UNIVERSITY OF UDINE

Department of Agri-Food, Animal and Environmental Sciences,

Leaching and plant uptake of toxic metals in abandoned mine tailings in the Cave del Predil (I) mining site and Rio del Lago valley

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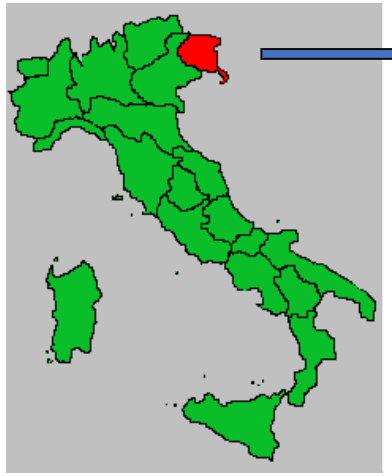
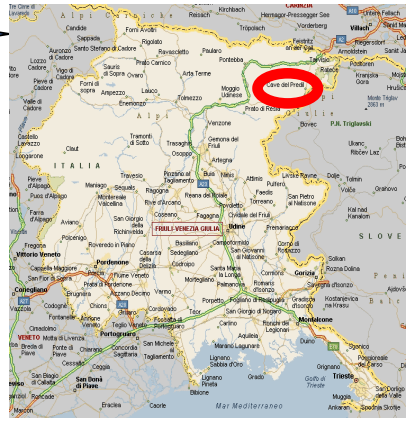
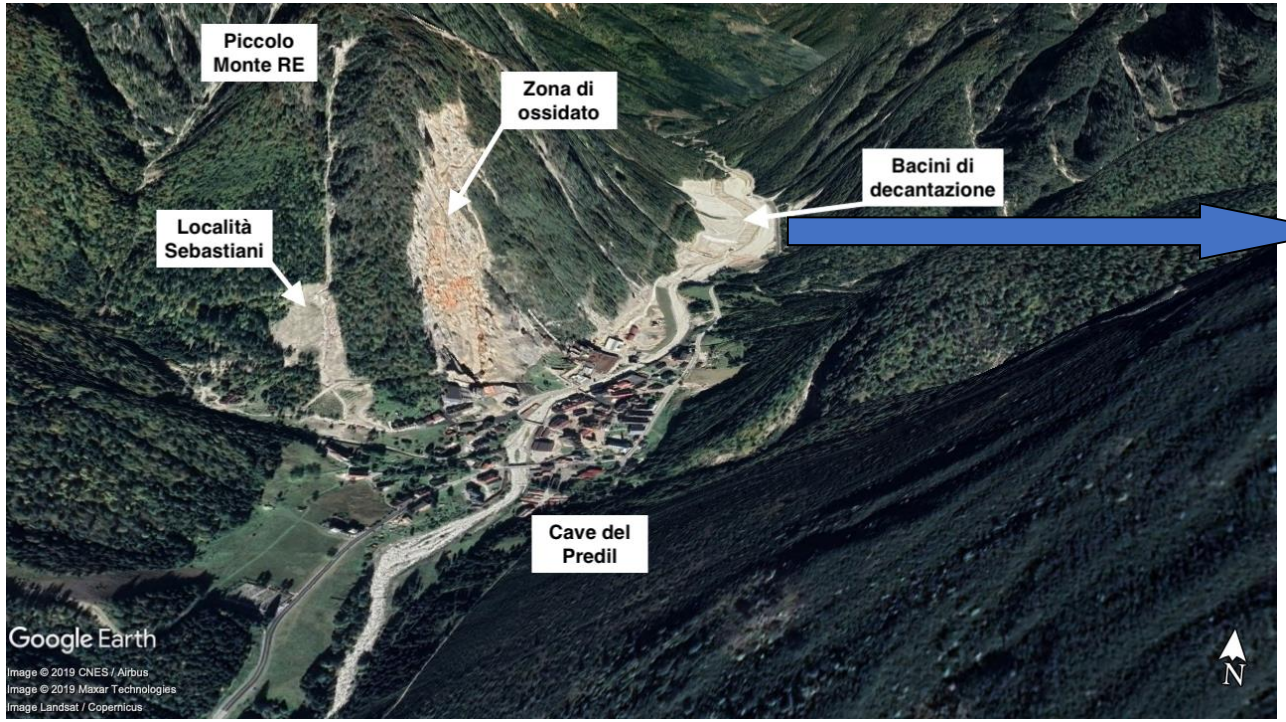
Cave del Predil (I) valley







Tailings (estimated $20 \bullet 10^6$ m^3)

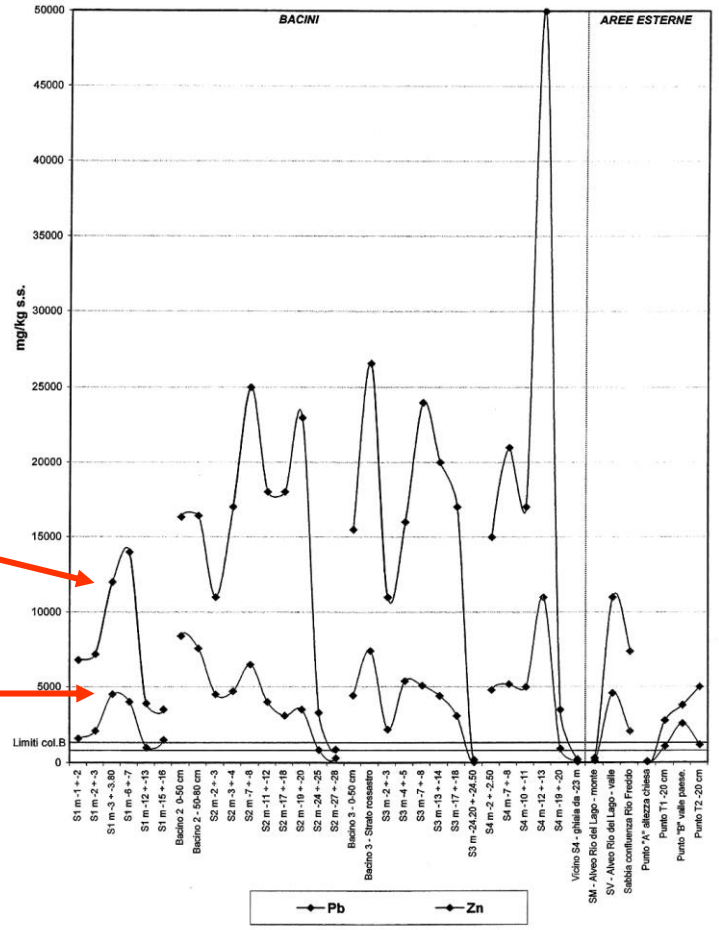
Tailing properties

Element	Mine tailings	Background (soil)		IT limits for industrial Sites
		Natural	Anthropogenic	
As	373±20	1.7	23	50
Cd	12±0.7	0.3	3.0	15
Cu	53±3.2	2.2	31	600
Ni	7±0.5	2.2	10	500
Pb	1935±110	38	617	1.000
Tl	521±16	1.1	6.9	10
Zn	7180±355	96	1571	1.500

