 hours (after 2 weeks; 1,4 mg/L)
Carbamazepine	Paraburkholderia xenovorans (bacterium) (aerobic)	-	100%	24 hours (10 mg/L)
	Trametes versicolor (fungus)	-	96%	2 days (200 µg/L)
	Pleurotus ostreatus PC9 (fungus)	-	99,7%	32 days (10 mg/L)
Propranolol	Trametes versicolor (fungus)	Carbamazepine, Atenolol, and clofibric acid	100%	24 hours (10 mg/L)
Trimethoprim	Pleurotus ostreatus (fungus)	Sulfamethoxazole	40,0%	15 days (50 mg/L)
Hydrochlorothiazide	Trametes versicolor (fungus)	Ibuprofen, Diclofénac, Mefenamic acid, Phenazone, Bezafibrate, Fenofibrate, Atorvastatin, Diazepam, Carbamazepine, Cimetidine, Sulfamethazine, Atenolol, Clarithromycin	52%	42 days (21 ng/g)
Sulfamethoxazole	Pseudomonas psychrophila HA-4 (bacterium) (aerobic)	-	34,30%	8 days (100mg/L)
	Proteobacteria and Actinobacteria (bacteria) (aerobic)	-	100%	4 days (10 mg/L)
	Achromobacter denitrificans PR1 (bacterium) (aerobic)	other sulfonamides	100%	30 h (600 µM)
	Phanerochaete chrysosporium (fungus)	-	71%	3 days (10 mg/L)
Clarithromycin	Trichoderma harzianum and Pleurotus ostreatus (fungus)	Carbamazepine	55-57%	7 days (0,03 µg/L)
	Trametes versicolor (fungus)	Ibuprofen, Diclofénac, Mefenamic acid, Phenazone, Bezafibrate, Fenofibrate, Atorvastatin, Diazepam, Carbamazepine, Cimetidine, Sulfamethazine, Atenolol, Hydrochlorothiazide	100%	42 days (21 ng/g)

