

Effect of soil organic matter on treating forest dieback

P. I. Yapa¹, H. K. S. G. Gunadasa*² and S. P. Nissanka³

¹Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka, Sri Lanka.

²Postgraduate Institute of Agriculture, University of Peradeniya, Sri Lanka.

³Faculty of Agriculture, University of Peradeniya, Sri Lanka.

*sajanee2010@gmail.com

Abstract

Dieback of trees in certain areas of the upper montane forest, Horton Plains, Sri Lanka, has been spreading for decades. However, reasons for this condition still remain a mystery. This paper discusses an investigation done to explore the key causes for this large-scale forest dieback incidence. For the study, twenty-four permanent plots were established in the forested area with 61-80% dieback severity. Three soil amendments or treatments: addition of compost, montane mycorrhizae, compost with montane mycorrhizae, and a control were used. The indicator plant used was *Syzygium rotundifolium*. Treatments were applied to five randomly selected *Syzygium rotundifolium* saplings of approximately 1m height and 0.015m diameter at the cotyledon scar residing in each plot. Soluble soil Pb and soil organic matter (SOM) were compared using soil samples collected at 0.20m depth level. Samples were collected encompassing two consecutive rainy periods, a distinctive dry period and another rainy period. Foliar samples from “treated” saplings were tested for Pb. During the experimental period, the selected saplings were closely monitored and changes in health were duly recorded. Effect of standard compost and montane mycorrhizae on protecting saplings from stressful conditions was significant ($p < 0.001$). The results from soil and foliar analysis revealed the status of Pb contamination during rain which appears to have links with forest dieback. Levels of Pb in the soil showed significant decline ($p < 0.001$) in the dry period compared to wet periods. Positive correlations between soil Pb and leaf Pb were significant ($p = 0.001$). Soil amendment with compost and montane mycorrhizae reduced the Pb content below the threshold levels ($p = < 0.001$) especially during the dry period compared with the wet periods. Application of compost and mycorrhizae appeared to be effective in reducing Pb toxicity in the soil. Contamination of soil with Pb appears to have strong links with the forest dieback. Soil improvement with standard compost and native montane mycorrhizae appears to be effective in successful regeneration of the affected areas.

Key words: Forest dieback, Pb, soil organic matter