Horizontal profile of tailings

Zn

Pb

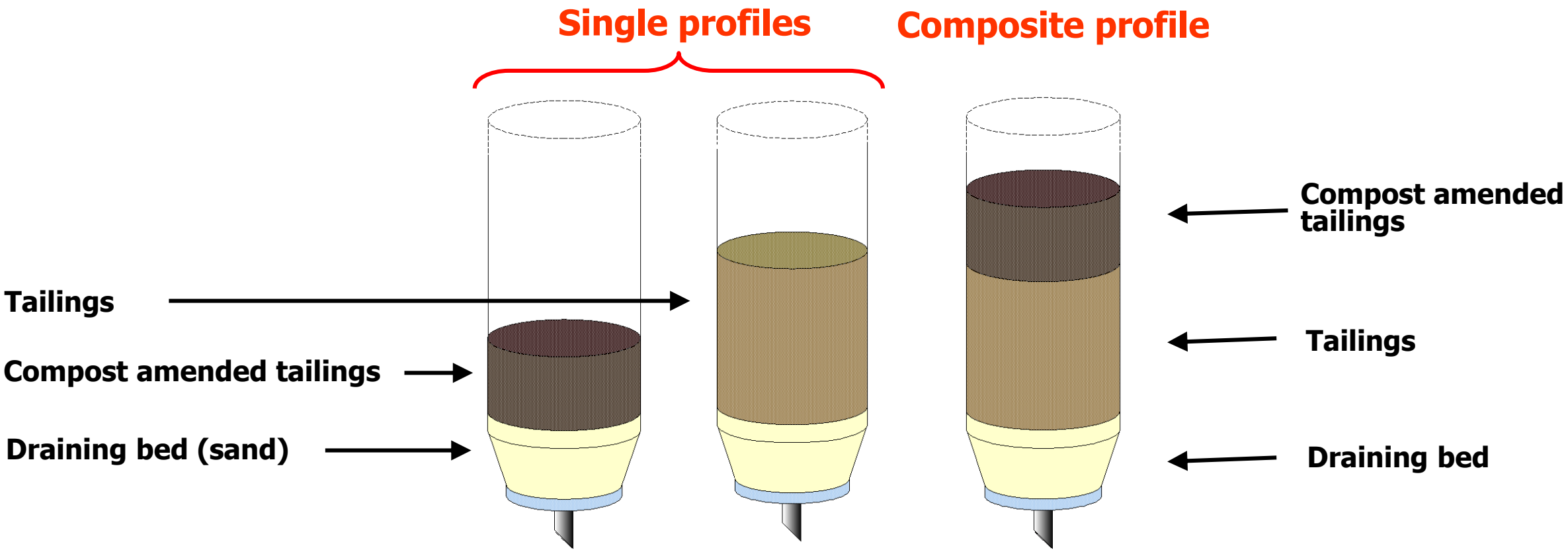


Aims

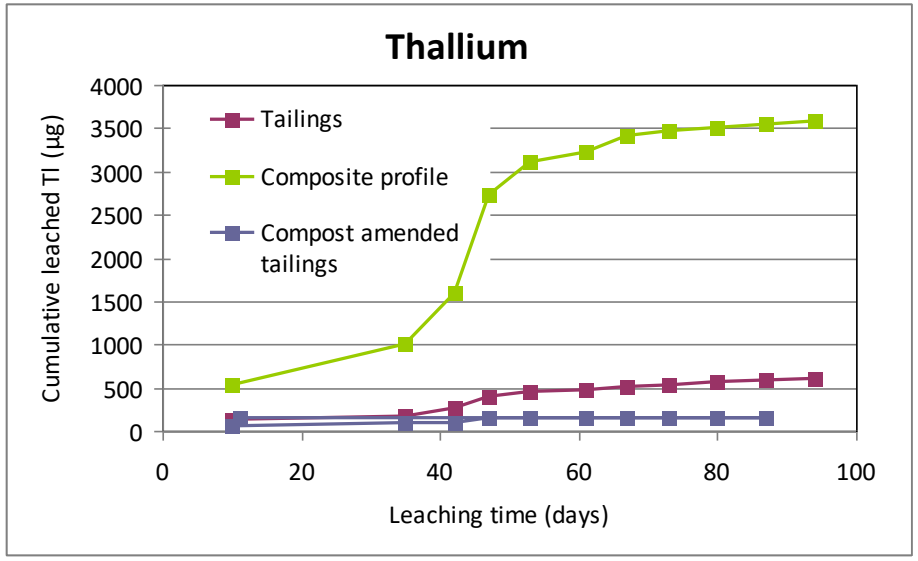
The aims of this study are to assess:

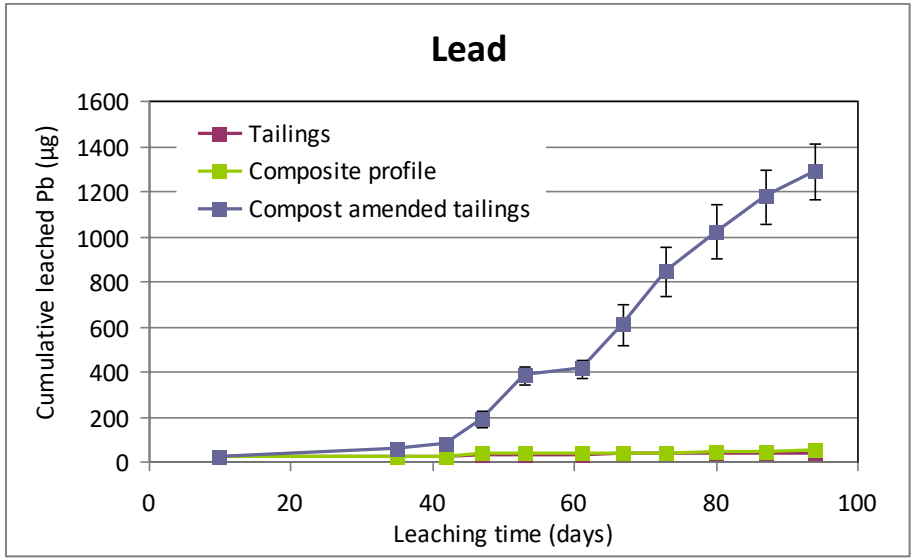
- the effect of metal immobilization treatments on mine tailings;
- the uptake and translocation of Pb, Zn and Tl in the metalliferous plant species Biscutella laevigata (L.) and Silene vulgaris (L.).

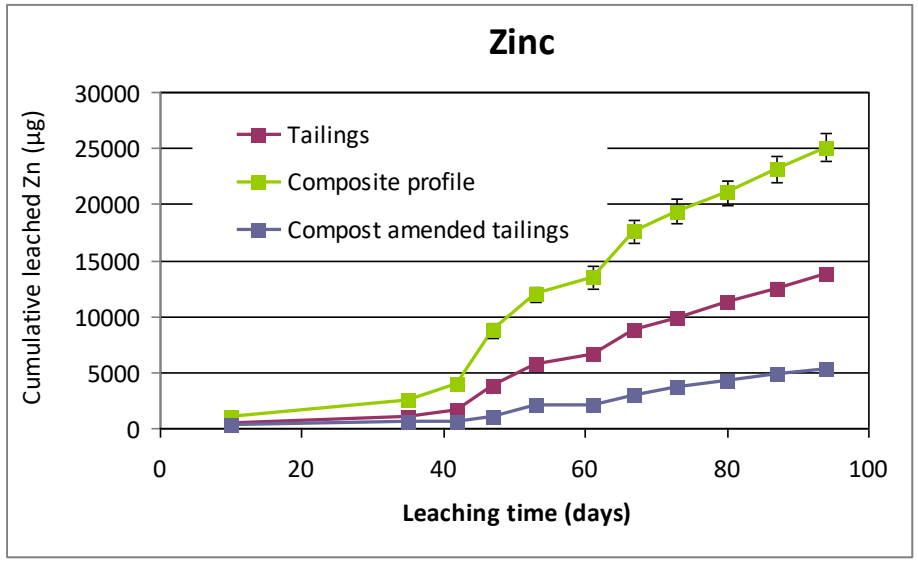
Soil columns:

