Onion soaks up heavy metal, researchers find

December 10 2012

Onion and garlic waste from the food industry could be used to mop up hazardous heavy metals, including arsenic, cadmium, iron, lead, mercury and tin in contaminated materials, according to a research paper published in the *International Journal of Environment and Pollution*.

Biotechnologists Rahul Negi, Gouri Satpathy, Yogesh Tyagi and Rajinder Gupta of the GGS Indraprastha University in Delhi, India, explain how waste from the processing and canning of onion (Allium cepa L.) and garlic (Allium sativum L.) could be used as an alternative remediation material for removing toxic elements from contaminated materials including industrial effluent. The team has studies the influence of acidity or alkalinity, contact time, temperature and concentration of the different materials present to optimize conditions for making a biological heavy metal filter for industrial-scale decontamination.

They have found that at 50 Celsius (122 Fahrenheit), the efficiency of the clean-up process is largely dependent on pH (acidity or alkalinity) and equilibration time usually occurs within half an hour; a pH of 5 was optimal. They demonstrated the maximum extraction was achievable for lead, one of the most troublesome metallic environmental pollutants. They could extract more than 10 milligrams per gram of Allium material from a test solution containing 5 grams per liter of mixed metal ion solution, amounting to recovery efficiency of more than 70%. The absorbed metals can be released into a collecting vessel using nitric acid and the biomass reused.

The team experimented with Allium biomass to demonstrated effective removal of heavy metals from both simulated and actual industrial effluents. "The technique appears to be industrially applicable and viable," they suggest. "This may provide an affordable, environmental friendly and low maintenance technology for small and medium scale industries in developing countries," they conclude.

More information: Biosorption of heavy metals by utilising onion and garlic wastes, *Int. J. Environment and Pollution*, 2012, 49, 179-196. www.inderscience.com/jhome.php?jcode=ijep

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