

# **Improvement of phytoremediation effects with help of soil fertilization**

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**PLANTS -  
HYPERACCUMULATORS**

**SMALL BIOMASS**

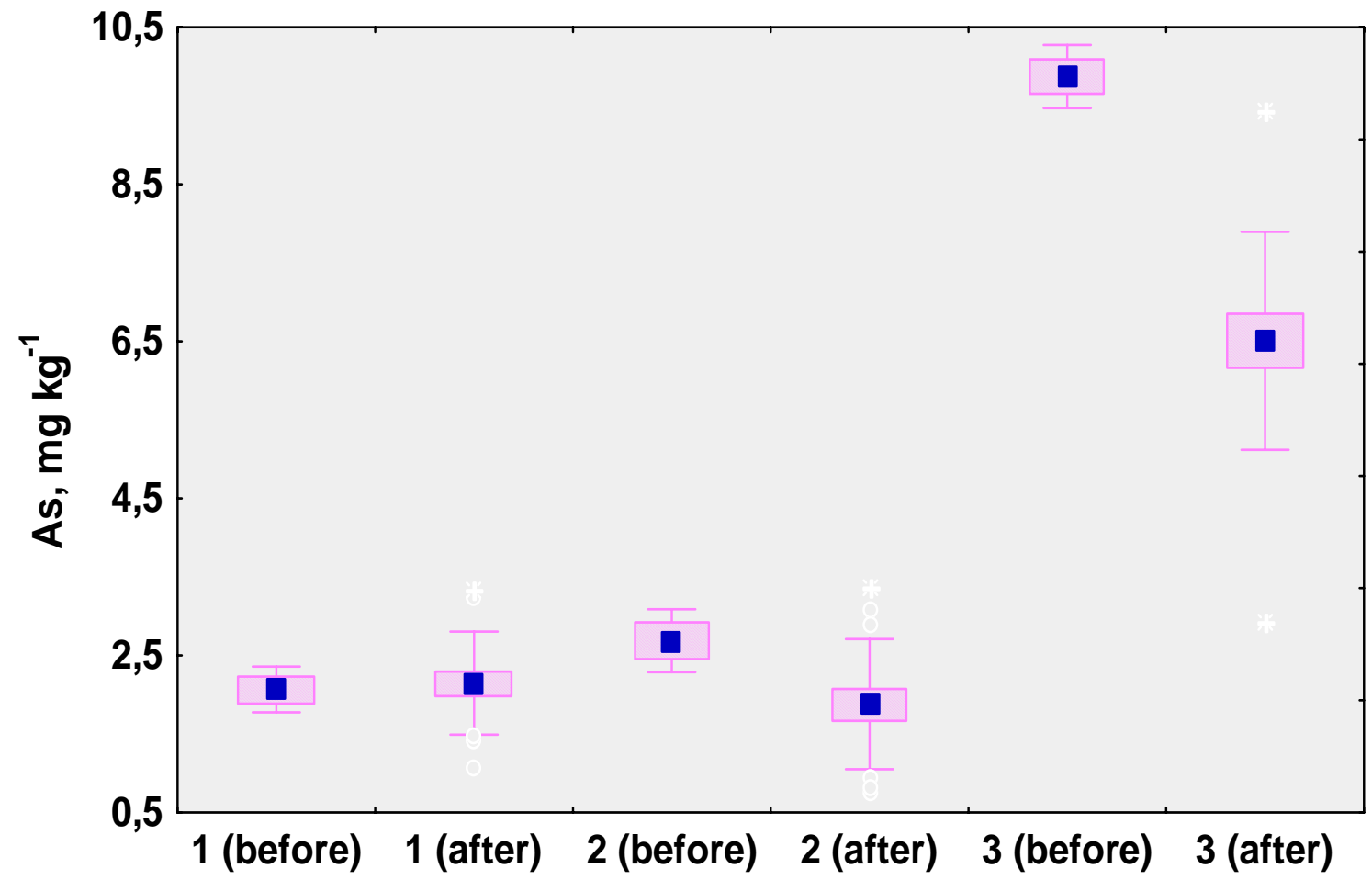