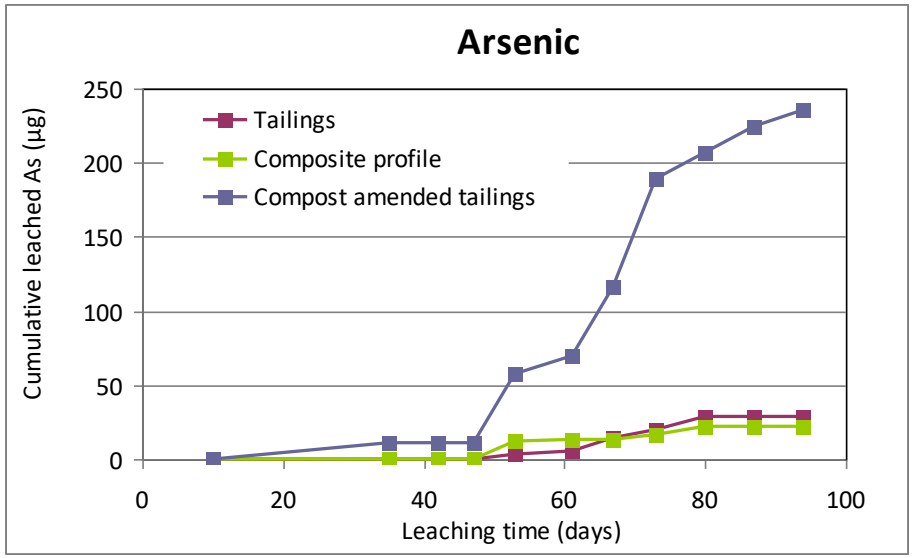


Results: concentration of metals in leaching water

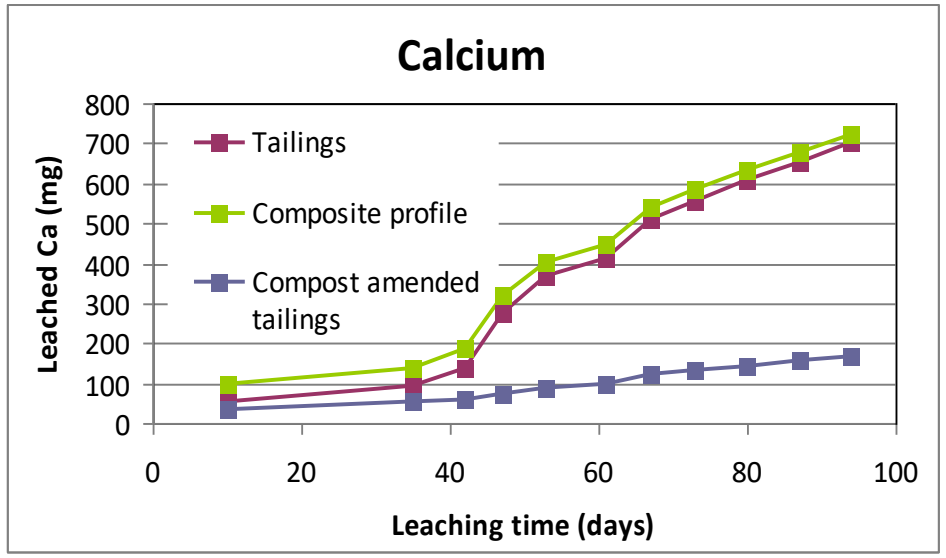


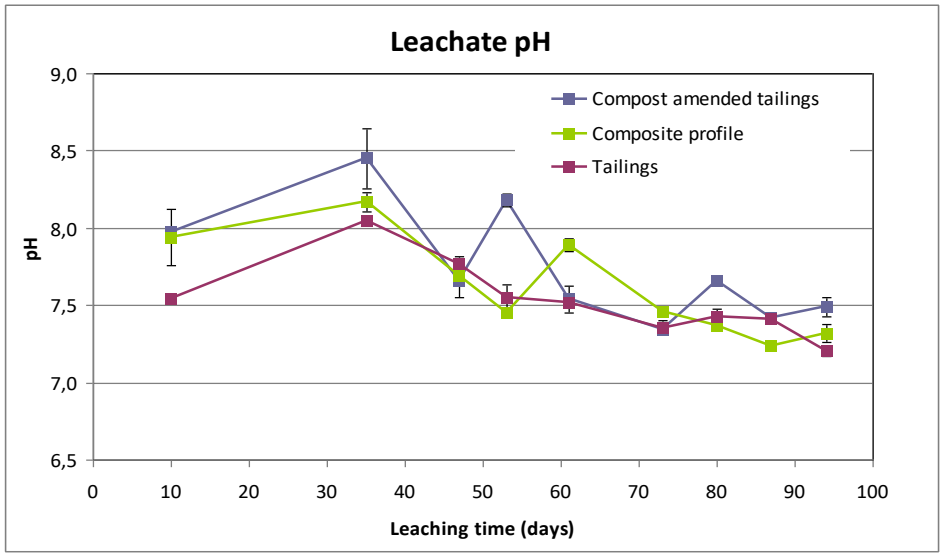


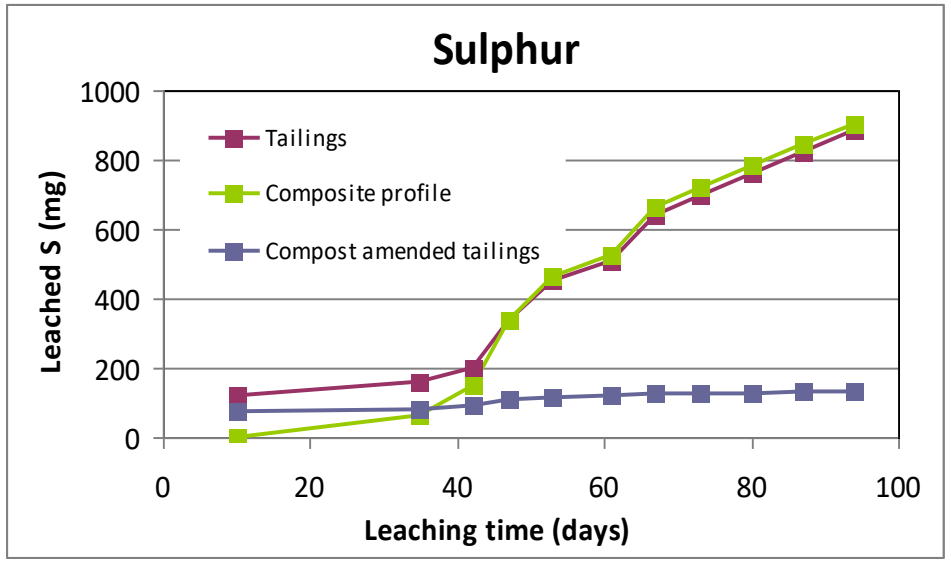


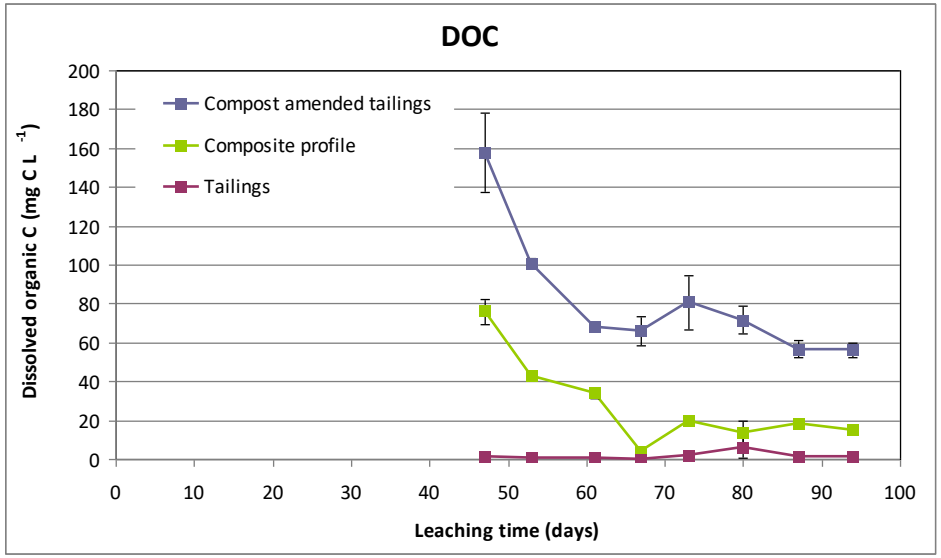


Results: concentration of metals in leaching water









Results: concentration of metals in leaching water

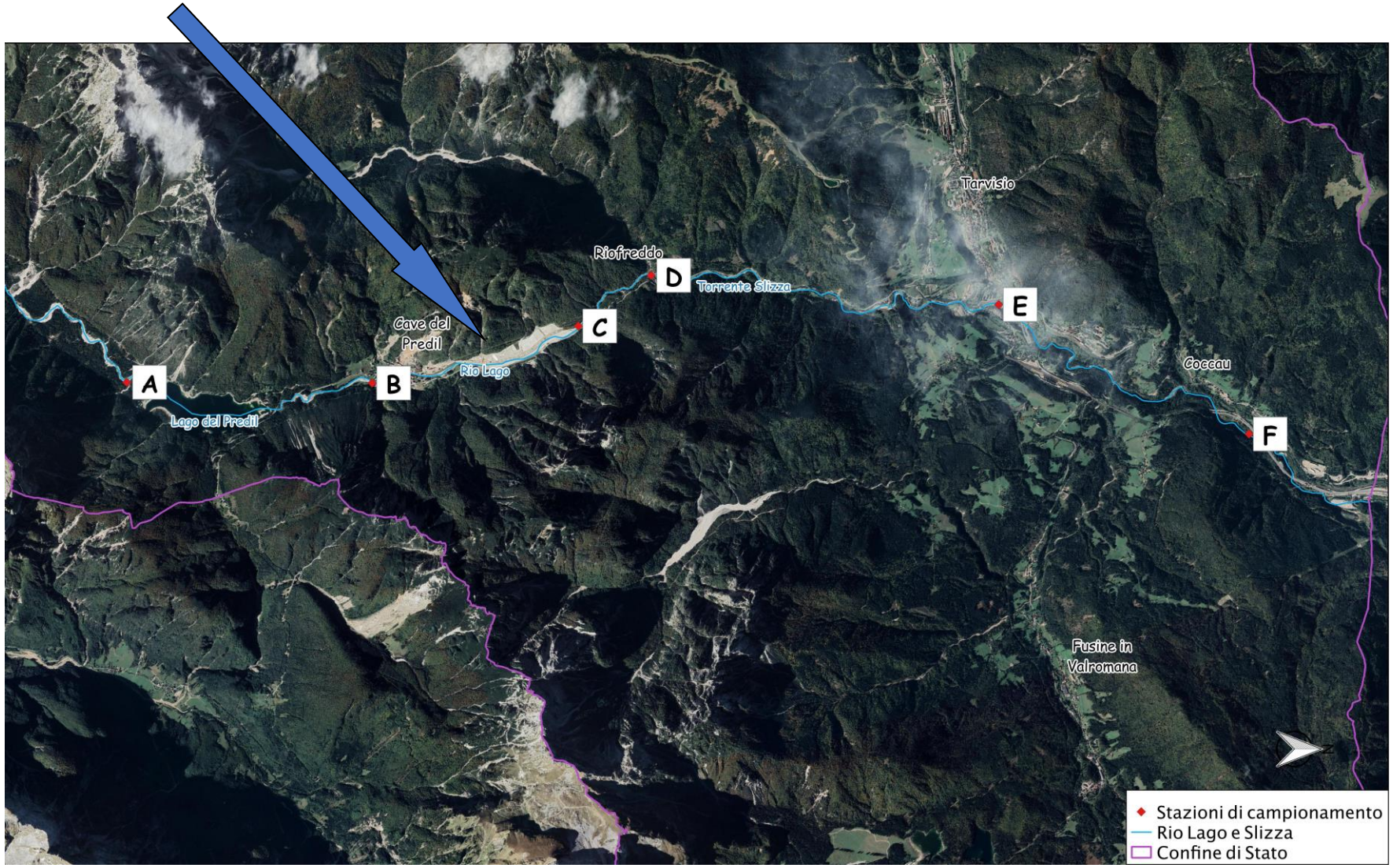
- Significantly more Zn and Tl leached from the composite profile (compost amended tailings + tailings) while Pb and As showed a much larger mobility in the single profile (compost amended tailings).
- The lower horizon of native tailings was therefore able to drastically reduce their leaching from the top horizon.
- This different behavior is coherent with the fundamental role of DOC in the mobilization of Pb and As and with its much lower influence on that Zn and Tl.
- Mobilization of Zn and Tl was governed by S oxidation and to a lesser extent by carbonates.

