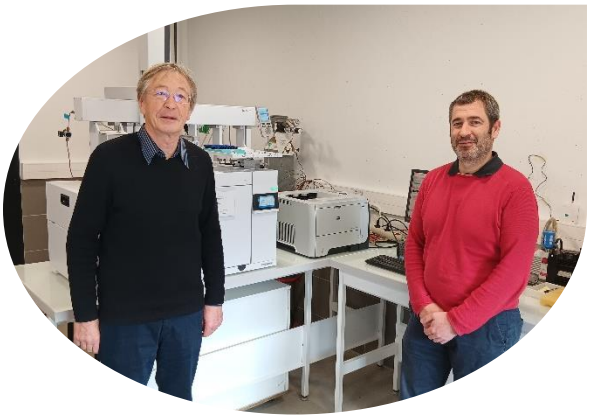
International Phytotechnology Society

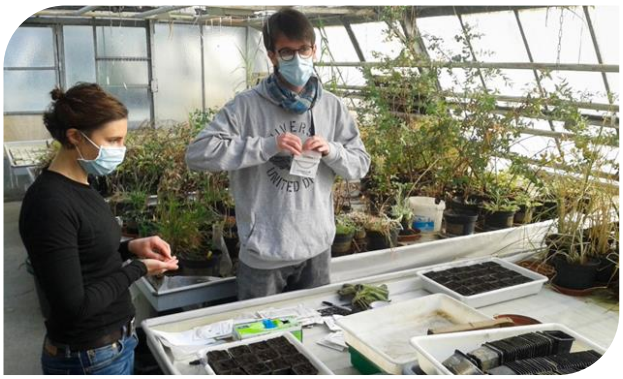
# Phytotech Insights

## Phytotechnology in Action: Dr. Cohen and Mench's Teams Tackle Dieldrin Contamination in agricultural soils



This month's newsletter features exciting updates from the lab of Drs. Cohen and Mench in France, showcasing their contributions to the field and their innovative approaches to solving environmental challenges.

Dieldrin, an organochlorine pesticide once widely used in agriculture, was banned in France in 1972 for agricultural purposes and later classified as one of the first 12 Persistent Organic Pollutants (POPs) under the Stockholm Convention in 2001. Despite its prohibition, dieldrin remains in agricultural soils due to its persistence, posing risks to food safety and farm sustainability. Certain plant species, especially those from the Cucurbitaceae family, are known to uptake and accumulate dieldrin in above-ground plant parts, sometimes exceeding regulatory Maximum Residue Limits (MRLs) in fruits. Given its toxicity, solutions are urgently needed to ensure safe crop production and remediate contaminated soils.

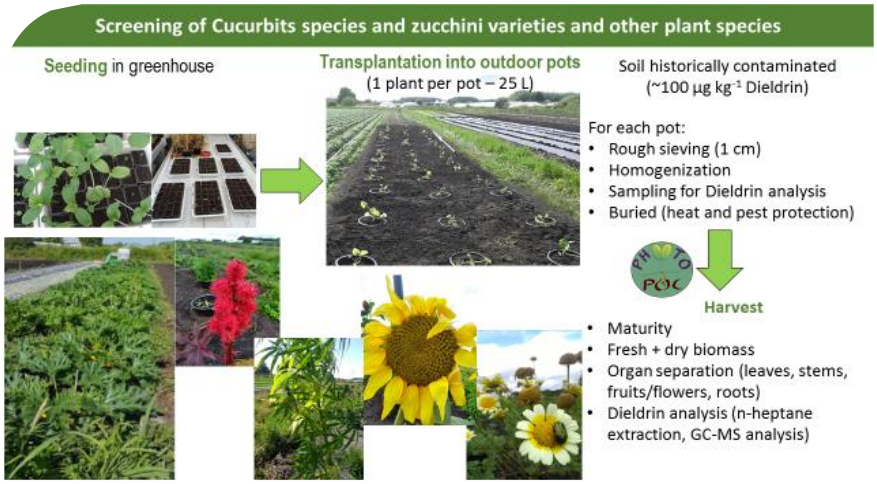


Dr. Grégory Cohen and his team at UMR EPOC (CNRS, Bordeaux-INP, Bordeaux Univ.), in collaboration with Dr. Michel Mench's group at UMR BIOGECO (INRAE, Bordeaux-Univ.), both outstanding members of the International Phytotechnology Society, have been at the forefront of developing phytotechnology-based approaches to address this issue. Their researches evaluate the potential of various plant species to extract, stabilize, or degrade dieldrin in contaminated soils. By investigating 17 non-Cucurbitaceae species and 10 varieties of zucchini (*Cucurbita pepo*), they aim to identify crops that either minimize dieldrin accumulation in edible parts and/or contribute to soil decontamination. The key findings of their research are:

- ***Phytoextraction Potential***: Zucchini plants exhibited the highest ability to extract dieldrin from soil and mainly store it in their above-ground biomass (> 90 %), with nearly 40% of

the accumulated dieldrin found in the fruits, depending on fruits productivity and accumulation. Nonetheless, some zucchini varieties maintained dieldrin concentrations well below EU regulatory limits (50 µg $kg^{-1}$ FW), making them safer for consumption.

- ***Phytostabilization potential*:** Most non-Cucurbitaceae species retained over 70% of dieldrin in their roots, limiting its movement to above-ground parts. Vetiver (*Chrysopogon zizanioides*) stood out as a promising candidate for stabilizing dieldrin in the root zone.
- ***Safe Crop Management*:** The research suggests that certain zucchini varieties could be cultivated safely while gradually removing dieldrin from the soil through leaf and stem harvests. Proper disposal of contaminated plant biomass is crucial to prevent reintroducing dieldrin into the environment.




This work is part of the PhytoPOC Project (PHYTOmanagement and remediation of agricultural soils contaminated with Organochlorine Pesticides), supported by ADEME, the French Ecological Transition Agency, Bordeaux-Metropole (BM), and the Gironde County (CD33) in France. Dr. Félix Colin, Dr. Marie-Cécile Affholder and more than 20 Master and engineer students contributed to the success of this project. Indeed, the research not only advances our understanding of plant-based remediation strategies but also offers practical solutions for farmers dealing with pesticide residues in their fields.

Drs. Cohen and Mench's teams continue to lead efforts in sustainable phytoremediation, ensuring that science supports both environmental restoration and agricultural resilience.

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