**USUALLY CAN UPTAKE ONLY  
ONE METAL**

**PLANTS WITH LARGE BIOMASS**

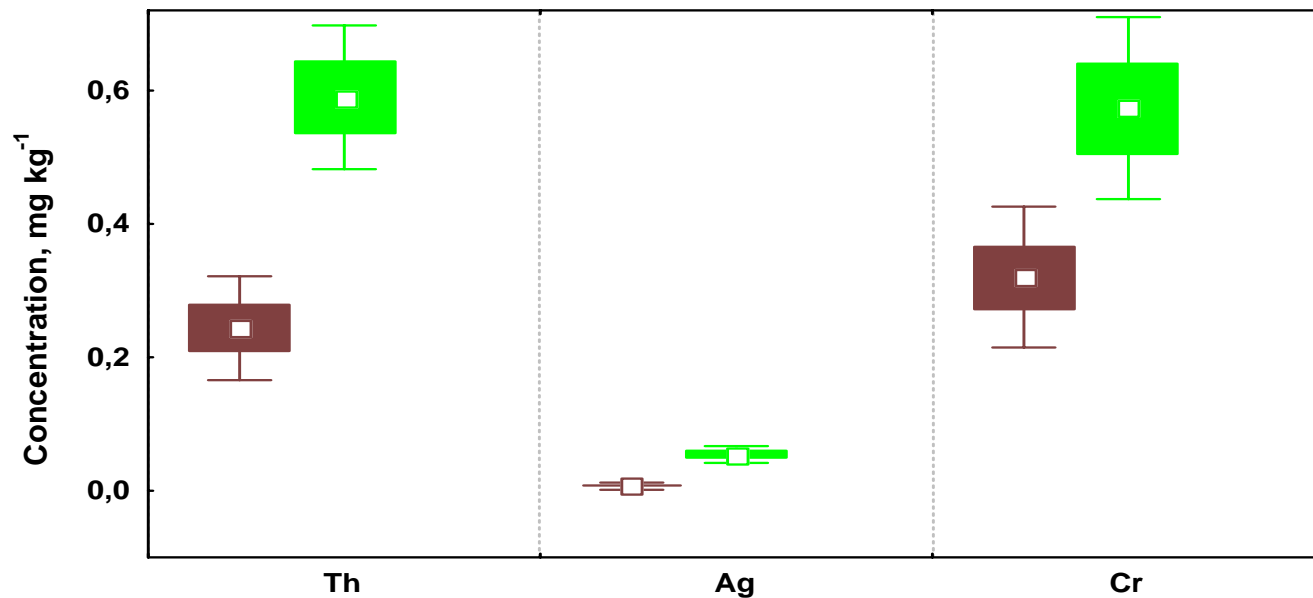
**FERTILIZATION OF SOIL**

**TREATMENT OF SEEDS**

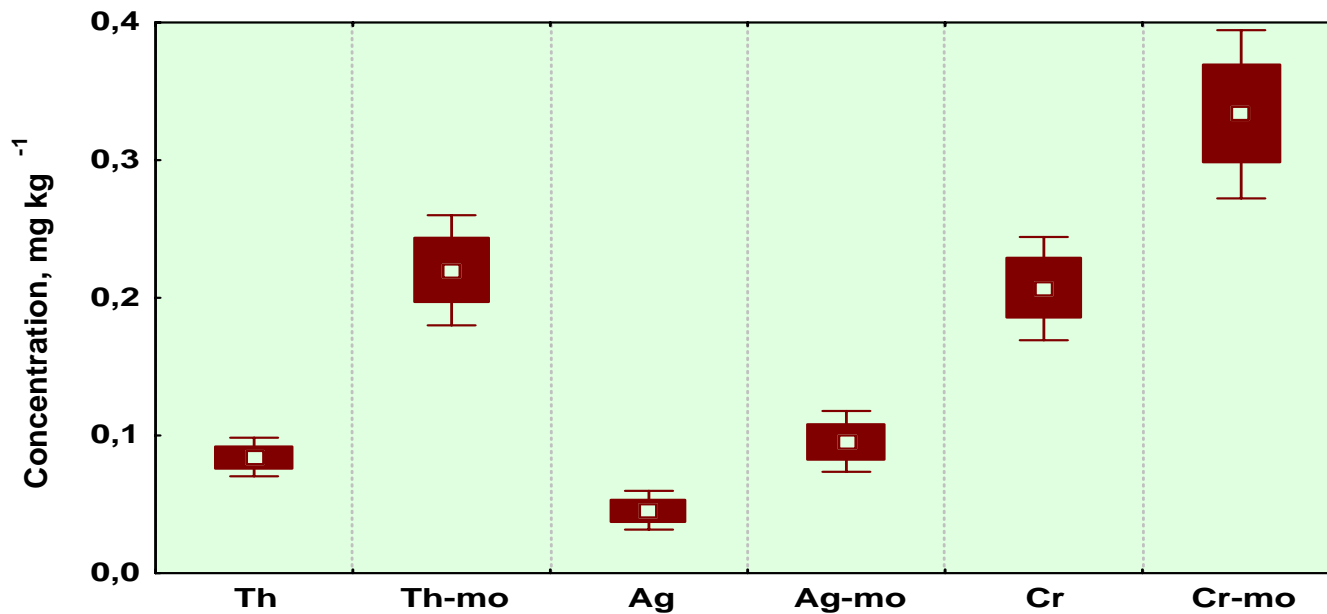
# Soil



### Roots



### Leaves



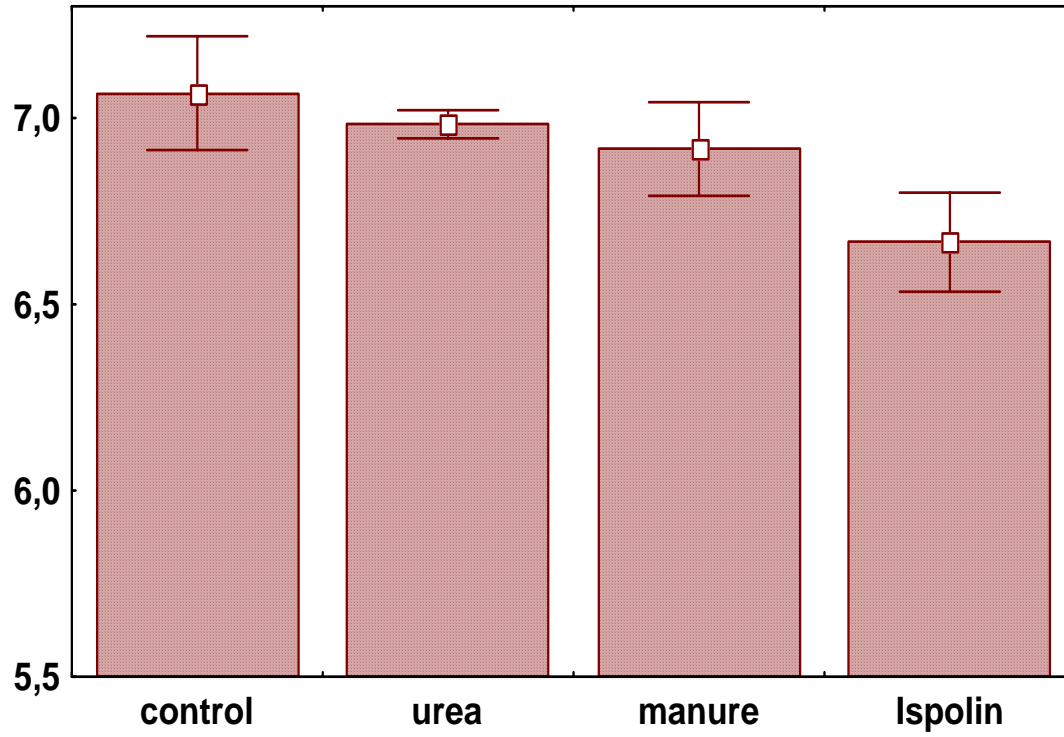