Target plant species

- *Biscutella laevigata* subs. *laevigata*

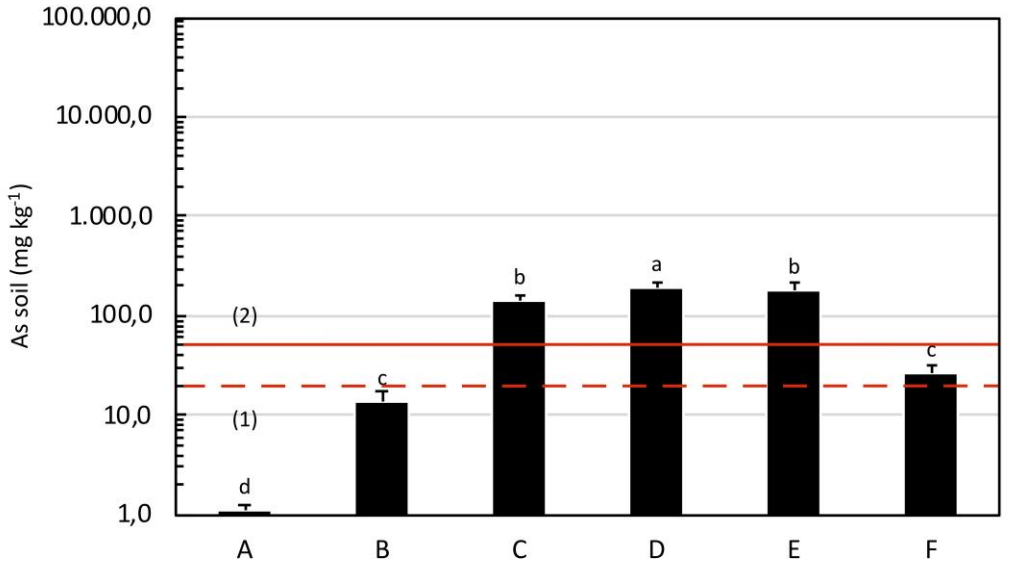
- *Silene vulgaris*

Tailing basins

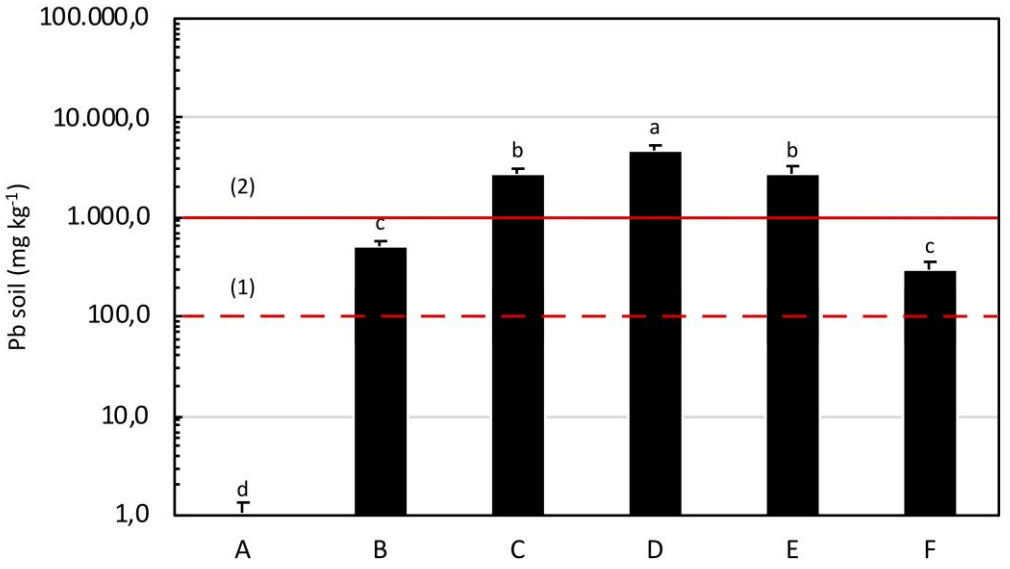


Results: concentration in river sediments

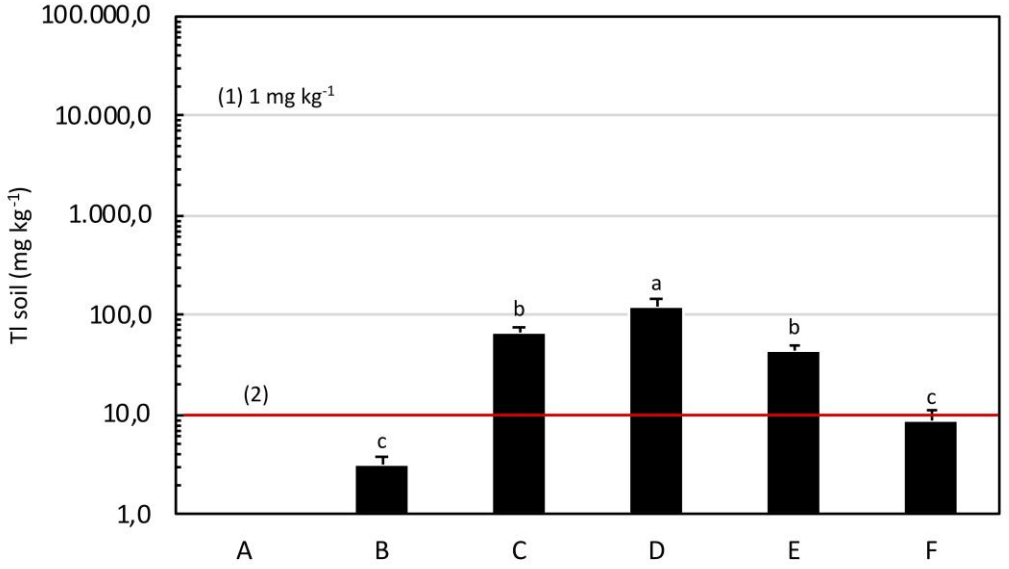
Arsenic



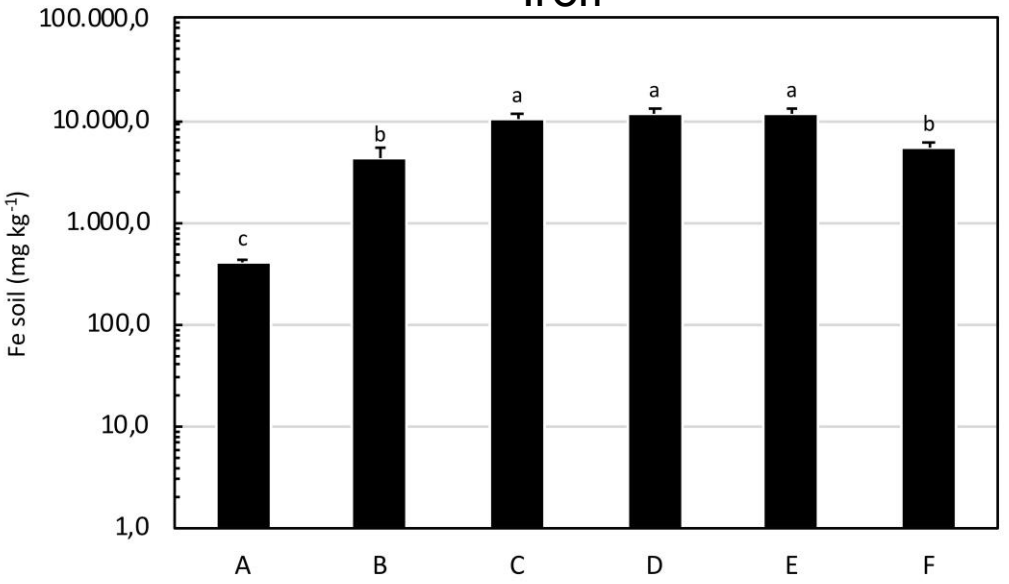
