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Short communication

Naturally growing *Saccharum munja* L. on the fly ash lagoons: A potential ecological engineer for the revegetation and stabilization

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ABSTRACT

Increasing areas of coal fly ash (FA) deposit pose a serious concern for its safe disposal to maintain the environment quality. Several thousand hectares of land have been occupied for the storage of FA all over the world. FA deposits cause serious environmental pollution through wind erosion and ground water contamination through leaching process. Naturally growing *Saccharum munja* on the derelict FA lagoons of NTPC Unchahar, India was identified as a native perennial grass in the rehabilitation process. We tested its ecological suitability for the effective restoration of FA lagoons in terms of their abundance and stabilization. The FA contains alkaline pH, and low organic C coupled with toxic metals i.e. Fe, Cd, Cr, Cu, Mn, Ni, Pb and Zn. The concentrations of these metals in different parts of the plant fall in the average range of plants and were found within toxic limits. Natural colonization of *S. munja* predominate in the areas of FA deposits with fast growth and high biomass which is used by local people for making ropes, baskets, mats, huts, etc. to support their livelihood. These results suggest that *S. munja* would be potentially useful to rehabilitate the FA dumps more efficiently if it is introduced properly on fresh lagoons to convert barren FA deposits into ecologically and socio-economically productive habitats without any inputs or maintenance.

1. Introduction

Fly ash deposition near the coal based thermal power plants is causing serious pollutions in the ecosphere. Abandoned FA deposits resemble with barren lands due to inhospitable condition for plant growth and niche development such as extreme alkalinity or acidity, heavy metals toxicity, lack of nitrogen and phosphorus, poor moisture retention and organic matter (Haynes, 2009; Pandey and Singh, 2010). A bare FA deposit generates ample dust and causes air, soil and water pollution in different ways leading to cause several diseases in humans and livestock (Pandey et al., 2009, 2011). Airborne nature of FA owing to light weight is a main reason of dust pollution around the thermal power plants. FA deposits need to be kept wet all the time through sprinklers to control dust emissions, although it is not followed properly. Seepage is another problem to contaminate ground water due to unlined FA deposits. In order to alleviate the problem rehabilitation of FA lagoon through suitable vegetation cover is an appropriate, cost-effective and eco-friendly technique to combat with this problem.

Some naturally growing plants have been reported from the derelict FA lagoons of India (Gupta and Sinha, 2008; Maiti and Jaiswal, 2008; Rau et al., 2009). Apart from these, a few species showed a great promise in view of their best adaptation and multiple uses. *S. munja* (wild grass) is one of the native colonizers that grow well on the abandoned FA lagoons of the NTPC Unchahar, India. It develops extensive root system and multiplies with root suckers and profuse seeding that binds FA particles and produces high biomass of about 180 t ha^{-1} y^{-1} fresh weight (Vasudevan et al., 1984) with tall thick clumps. *S. munja* spreads in the form of patches at FA lagoons. However, some areas are less dense. To fasten the colonization of *S. munja* on the abandoned FA lagoons, eco-engineering protocol or technology should be used by humans (Chauhan and Ganguly, 2011). In this regards, Rau et al. (2009) noticed a significant improvement in the seedling establishment, plant weight and shoot length in rhizobacterial inoculated plants in order to improve revegetation process of FA deposits. They suggested that FA-tolerant rhizobacteria should be used to fast colonization of plants on the FA deposits. Likewise, Chaudhary et al. (2011a,b) reported that FA-tolerant *Rhizobium* inoculation is beneficial in the growth of leguminous plants in FA condition. *S. munja* is widely used by surrounding villagers for making ropes, hand fans, baskets, brooms, mats, and huts (Fig. 1). It is palatable in juvenile stage but unpalatable at mature stage to animals. Being

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