GBM voorbeeld

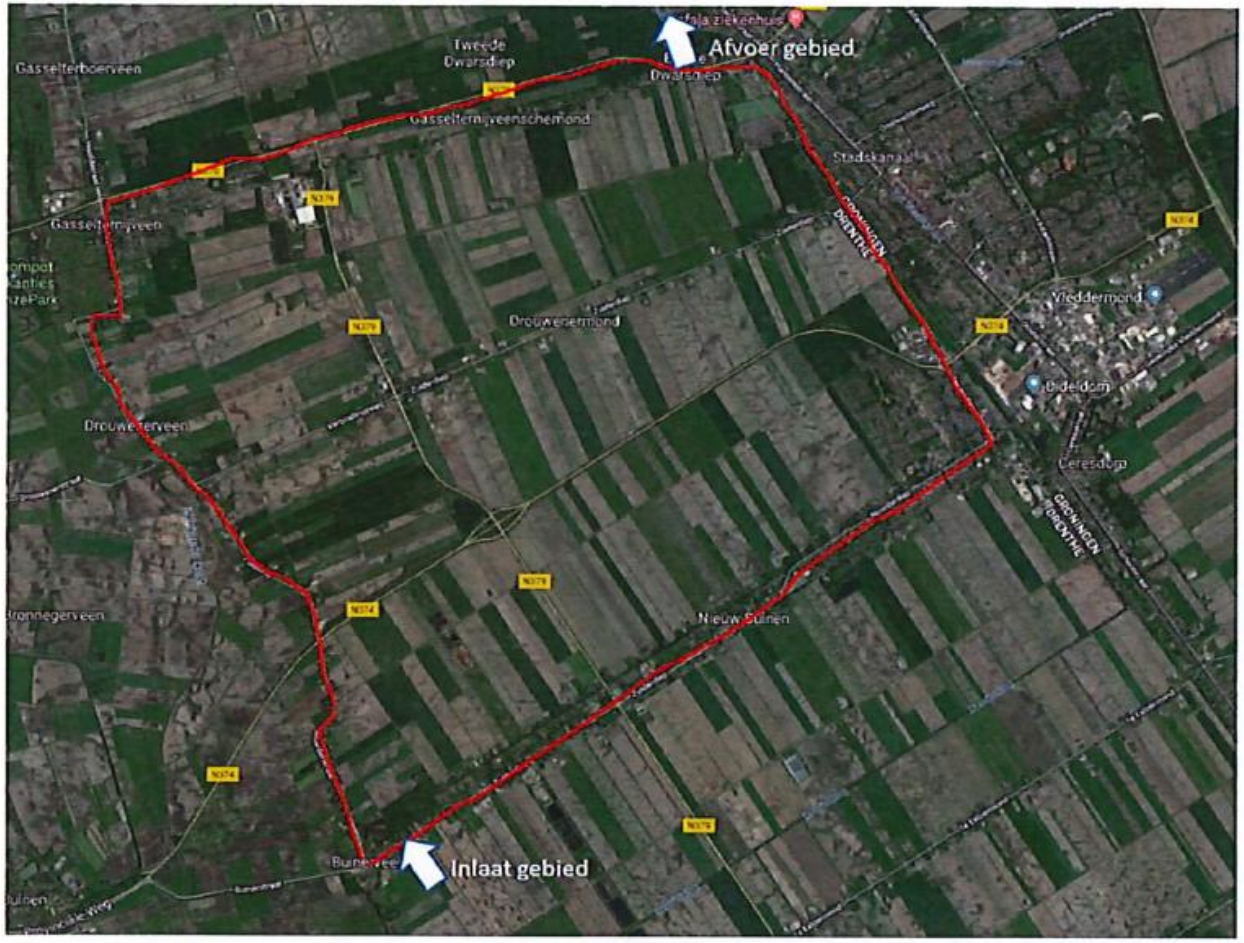
a. Metolachlor



- Degraded by fungus *Cunninghamella elegans*: 99% in 2 days
- Hydroxylated metabolites
- 24°C and neutral pH
- Widely used for the metabolism of xenobiotics



Casus Veenkoloniën



Totale oppervlakte

+/-2900 hectare

Landbouw oppervlakte

+/- 2200 hectare

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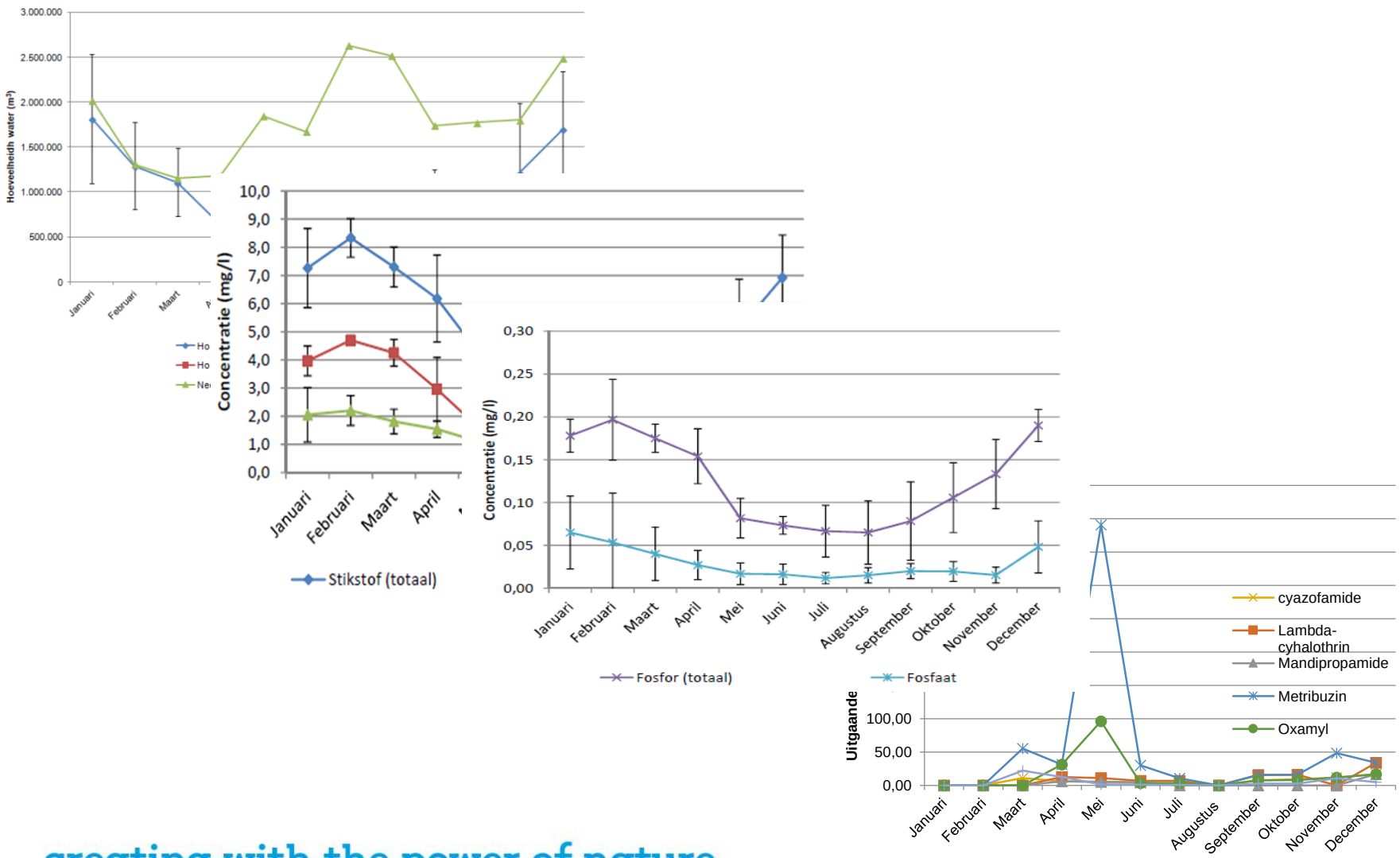
Gegevens