**WHEAT**

**UREA**

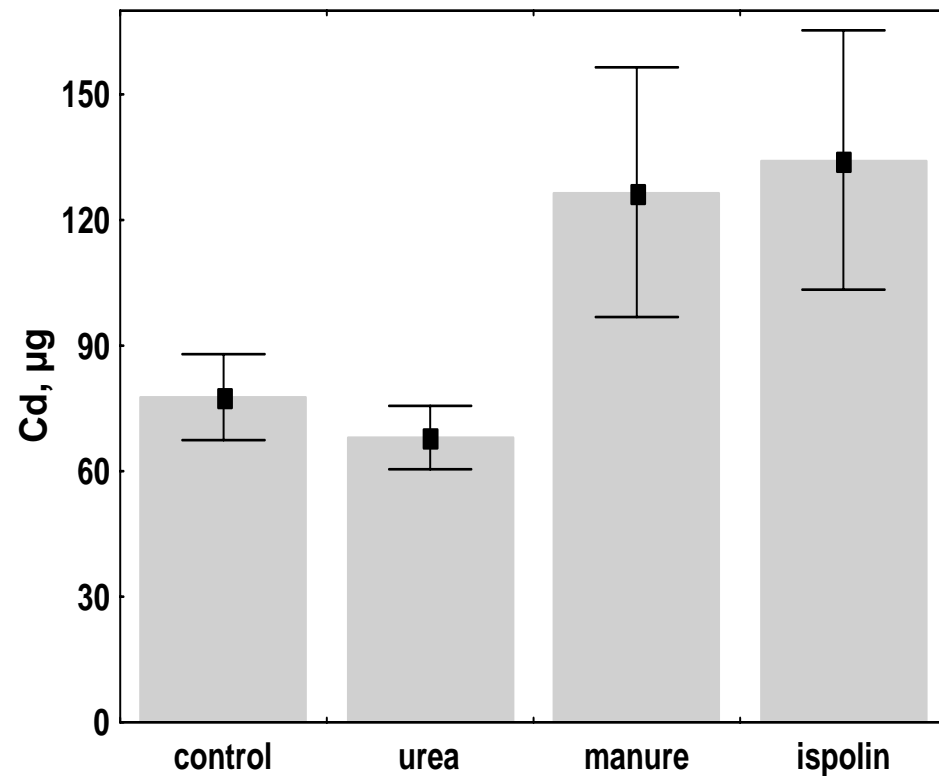
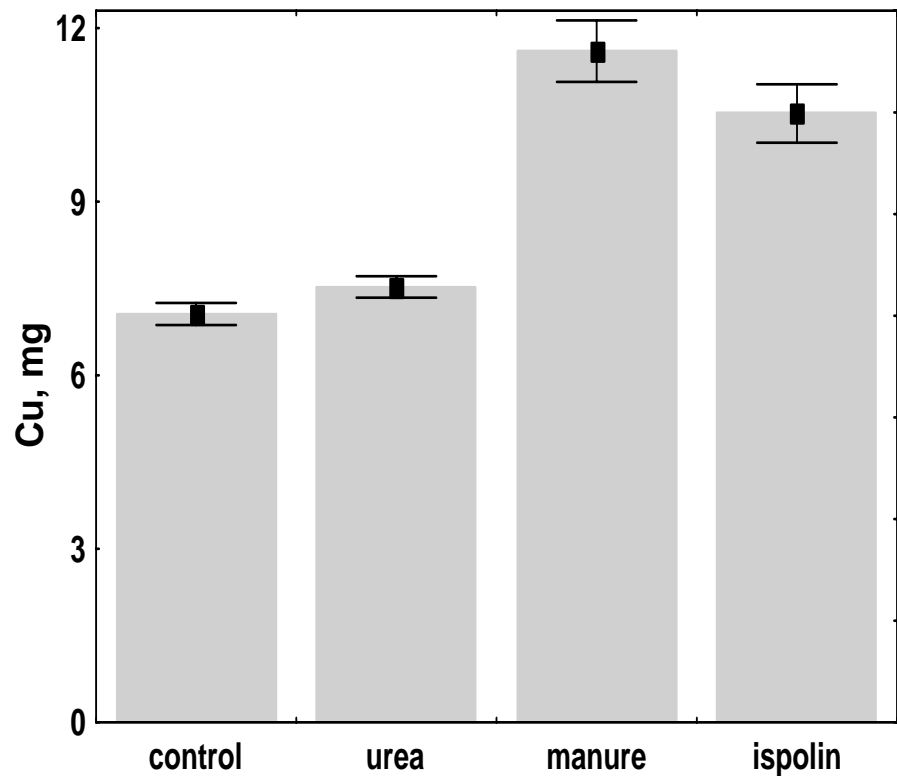
**MANURE**

**ISPOLIN**

soil pH



# AMOUNT OF CU AND CD TAKEN BY PLANT





# Content of metals in contaminated soil (mg/kg)

Metal	Without fertilizers		Without fertilizers		
	Initial soil	Wheat (control)	Urea	Manure	Ispolin
Al	7790	6627	6207*	6373*	6140*
Cd	2.44	1.7*	1.33*	1.56	1.41*
Cu	175	164	151	169	143*
Pb	205	170	155	169	143*
Zn	565	507	555	426*	404*

