



Rehabilitation of ravine lands with multipurpose tree plantations

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Abstract

Ravine rehabilitation with multipurpose trees species (MPTs) is the best method to convert degraded land into an economic resource. An investigation was carried out to study the effect of growing various MPTs like babul, neem, aonla, karanj and bael plantations on soil properties. The tree plantations possessed trees with an average age of 15 years old and maintained on gully head of Chambal ravine system. Soils were low in organic carbon (4.3 g kg^{-1}), available N (173 kg ha^{-1}) and phosphorus (5.7 kg ha^{-1}). Higher litter fall followed the sequence in babul > bael > neem > karanj > aonla plantations. However, with tree plantations over the years improved soil properties especially bulk density, SOC, cation exchange capacity and available nutrient status compared to the plots without tree plantations. Significant improvements in SOC ($5.9\text{-}11.8 \text{ g kg}^{-1}$), available N ($218 \text{ to } 468 \text{ kg ha}^{-1}$), available P ($7.5 \text{ to } 16.0 \text{ kg ha}^{-1}$) and available K ($710 \text{ to } 1238 \text{ kg ha}^{-1}$), respectively were observed under tree plantations. Micronutrients also enhanced under tree plantations. Average Fe, Mn, Zn and Cu contents were higher by 14%, 23%, 27% and 69%, respectively compared to that of control plots without trees. Among the tree species babul, neem and karanj were major contributors for litter fall and nutrient additions and could, therefore, be preferred for ravine or gully lands, leading to improvement in soil fertility thereby enhancing vegetative barriers for a stable ecosystem.

Keywords: Leaf nutrients, Multipurpose trees, Nutrient content, Ravine, Soil properties