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Visualisatie omvang

watercorridor

+/-17 hectare

Landbouw oppervlakte

+/- 2200 hectare

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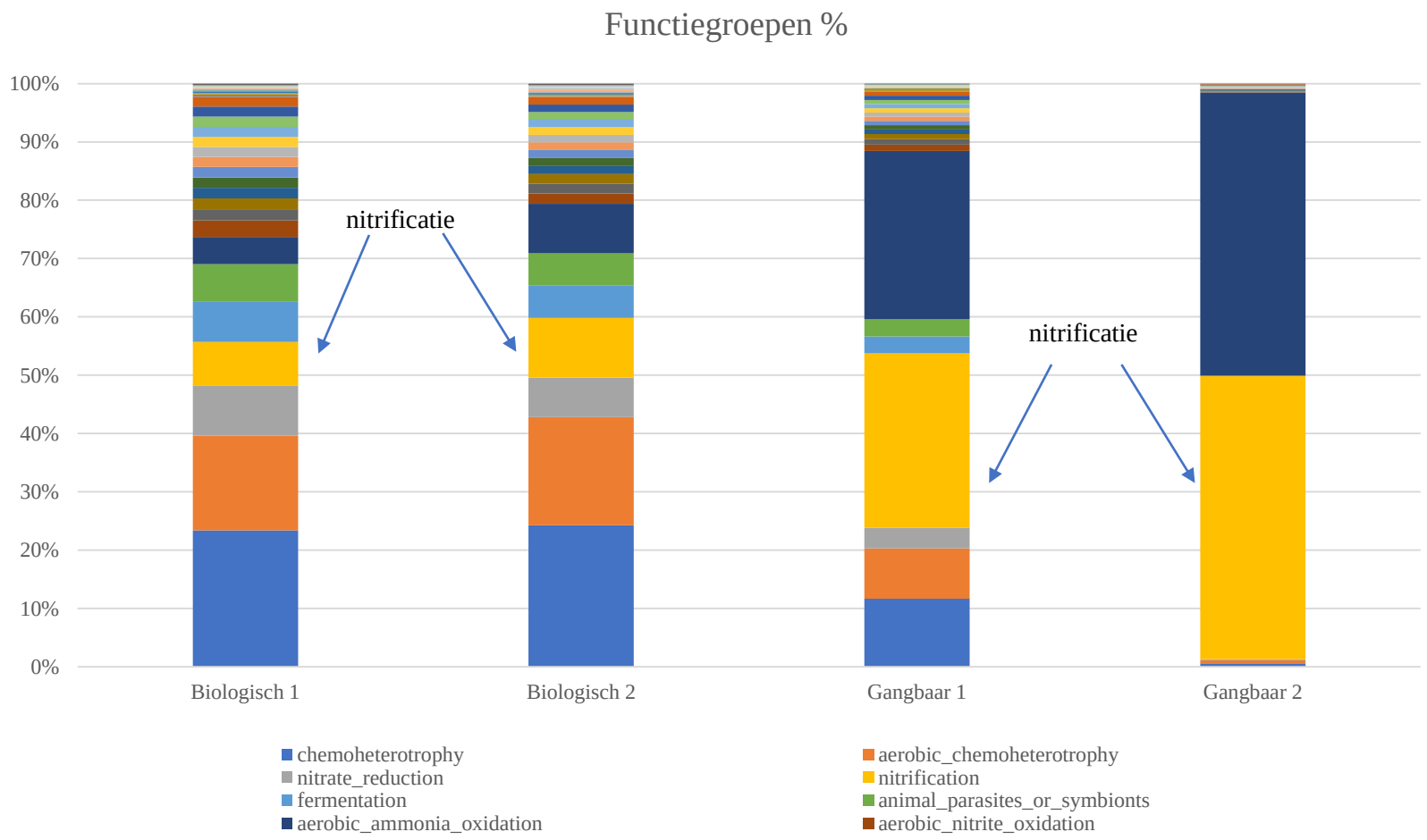
Bodembeheer vergelijken



