



MASTER THESIS PROJECT

**TRANSFER, ACCUMULATION, AND BIOLOGICAL
IMPACT OF METAL(LOID)S IN A SOIL-WATER-VICIA
FABA-APHID CONTINUUM IN POLLUTED SOILS
REHABILITATED WITH BIOCHAR**

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Summary

Soil pollution by metal(loid)s as a consequence of anthropogenic activities is a contemporary topic demanding study. In order to remediate such soils, an environmentally safe technology known as phytoremediation has evolved in recent decades. In phytoremediation, plants and their accompanying microorganisms are used to treat a polluted site *in situ*. *Vicia faba* showed potential for application in phytoremediation tests in laboratory conditions because of its reliable germination, fast and high biomass production, widespread geographic cultivation, and it is a model for pollutant transfer. Although these pollutants could be transferred to higher food chains through plants and as a result dispersed in the environment. Nonetheless, polluted soils are often deficient (extreme pH, low nutrient content), which, in conjunction with their excessive metal(loid) concentrations, inhibits plant development. Therefore, modifications must be implemented. Biochar, carbon-rich material produced during pyrolysis of biomass, was added as an amendment to former mining site soils. Biochar may improve soil conditions and absorb heavy metals. Biochar showed a high ability to enhance soil characteristics, immobilize cations, and thus promote plant development. However, its function is highly dependent on the characteristics of the soil. In this context, the first objective of this work was to determine the effect of applying biochar amendment, to former mine technosols highly contaminated with metal(loid)s on (i) soil physicochemical properties, (ii) *V. faba* plant growth, and metal(loid) accumulation, and (iii) transfer of pollutants to aphid *Acyrtosiphon pisum* feeding on *V. faba* plants and repellent effects on these insects.