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Interaction between lombricompost and AMF communities: consequences on metals accumulation and bioaccessibility in urban agriculture crops

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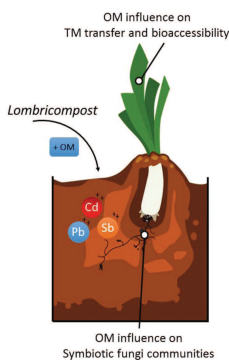
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Interaction between lombricompost and AMF communities: consequences on metals accumulation and bioaccessibility in urban agriculture crops

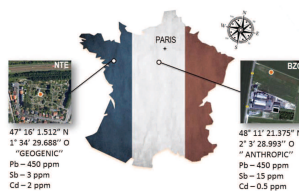


Context

- Two-thirds of the population leaves currently in urban areas, and this trend is increasing
- A will of self-growing food sprout in response to the economic/ecologic crisis
- Soil/food quality for urban agriculture (UA) is a major concern due to pollution
- Persistent trace metals (TM), such as cadmium (Cd) and lead (Pb) are common pollutants
- Antimony (Sb) is an emerging anthropic contaminant
- Biofertilizers and organic amendments are used by gardeners to increase yields
- Their properties and reactivity can affect soil microorganisms and TM mobility

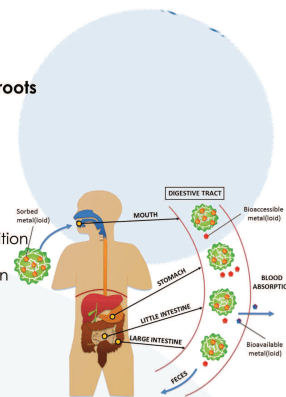
Objectives

- Study the effect of lombricompost on:**
- 1- arbuscular mycorrhizal fungi (AMF) communities in plant roots
 - 2- TM phytoaccumulation and human bioaccessibility.



Material and methods

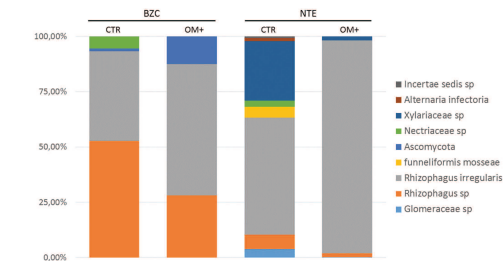
- Scale** - Microcosm pot experiment under greenhouse condition
Plant - Organic leek (*Allium porrum* L.), 5 months
Soil - Comparison of anthropic and geogenic contamination
Treatments - ± Lombricompost, to increase soil % OM by 1%
Measurements - Total TM in plant
- Bioaccessible fraction (BARGE method)
- AMF community (Illumina MiSeq)
Analysis - Mothur & Usearch for AMF sequences analysis



Results

> Effects of Lombricompost on Fungal community

- Important changes in root fungal community (Both soils)
- *Rhizopagus irregularis* increased (BZC+25% & NTE+40%)
- *Funnelliformis mosseae* disappeared in NTE soil
- Decrease of other *Rhizopagus* species and *Glomeraceae* species.



AMF communities associated with amended (+OM) and control (CTR) leek roots

> Effects of Lombricompost on TM human bioaccessibility

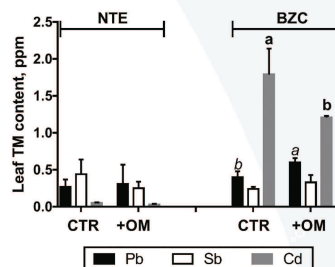
- No effect for all TM

Effect of Lombricompost (OM+) on TM bioaccessible fraction

Plant	Soil	Treatment	% Pb	% Sb	% Cd
LEEK	NTE	CTR	65.7 ± 9.3	20.6 ± 6	114 ± 34
		OM+	54.6 ± 15.8	20.1 ± 1.6	104 ± 11
BZC	CTR	CTR	66.4 ± 7.5	19.8 ± 4.1	91 ± 4
		OM+	59 ± 12.2	15 ± 1.5	95 ± 3

> Effect of Lombricompost on TM accumulation

- BZC soil (Anthropic Pb/Sb contamination)
Sb - No effect
Cd - Decrease
Pb - Increase
- NTE soil (Geogenic Pb/Sb contamination)
Sb/Pb/Cd - No effect
- Pb accumulation was low compared to soil total content



Lombricompost affected TM phytoavailability, BUT, the human bioaccessibility was no affected in plant.



Important shift of symbiotic fungal communities, impacted species can influence TM mobility and phytoaccumulation. Field trials is needed, to enhance hazard recommendations for gardeners