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Mogelijke pilot (1-3 ha)

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Hoopvol met de natuur

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Environmental Science & Technology

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Article

Cite This: *Environ. Sci. Technol.* 2019, 53, 11410−11419

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Defluorination of Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) by *Acidimicrobium* sp. Strain A6

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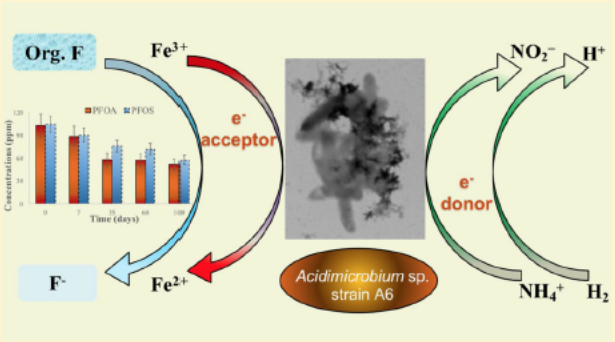
Supporting Information

ABSTRACT: Incubations with pure and enrichment cultures of *Acidimicrobium* sp. strain A6 (A6), an autotroph that oxidizes ammonium to nitrite while reducing ferric iron, were conducted in the presence of PFOA or PFOS at 0.1 mg/L and 100 mg/L. Buildup of fluoride, shorter-chain perfluorinated products, and acetate was observed, as well as a decrease in Fe(III) reduced per ammonium oxidized. Incubations with hydrogen as a sole electron donor also resulted in the defluorination of these PFAS. Removal of up to 60% of PFOA and PFOS was observed during 100 day incubations, while total fluorine (organic plus fluoride) remained constant throughout the incubations. To determine if PFOA/PFOS or some of their degradation products were metabolized, and since no organic carbon source except these PFAS was added, dissolved organic carbon (DOC) was tracked. At concentrations of 100 mg/L, PFOA/PFOS were the main contributors to DOC, which remained constant during the pure A6 culture incubations. Whereas in the A6 enrichment culture, DOC decreased slightly with time, indicating that as defluorination of PFOS/PFOA occurred, some of the products were being metabolized by heterotrophs present in this culture. Results show that A6 can defluorinate PFOA/PFOS while reducing iron, using ammonium or hydrogen as the electron donor.



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Dank voor jullie aandacht

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