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CLIENT II
Internationale Partnerschaften
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Mercury AMF – Phytoremediation of contaminated mining sites in Ghana and Burkina Faso

Client II – International partnerships for sustainable innovations

In Ghana and Burkina Faso, mercury is used in manual small-scale gold mining. Agricultural land is contaminated by the use of mercury, which has drastic effects on the environment and human health. In the "Mercury AMF" collaborative project, partners from Germany, Ghana, and Burkina Faso investigate an innovative process for decontaminating mercury-polluted soils in West Africa. This approach sees arbuscular mycorrhizal fungi (AMF) plant systems being developed and tested as a means of extracting mercury.

Consequences of small-scale gold mining

The small-scale, often illegal, gold mining sector in Ghana and Burkina Faso has a strong impact on the ecological and socio-economic development of the neighboring communities. Gold miners use mercury to break down gold for amalgamation. This is a process in which raw materials containing gold are mixed with liquid mercury. This liquid amalgam is then heated to extract the free gold. Consequences include the contamination of drinking water and agricultural land as well as health problems in people working in the mining industry. To counteract the negative consequences of gold mining, Ghana and Burkina Faso have enacted laws governing land recovery after gold mining. Mine operators are encouraged to grow crops that can thrive on polluted land and steadily reduce mercury levels in the soil.

Gold mining site in Burkina Faso.

Tropical, nitrogen-fixing trees (legumes), which form a symbiotic relationship with nitrogen-fixing nodule bacteria (rhizobia), show promising potential for the desired recovery of land for agricultural production; this process is called phytoremediation. Furthermore, many types of legumes have a dense network of fine roots, which come into contact with root fungi (mycorrhiza) and can form a lasting symbiosis of fungi and plants. With their dense network of hyphae, it is highly likely that these mycorrhizal fungi will increase the potential for decontaminating mercury-polluted soils.

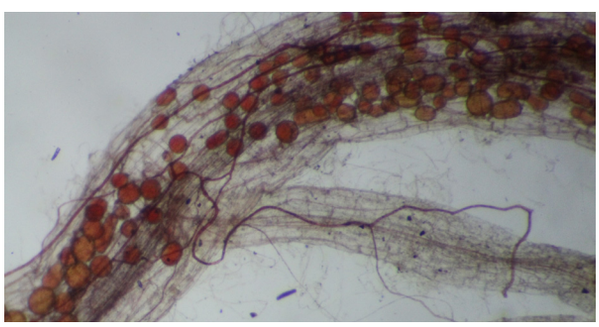
Innovative AMF plant systems

The "Mercury AMF" project builds on this scientific foundation. The researchers are the first to utilize a biosustainable arbuscular mycorrhizal fungus (AMF) plant system for the decontamination of mercury-polluted gold mines in Ghana and Burkina Faso. Arbuscular mycorrhizal fungi (glomeromycetes) are a common form of mycorrhizal fungi that form tree-like hyphae structures within the root cortical cells. The innovative method of mycophyte extraction, which is based on a symbiosis of selected plants with mycorrhizal fungi, is to be used to accumulate mercury and thus to decontaminate mercury-polluted sites. Partners from Germany, Ghana, and Burkina Faso are working together to make an important contribution to building knowledge about the principle of mycophyte extraction and its real-world application in a specific case. Different local stakeholders are involved in using the results to market products and services in West Africa.

Local transfer of knowledge and results

The phytoremediation of mercury-contaminated soils using AMF plant systems has never been carried out before and requires a well-founded, interdisciplinary research approach. "Mercury AMF" applies basic technological, soil-ecological, and plant-physiological research to investigate soil bioavailability, the accumulation of mercury in various different plants, and interactions

with AMF in this process. At the same time, social science research is utilized to analyse the institutional and socio-economic context for the application of AMF plant systems. Stakeholder groups, such as operators of commercial and small-scale mines, and individuals from the fields of administration, policy-making, and business will be involved from the very beginning of the project and also benefit from accompanying capacity-building measures. This approach guarantees that the project's results will have a lasting effect in Ghana and Burkina Faso.



Symbiosis between mycorrhizal fungi and vegetable fine roots.

Within the scope of this project, INOQ GmbH is able to work in cooperation with local companies such as tree and plant nurseries to develop a phytoremediation and phytoextraction service. Following an establishment phase on the Ghanaian and Burkinabe markets, there are also long-term plans to develop the market in other regions of Africa. The company aims to provide a variety of consulting services, such as infrastructure development, technical staff training, and on-site consulting for local authorities and businesses. The target market for these services includes a large number of countries that conduct mining activities in similar agro-ecological zones.

Overall, the project will play an important role in decontaminating mercury-polluted soils in Ghana and Burkina Faso, thus helping to eliminate the corresponding damage to environmental and human health.

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