PHYTOMANAGEMENT STRATEGIES FOR A METAL-CONTAMINATED AGRICULTURAL SOIL TO PROVIDE BIOMASS FOR CLEAN BIOFUEL PRODUCTION – FEEDBACK FROM A POT TRIAL.

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Context

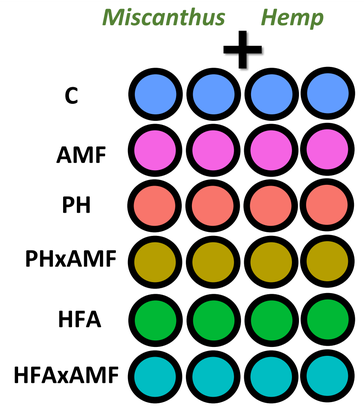
- ↑ degraded and contaminated soils, ↑ demand for food and fuel
- Food *vs* fuel competition for arable land
- Lignocellulosic plants can grow on contaminated soils hence they are cultivated on contaminated soils to produce biomass for biofuels

Objectives

- Study the effect of different treatments on the
  - biomass production of miscanthus and industrial hemp
  - plant Cd, Pb and Zn uptake
  - labile Cd, Pb and Zn concentration in soil

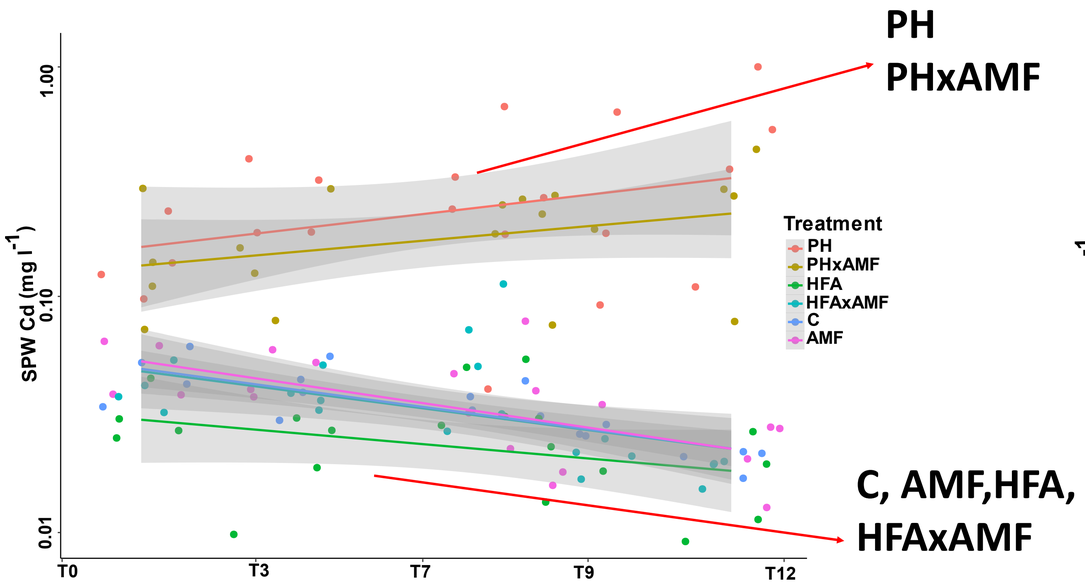
Methodology

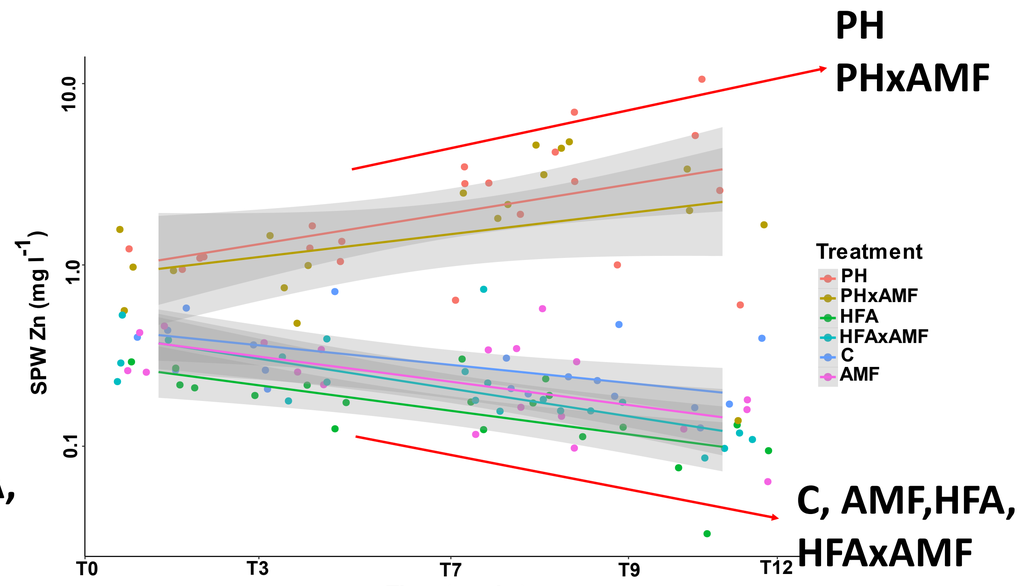
- Pot trial: soil collected 1 km from the former Metaleurop Nord smelter and contaminated with Cd, Pb and Zn (14.1, 731 and 1000 mg kg^{-1}, respectively)
- Lignocellulosic crops: *Miscanthus x giganteus* and *Cannabis sativa* L.
- Six treatments: control (C) (without treatment), mycorrhizae (AMF), protein hydrolysate (PH), humic/fulvic acids (HFA), protein hydrolysate x mycorrhizae (PHxAMF) and humic/fulvic acids x mycorrhizae (HFAxAMF)
- Gro th period: 12 weeks
- Measurement and analysis: Biomass production, Cd, Pb and Zn concentrations in soil pore water and aerial plant parts