Lead



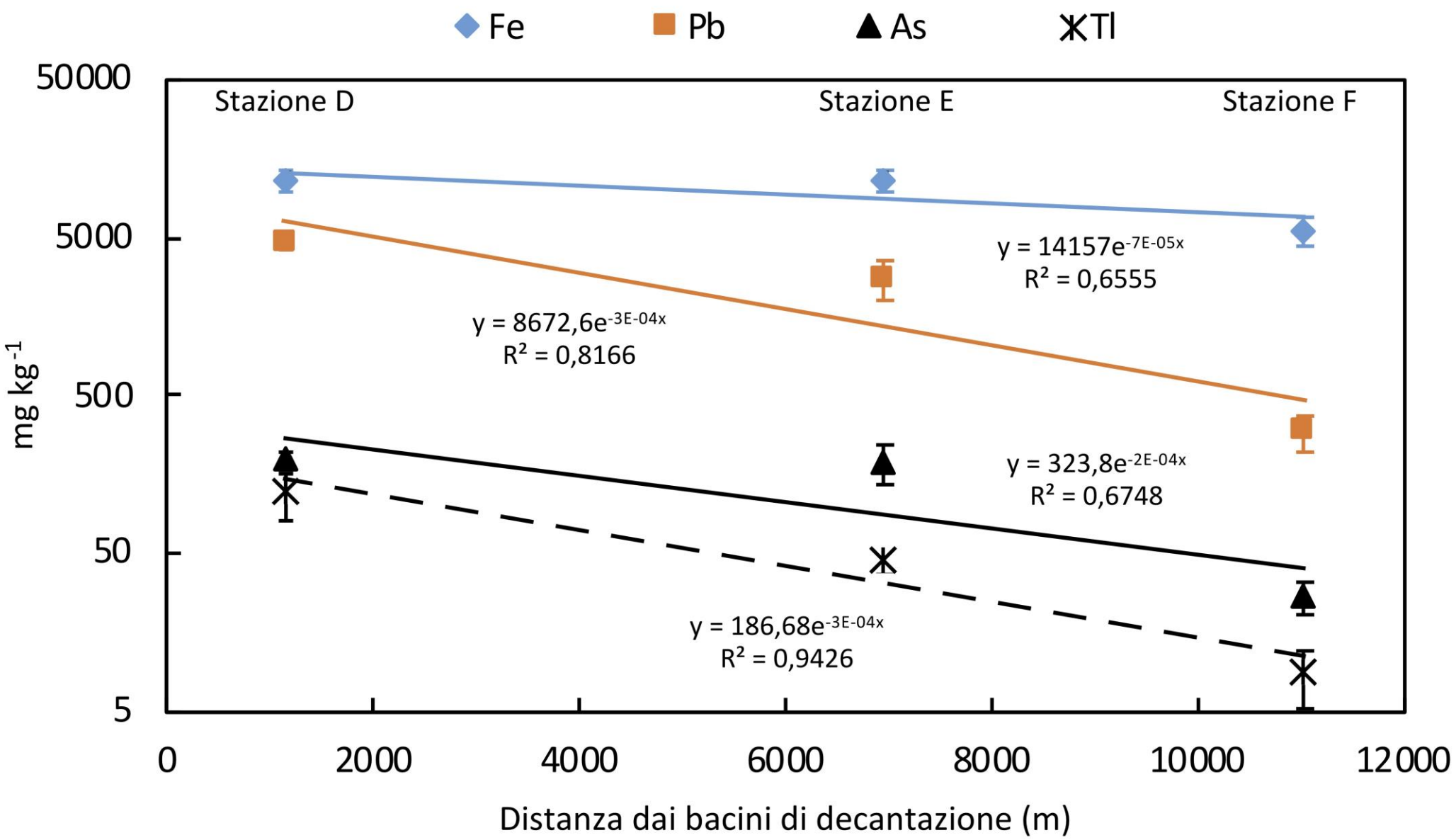
Thallium



Iron

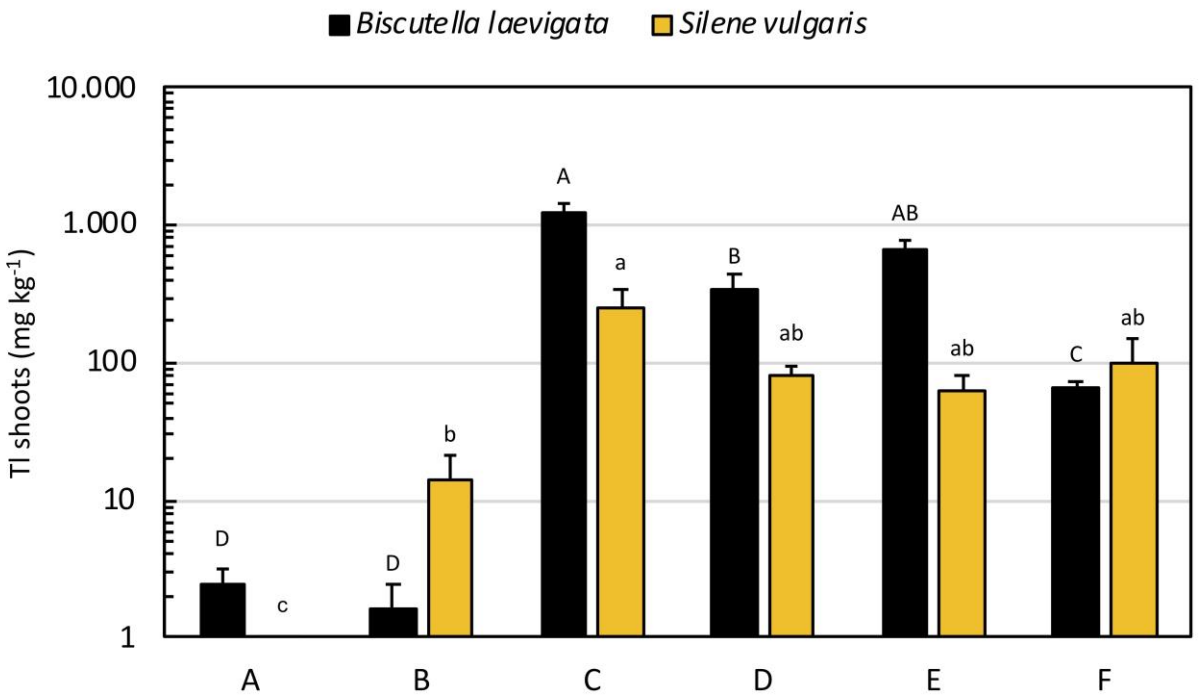


Results: Concentration according to distance from tailing basins

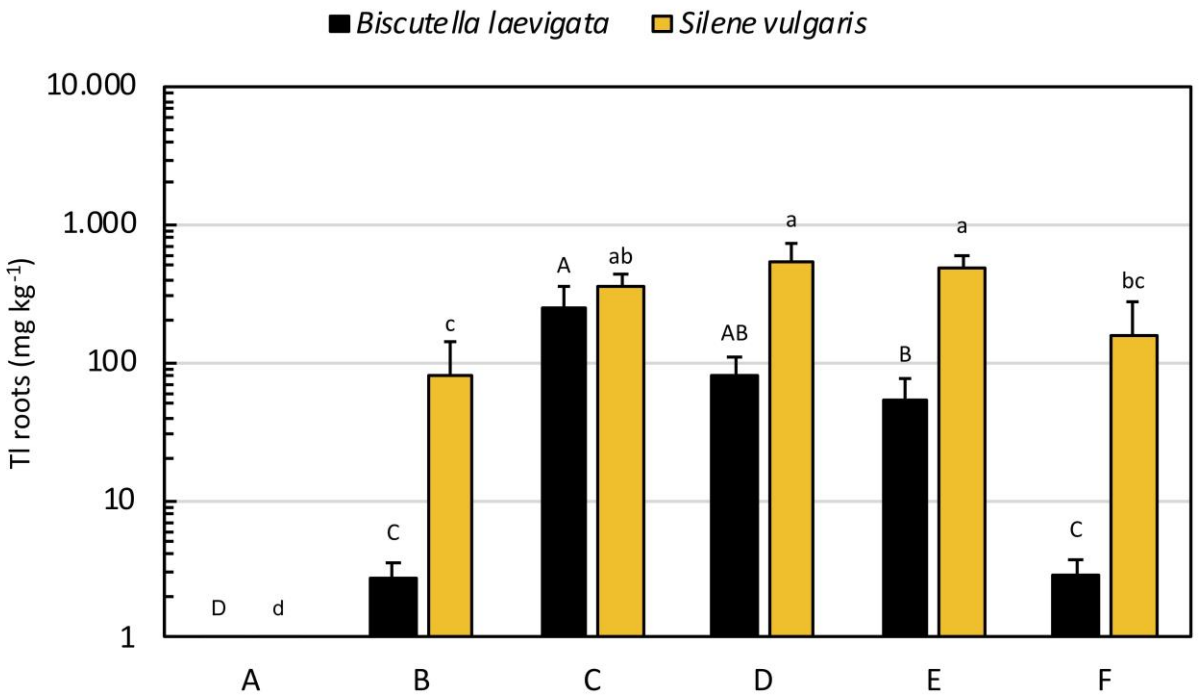


Results: Thallium concentration in plant tissue

--- Aerial part ---

