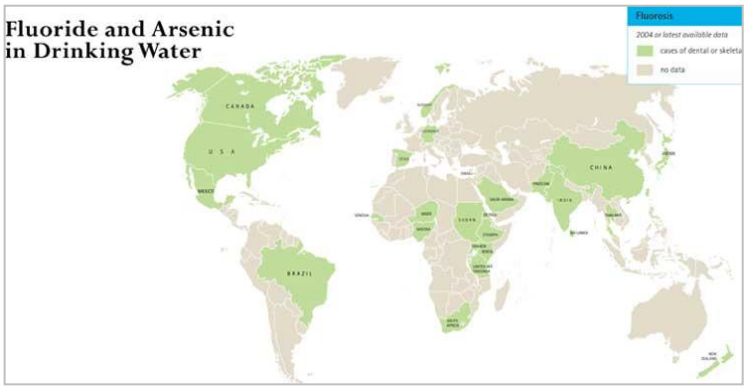
NEW ECOLOGICAL TECHNIQUES FOR THE ABSORPTION OF ARSENIC FROM SOIL USING CHINESE FERN

By Anna Belorozovich



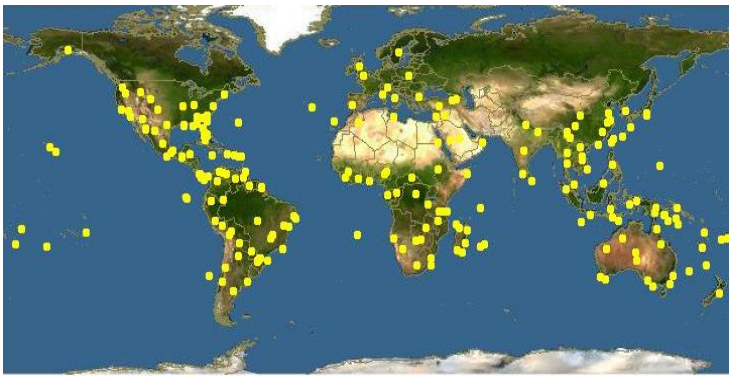
While arsenic contamination of soils and water is causing great concern for environment and human health, interesting ecological solutions for remediation are being studied. As shown on the map published by the World Health Organization, the problem is affecting many regions of the world. Arsenic is a natural element that can contaminate soil, as well as groundwater used for drinking and irrigation. Arsenic contamination is also a common result human activity such as industrial pollution, mining and agriculture where arsenic is used as pesticide.

By being present in soil and water, it can contaminate food production with serious consequences on human health. In Bangladesh, for example, large numbers of people are regularly drinking water containing more than 100 times the usual concentration of arsenic. Exposure to arsenic may have adverse effects on populations including poor growth, failure to reproduce and death. In regions like Bangladesh, West Bengal in India, and Taiwan adverse effects on health such as skin changes and cancer have been experienced by people living in contaminated areas.

New interesting studies are emerging all over the world after the Chinese discovery of the potential of *Pteris Vittata*, otherwise called Chinese brake fern, as hyper-accumulator of arsenic from soil. While arsenic is generally considered phytotoxic and affects negatively plant growth, the reaction of P*teris Vittata* to contaminated soils is completely different. This fern has a large accumulating capacity to arsenic and experiments have shown that the biomass of P. Vittata was greatly enhanced when arsenic reaches high concentration level in soils.

The fern absorbs arsenic from soil through its roots and moves the poisonous substance from its roots to its leaves, releasing it into the air. Experiments conducted in greenhouses, with an environment similar to the subtropics, show that the *P. Vittata* can remove almost 90% of the total uptake of arsenic from contaminated soils, grew rapidly with great biomass, wide distribution and easy adaptation to different environmental conditions and it is effective at volatilizing arsenic.

Is there a chance that Chinese brake fern may represent an ecologic solution for cleaning up contaminated soils and preventing contamination of waters and risks on human health? The good news is that *P.Vittata* is widely distributed on every continent, being easily adaptable to different soil types as well. It is especially typical of the East, tropical and Southern Africa, temperate and tropical Asia and Australia, while being introduced in many American States.



While the discovery belongs to researchers from the Chinese Academy of Sciences, (Department of Environmental Remediation, Institute of Geographical Sciences and Natural Resources Research, Beijing) important studies have been carried out by American scholars from University of Florida (Soil and Water Science Department) and from the North Carolina State University (Department of Plant Pathology). Experiments carried out by Japanese researchers from Tokyo University of Pharmacy and Life Science and Ehime University confirm the ability of the Chinese brake to absorb arsenic from contaminated soil but raise the question about impact on air pollution in the event of a spread use of this plant for soil remediation. The Instituto Politécnico Nacional CIIDIR Durango, Mexico, has highlighted the possible use of *Agave Durangensis* for the same purpose.

Ecological soil remediation techniques seem to offer invaluable opportunities to the problem of arsenic contamination and are waiting to be developed for practical application.

To know more:

Some studies on *P.Vittata*
Science Direct
US National Library of Medicine
Scholar Works

Arsenic contamination
who.int/mediacentre/factsheets/fs372/en/
who.int/bulletin/archives/78%289%291093.pdf
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