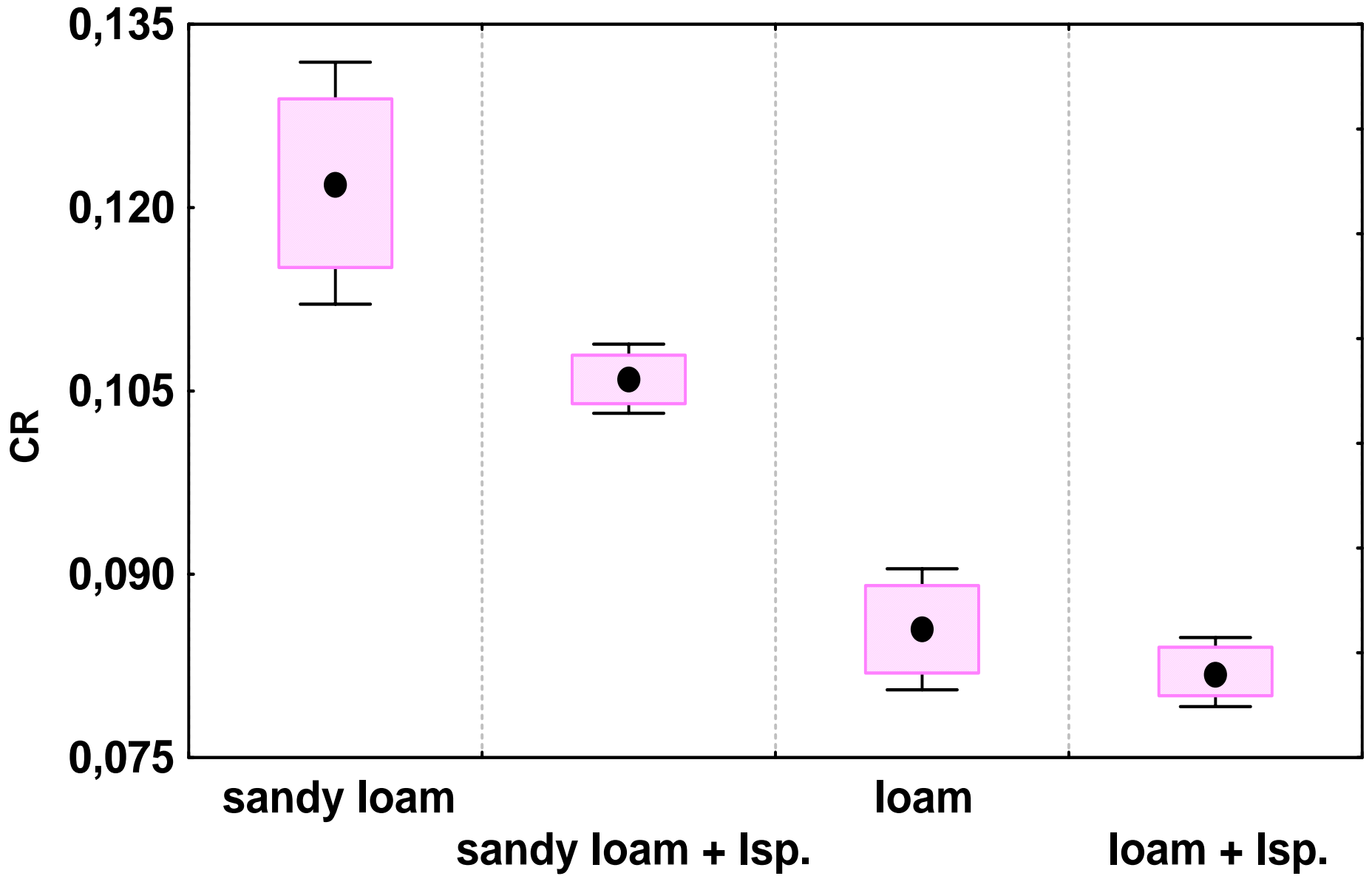
**Nine years** to reduce soil Zn content from  
**440 mg kg<sup>-1</sup> to 300 mg kg<sup>-1</sup>** using plants-  
hyperaccumulators

**one vegetation season**

## EFFECT OF ISPOLIN ON PLANT MINERAL NUTRITION

		Loam		Sandy loam
Roots	↑	K Mo Rb	↑	K Mo Rb P S
			↓	Cd Mg Pb Sb Sr
Leaves	↑	K Mo Rb	↑	K Mo Rb Ni
	↓	B Ba Ca Fe Mg Sr	↓	Li Mg Mn Na Sr

# Chlorophyll



# CONCLUSIONS

- **Application of large biomass crops and soil/seed treatments can improve phytoremediation effects**
- **Careful investigations should precede the use of fertilisers applied to soils**

**Depending on soil type, application of certain fertilisers can result in significant variations in concentrations of macro- and micro-nutrients in plants**