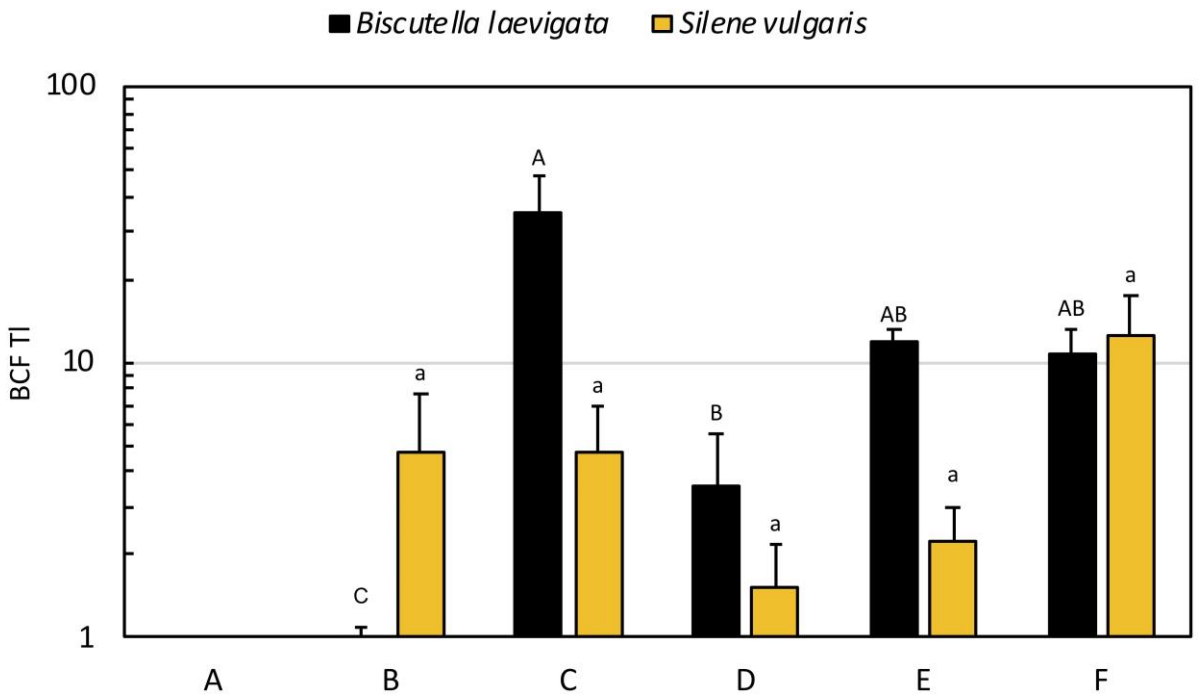


--- Radical part ---

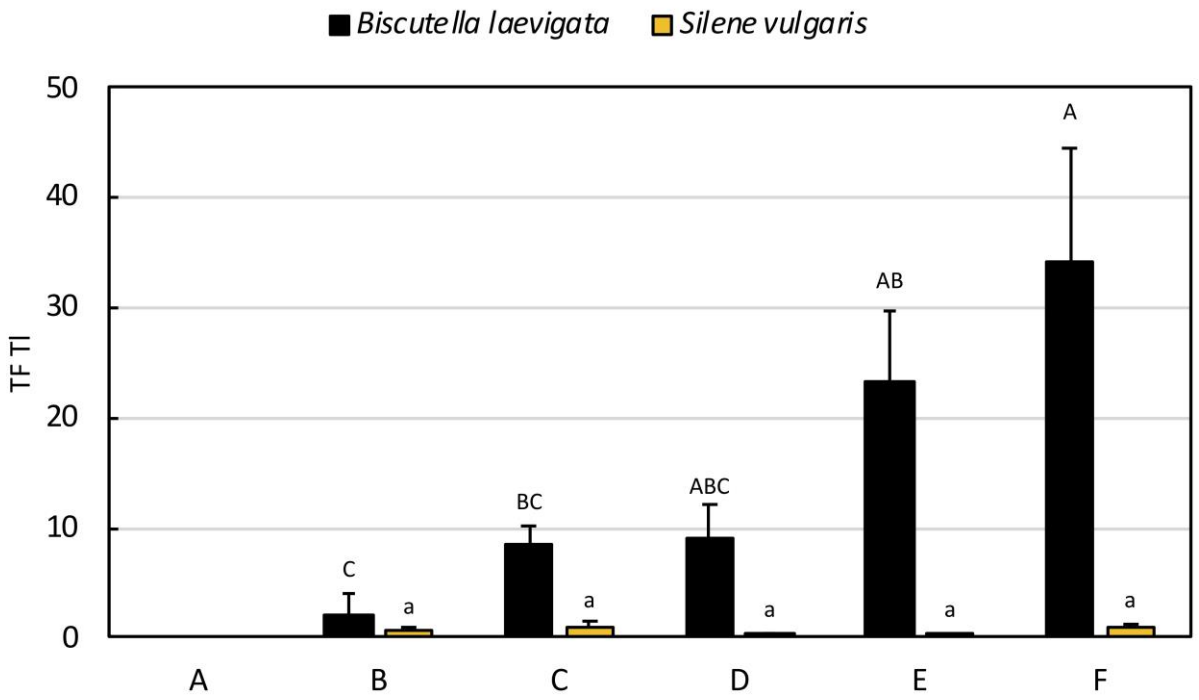


Results: Thallium accumulation in plant tissue

Bioconcentration factor

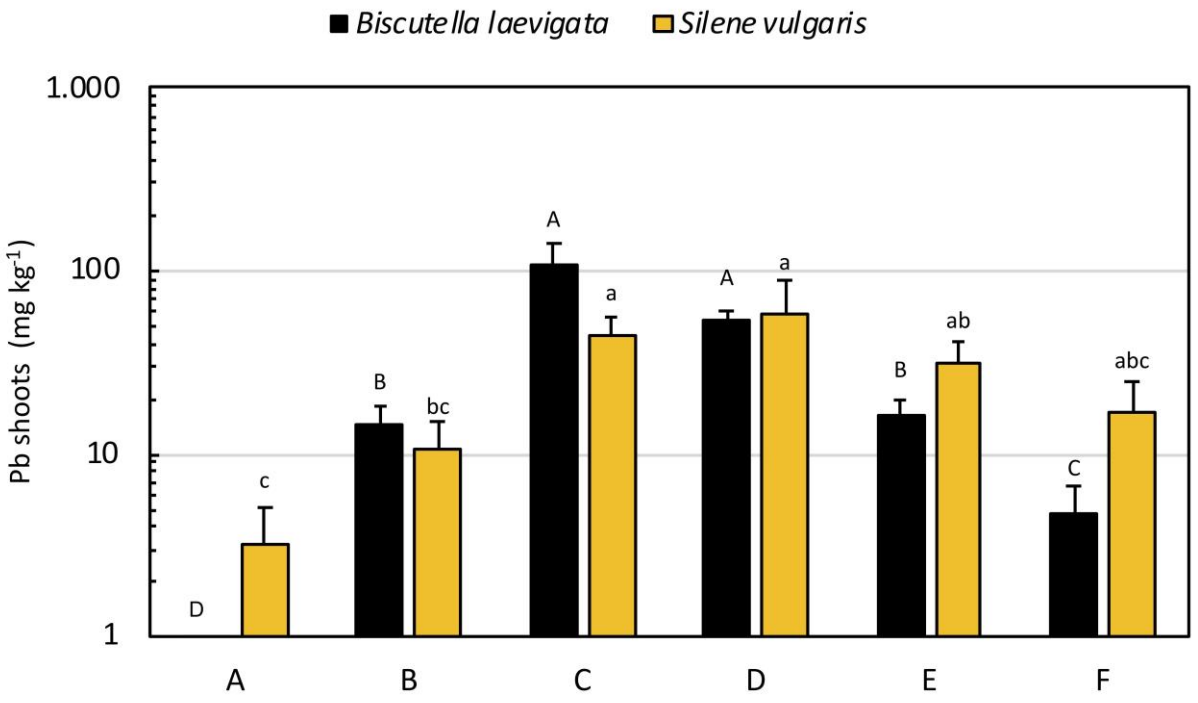


Translocation factor

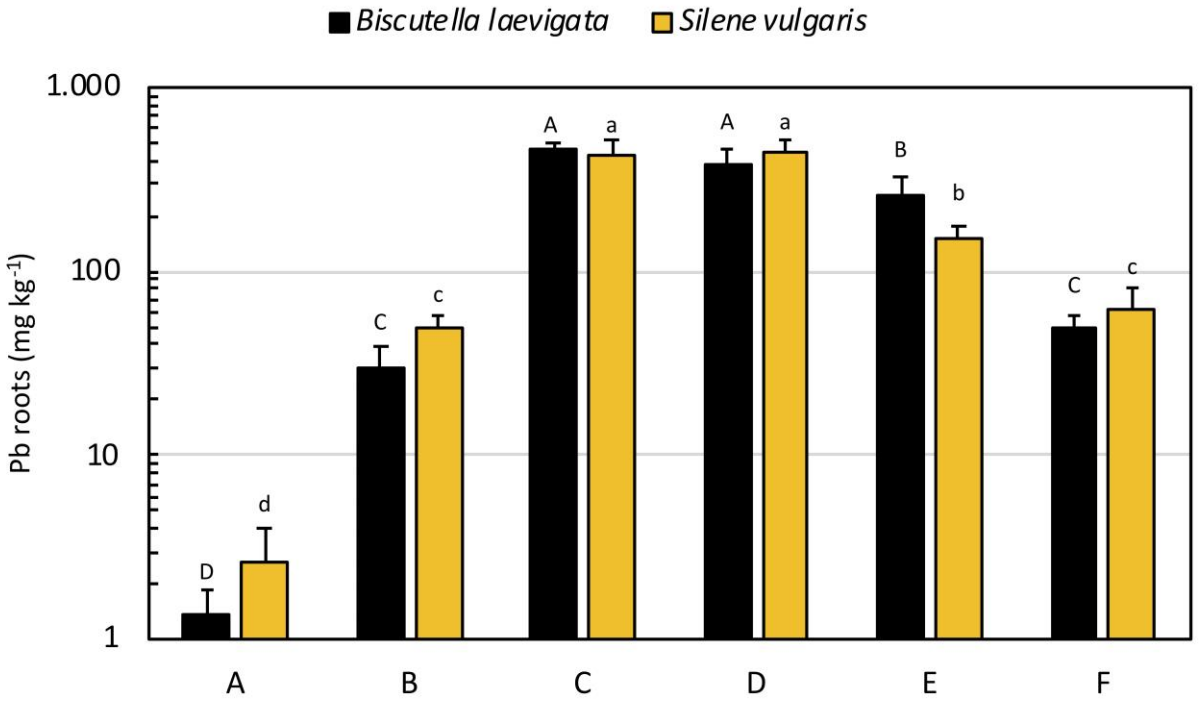