Results

Effects of treatments on Cd, Pb and Zn concentrations in soil pore water (SPW) for miscanthus

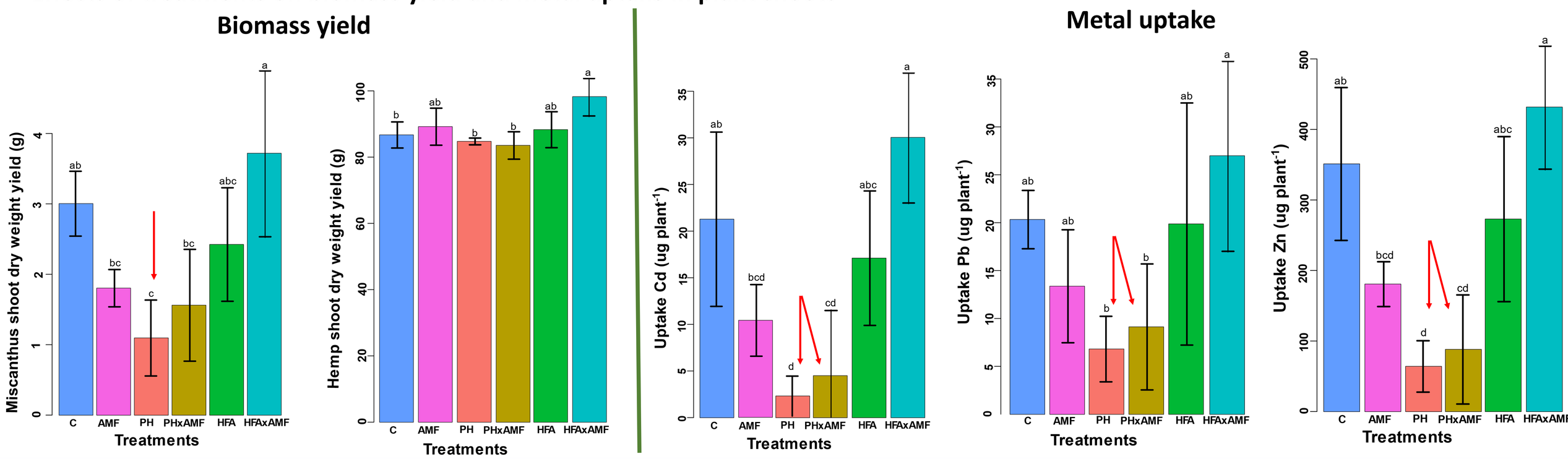




No significant effect on Pb

A similar trend was observed for hemp

Effects of treatments on biomass yield and metal uptake in plant shoots



Conclusion & Perspectives

	PH			PHxAMF			HFA			HFAxAMF		
	[M]💧	🍃	[M]🍃	[M]💧	🍃	[M]🍃	[M]💧	🍃	[M]🍃	[M]💧	🍃	[M]🍃
Miscanthus	↗	↙	↙	↗	↙	↙	↙	↗	↗	↙	↗	↗
Hemp	↗	↗	↗	↗	↗	↗	↙	↗	↗	↙	↗	↗

Legend : [M]💧 **Labile metal concentration** 🍃 **Biomass yield** [M]🍃 **Metal uptake**

The humic/fulvic acid treatments (HFA and HFAxAMF) were able to :

- reduce the availability of contaminants
- increase biomass production
- increase metal concentrations in aerial parts

This suggests humic/fulvic acids treatments as relevant biostimulants to be upscaled and optimized in a field trial.

Acknowledgement

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