

## S'pore researchers identify 12 tropical plants that remove toxic heavy metals from soil



(From left) Prof Lam Yeng Ming, Assoc Prof Tan Swee Ngjin and PhD student Wang Yamin with some of the plants that are able to remove toxic heavy metals from soil. ST PHOTO: THADDEUS ANG



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SINGAPORE - Plants readily found in Singapore are now being tapped to clean the soil of toxic contaminants, with 12 tropical species identified to take on the job.

Since the start of April, a pilot to remove heavy metals and metalloids using more than a hundred tropical plants has begun at industrial land in the north of Singapore.

The three-month pilot uses the findings from an islandwide study published in February by researchers from Nanyang Technological University (NTU) and National Parks Board. The study identified 12 plant species that can effectively extract metals and metalloids potentially toxic to humans.

Although the plant-based method has been deployed at some wetlands here, the study paves the way for a sustainable approach of using a palette of naturalised or native vegetation that has minimal impact on ecosystems, said Professor Lam Yeng Ming, chair of NTU's School of Materials Science and Engineering, on Wednesday (April 13).

This is particularly relevant for a small nation like Singapore, where industrialised land may be repurposed to support new development plans, she noted.

Associate Professor Tan Swee Ngin, from the Academic Group of Natural Sciences and Science Education at NTU's National Institute of Education, said that during the study, such plots of land were found to contain higher levels of heavy metals and metalloids, which could affect the environment as well as the health of flora and fauna.

While elements such as cadmium, arsenic and lead occur naturally in soil, these can reach higher levels over a long period of time due to heavy metal particles from air pollution, domestic sludge and synthetic products such as pesticides and batteries.

The method proposed by the study harnesses phytoremediation, which removes pollutants using plants that can absorb heavy metals through their roots.

Phytoremediation serves as a more environmentally friendly alternative compared with industrial methods such as soil washing and acid leaching, said Prof Lam, adding that these approaches run the risk of negatively affecting soil health and exposing humans, plants and animals to heavy metals.

The team is also working on recovering metals and metalloids from discarded plants, in a bid to contribute to the circular economy, said Prof Lam.

Worldwide, phytoremediation has been used in countries such as the United States, Ukraine and Zambia.

In 1996, for instance, wild grasses were used to remove radioactive waste near the Chernobyl power plant in Ukraine.

Prof Tan said that, while the method has existed for decades, overseas studies tend to involve foreign plants, some of which may not survive in Singapore's climate.

Through a field survey involving a total of 46 tropical plant species that were tested with soil collected from nature parks and industrial sites, the team identified 12 plants, including one aquatic species.



These include cow grass (*Axonopus compressus*), a grass native to South America that is commonly seen in gardens and parks. It was found to have the potential to accumulate multiple elements, including cadmium and antimony.

The method, however, can take between months and half a year, depending on the extent of pollution, said Prof Tan.

To help improve plant growth and uptake of contaminants, the team is currently testing the incorporation of inorganic particles into these plants.

In the coming months, members of the public who wish to use the plants to cleanse soil can also look forward to a pictorial guide released by the research team.

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