

Optimizing fly-ash dose for better tree growth and nutrient supply in an agroforestry system in semi-arid tropical India

Abstract:

Research on fly-ash utilization in dryland Alfisols in semi-arid tropical India may help successful establishment of agroforestry systems. A field study was conducted during 2001–2004 with the objective of evaluating fly-ash using different levels (0, 17, 33, and 66% v/v) in tree microsites along with compost and tank silt mixtures. Specifically, the focus was to find the optimum dose of fly-ash mixtures for tree growth and nutrient release with time of both essential and heavy elements in fly-ash and soil: phosphorus (P), potassium (K), calcium (Ca), sodium (Na), aluminium (Al), zinc (Zn), and cadmium (Cd) and their effect on plant tissues with respect to copper (Cu), Zn, Cd, nickel (Ni), chromium (Cr), and lead (Pb). The changes in plant-available or extractable status of elements and the growth of two major tree species [viz., teak (*Tectona grandis*) and leucaena (*Leucaena leucocephala*)] were monitored at 6-month intervals during 2002–2004 in an agrisilvicultural system. Pit mixtures with 66% fly-ash by volume of pit significantly increased the tree growth of teak throughout the study period. For leucaena, it positively influenced the growth at initial stages. The dose increased the status of available P, K, Ca, and Na during the study period. The exchangeable Al and available Zn content of microsites corresponding to the dose significantly increased during 2001–2003 but the levels were less than the toxic limits. The available Cd content showed an increase only during the initial stage of the study period. The variation in heavy-metal content (Cu, Cd, Cr, Ni, Pb, and Zn) in plant tissues among the different treatments was found to be nonsignificant.

Keywords: [Alfisols](#), [available nutrients](#), [compost](#), [leucaena](#), [tank silt](#), [teak](#).