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PLANTS MIGHT BE ABLE TO REMOVE LEAD FROM SOIL: STUDY

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

The present experiment was carried out using a soluble salt of lead, says Chandana Chandrasekhar (left).

Researchers from Mahatma Gandhi University, Kerala have identified a native roadside plant that can take up lead from the soil and thus help in removing the metal from the environment. The plant was found to accumulate lead at about 12,000 microgram/g of dry weight in the root and 7,000 microgram/g of dry weight in its shoot.

“These plants grow in soils that are continuously exposed to lead from vehicle exhausts. Though lead additives in petrol and diesel are banned now, some low-quality fuels still have a huge percentage of lead,” explains Dr. Joseph George Ray from the School of Biosciences at the University and corresponding author of the work published in *Ecotoxicology and Environmental Safety.*

Among the hundreds of native plants screened, research done earlier by the group shortlisted three plants. The present study found that *Eclipta prostrata* had the highest lead tolerance.

E. prostrata or ‘False Daisy’ is found across the Indian subcontinent. Known ‘Bhringraj’ (Karisalankanni in Tamil), it is used as a ‘hair-growth stimulant’ and in many ayurvedic preparations. “The plant may be using the lead to protect itself from the pests, or other predators. Tribal people use it an antidote for snake bites and treatment of scorpion stings,” adds Dr. Ray.

Spectrophotometric studies showed increased levels of many enzymes that are known to induce tolerance in plants.

“Hi-tech microscopic analysis showed that the lead travelled to the leaves and was deposited as lead nanoparticles in its cell wall, cytoplasm, and chloroplast. Though we noticed a little distortion in the structure of these organelles no toxicity was seen,” explains Chandana Chandrasekhar, the first author of the paper.

Dr. Ray further explains that the plants can be burned up after they have taken up the lead. In this way, the metal can be effectively contained and later disposed off safely.

This study has provided evidence that the plant is a lead hyperaccumulator that has the suitable biochemical machinery. But as the present experiment was carried out using a soluble salt of lead (lead nitrate), more studies are needed in contaminated environments where lead is usually found in insoluble forms.

To increase the solubility of lead so that it becomes bioavailable to the plant, some solubilising agents (metal chelators) need to be added to the soil; the plant must be tolerant to such chemicals as well. “Made into a solution, solubilising agents will be added to the contaminated soil. As chelators have long residence time and can percolate well, they will react with the lead in the soil and make it in a form available to the plant,” adds Dr. Ray.

Such experiments using naturally contaminated soils are significant further steps in using the

plant for bioremediation of lead-contaminated soil.

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