Results: Lead concentration in plant tissue

--- Aerial part ---

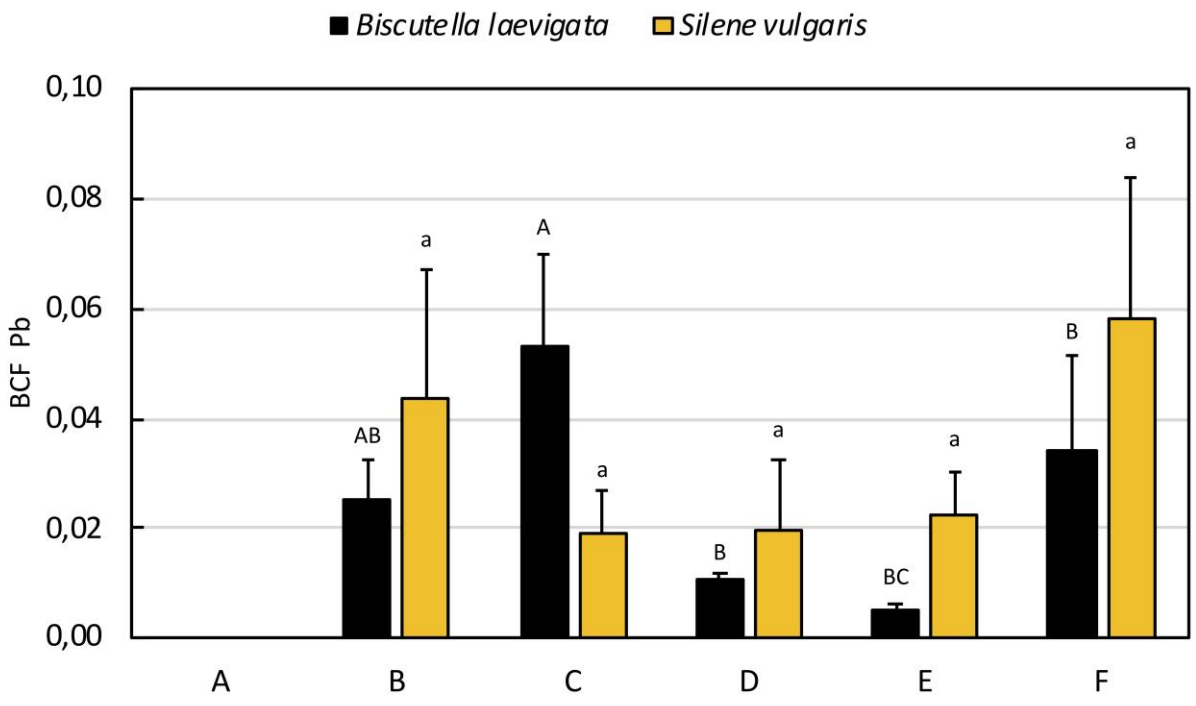


--- Radical part ---

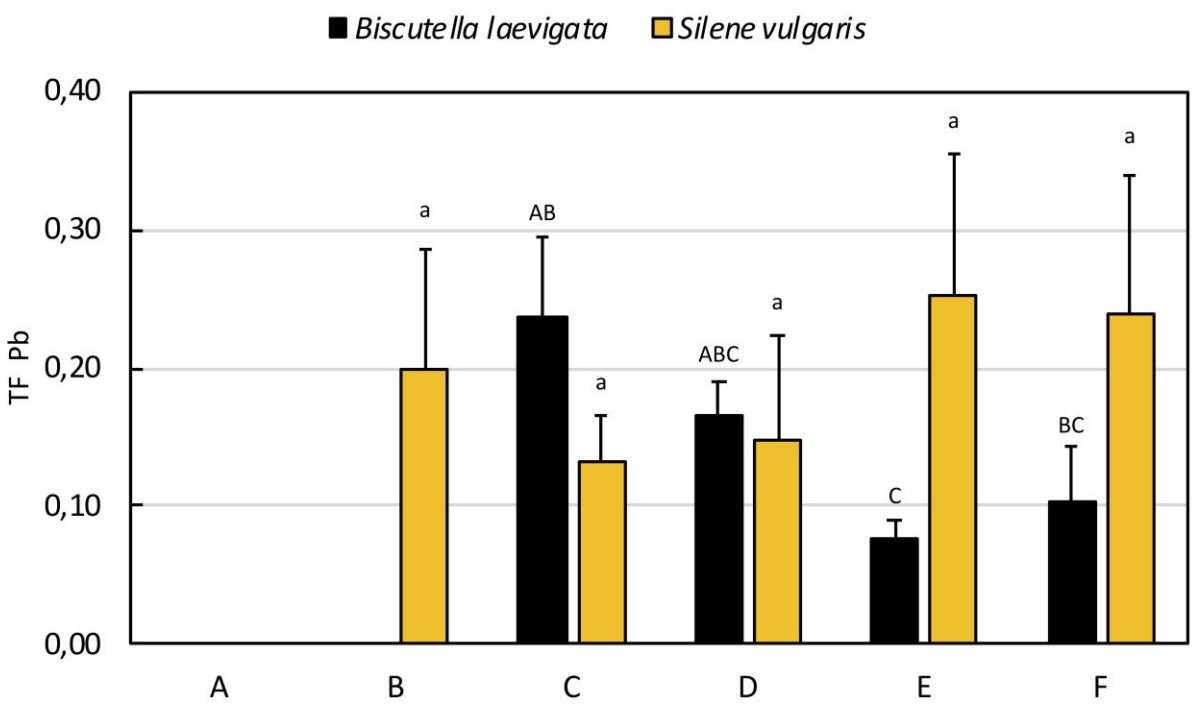


Results: Lead accumulation in plant tissue

Bioconcentration factor



Translocation factor



Conclusions

- No conclusions …. Still work in progress……