Tropentag, September 14-16, 2022, hybrid conference

"Can agroecological farming feed the world?
Farmers' and academia's views"

Rhizophagus irregularis facilitated plant phosphors nutrient and reduced the shoot hg concentration of *Medicago truncatula*: its implication for food security under Hg-polluted soil

Yaqin Guo[1], Nadine Sommer[2], Konrad Martin[1], Frank Rasche[1]

[1] *University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany*
[2] *University of Hohenheim, Inst. of Plant Physiology, Germany*

Abstract

Mercury (Hg) uptake by plants imposes harmful effects on plants and aggravate problems in food security. However, arbuscular mycorrhizal (AM) fungi can enhance plant tolerance to various environmental stresses, yet Hg-plant-AM fungi interactions are poorly understood. In this study, *Medicago truncatula* was used as a test plant to examine the effects of Hg and AM inoculation (*Rhizophagus irregularis*) on mycorrhizal colonisation, mycorrhizal function (Phosphors as an indicator), plant growth, and Hg accumulation both in roots and shoots. In addition, Zn nutrient uptake and two Zn transporters (MtZIP2 and MTZIP6) were considered to reveal whether AM inoculation influence the root Hg uptake by regulating the Zn transporters. The results showed a negative effect of Hg on mycorrhizal colonisation. However, AM inoculation significantly improved plant P nutrient uptake irrespective of Hg. Besides, both Hg and AM inoculation had negative effects on plant growth, whereby Hg only inhibited the root growth, while AM inoculation reduced both roots and shoots biomass. Results also showed that inoculation with R. irregularis significantly reduced shoot Hg concentrations in Hg-polluted soils, but no effects on root Hg accumulation. Furthermore, *R. irregularis* significantly up-regulated root Zn transporters irrespective of Hg concentrations. These results suggest that Hg uptake by roots may leverage another pathway instead of Zn pathways. More importantly, our results suggested that the significant reduction of shoot Hg accumulation by R. irregularis can be a promising way for safe production of plants in Hg-polluted soils, although other plants and AM species, as well as field experiments should be further proved.

Keywords: AM fungi, heavy metals, Hg accumulations, plant-microbe interaction, root Hg uptake, Zn transporters

Contact Address: Yaqin Guo, University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Garbenstr. 13, 70599 Stuttgart, Germany, e-mail: yaqin.guo@uni-hohenheim.de