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“Filling gaps and removing traps  
for sustainable resource management”

## Arbuscular Mycorrhizal Fungi in Phytoremediation of Mercury Polluted Soils in Ghana and Burkina Faso

SERGEY BLAGODATSKY<sup>1</sup>, MIRIAM EHRET<sup>2</sup>, FRANK RASCHE<sup>1</sup>, IMKE HUTTER<sup>3</sup>, REGINA BIRNER<sup>1</sup>,  
BELOVED M. DZOMEKU<sup>4</sup>, OBLÉ NEYA<sup>5</sup>, GEORG CADISCH<sup>1</sup>, JENS NORBERT WÜNSCHE<sup>6</sup>

<sup>1</sup>University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany

<sup>2</sup>University of Hohenheim, Research Center for Global Food Security and Ecosystems, Germany

<sup>3</sup>INOQ GmbH, Germany

<sup>4</sup>CSIR - Crops Research Institute, Ghana

<sup>5</sup>West African Science Service Center on Climate Change and Adapted Land Use (WASCAL), Competence Center, Burkina Faso

<sup>6</sup>University of Hohenheim, Inst. of Crop Science, Germany

### Abstract

Small-scale gold mining in Ghana and Burkina Faso (West Africa) contributes significantly to national economies and people livelihood. This activity causes, however, high environmental risks. Unregulated surface gold mining contributes to deforestation and land degradation in these countries. In addition, illegal mining operators use a technology for gold amalgamation that pollutes the environment with mercury (Hg) and adversely affects human health. The overall objective of the BMBF-funded Mercury-AMF-project is to reduce the environmental damage caused by mercury used in gold mining in Ghana and Burkina Faso. This will be achieved by developing and implementing novel arbuscular mycorrhizal fungi (AMF) - plant systems as a strategy to reclaim mercury-contaminated sites. The cultivation of pioneer plants on contaminated soils can reduce the mercury pollution. Symbiotic mycorrhizal associations of those plants may strengthen the potential to remediate Hg-contaminated soils.

The implementation of the project is based on the following specific activities:

1. Characterisation of the arbuscular mycorrhizal fungus (AMF) candidates in the soils of Ghana and Burkina Faso;
2. Development of prototype AMF plant systems as an innovative strategy for the remediation of Hg-contaminated sites;
3. Testing of mycophytoextraction methods to reduce the Hg soil concentration below threshold values;
4. Examination of the return of Hg-contaminated sites to agricultural use and the promotion of sustainable land management in gold mining regions;
5. Set-up of modelling approaches for the efficiency of mycophytoextraction methods and Hg plant uptake;
6. Exploration and communication of institutional and socio-economic framework conditions for the introduction of AMF plant systems.

During the first 6 month of the project soil and plant sampling campaigns were organised for screening the AMF-candidates capable for symbiosis with local plant species and tolerant to the mercury pollution. Clarification of possible mechanisms of phytoremediation is the next essential component of the research: several pathways of decontamination are possible including phytostabilisation, phytovolatilisation and phytoextraction. Based on the first results, field experimental trials with new AMF-plant systems will be established.

**Keywords:** Arbuscular mycorrhizal fungi-plant systems, gold mining, mercury-contamination, phytoremediation