

VETIVER CAN GROW ON FLY ASH WITHOUT DNA DAMAGE

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Abstract

Fly ash is a by-product of coal-fired electricity generation plants. Fly ash management is a critical global problem in need of attention. The prevalent practice of disposal is as slurry of ash and water to open lands or ash ponds located near power plants. This has led to waste thousands of hectares of land all over the world. Wind and leaching are often the causes of off-site contamination from fly ash dumpsites.

We have studied different combinations of fly ash amended with garden soil (0, 25, 50 and 100%) and have grown Vetiver (*Vetiveria zizanioides* Linn. Nash) plants over a period of 18 months. The plants showed massive, mesh-like growth of roots which could have a phytostabilizing effect. The plant achieved this without any damage to its nuclear DNA as shown by comet assay done on the root nuclei, which implies the long-term survival of the plant on the remediation site. The study revealed a marked decrease in concentration of heavy metals in the amendments and their leachates, over a period of 18 months. The decrease of heavy metal concentration in fly ash-soil amendments/ leachates could be well correlated with the reduction of genotoxic potential of fly ash. When Vetiver is used for phytoremediation of coal fly ash, its shoots can be safely grazed by animals as very little of heavy metals in fly ash were found to be translocated to the shoots. These features make planting of Vetiver a practical and environmentally compatible method for restoration of fly ash dumpsites. Lack of DNA damage in Vetiver has been compared to that in a sensitive plant i.e. *Allium cepa*. Our results suggested that apart from traditional end-points viz. growth parameters like root length, shoot length and dry weight, comet assay could also be included in a battery of tests for initial, rapid and effective selection of plants for restoration and phytoremediation of polluted sites.