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## Genetic engineering of tobacco plants by expressing arsenic responsive genes of *Lysinibacillus sphaericus* and *Arabidopsis thaliana* for removal of arsenics from the contaminated lands

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Contamination of foods and water with heavy metals is a severe threat to human health and the environment. Long-term exposure to these metals such as arsenics leads to chronic poisoning of human body and results in severe diseases like keratosis, gangrene, kidney damage, neuro-vascular disorders and many forms of cancer. Here we report our recent results on genetic engineering of tobacco plants for removal of arsenics from the contaminated lands so that arsenic free foods and fodders can be obtained from these soils. Previously, by using bioinformatics, molecular biology and microbiology tools we have identified and studied three key genes suitable for this purpose. One of these genes (*PCSI*) was isolated from the model plant *Arabidopsis thaliana* and the other two genes (*arsB* and *arsC*) were isolated from an arsenic-resistant bacterium *Lysinibacillus sphaericus* collected from an arsenic contaminated land in South East Asia.

Our modeling studies show that by overexpressing *PCSI* it is possible to increase the uptake and accumulation of arsenic in the roots of the model plant *Arabidopsis* by 38% indicating that the arsenic content in the growth medium could be reduced by the same amount. Results obtained in the laboratory experiments show that transgenic *Escherichia coli* overexpressing *arsB* and *arsC* genes of *Lysinibacillus* can reduce arsenic content in the liquid growth medium by 46%. Recently, we have transferred these genes into tobacco plants in various combinations by T-DNA mediated gene transformation and regenerated transgenic plants. Results on bioremediation potentials of these transgenic plants will be discussed.

### Biography

Abul Mandal has completed his PhD in 1983 from University of Agriculture in Cracow, Poland and postdoctoral studies from University of Stockholm, Sweden. In 2010 Mandal was appointed as a Professor of Molecular Biology at the University of Skovde, Sweden. Currently, he is heading the Biotechnology Research Division at this University. He also functions as the Academic Coordinator for Internationalization. He has published about 100 papers in peer reviewed journals. His recent publications are available at [www.his.se/mana](http://www.his.se/mana). He also has registered four patents, three in USA and one in India. Until today, Mandal has supervised 12 doctoral (PhD) dissertations.