ABSTRACT

Patches of dying trees have become commonplace in the Horton Plains, Sri Lanka for a yet unknown reason. The study was conducted to obtain a better understanding of the key causes of forest dieback.

In the experiment, twenty-four permanent plots were established within an area of 61-80% dieback severity and three soil amendments through addition of (a) compost, (b) montane mycorrhizae, and (c) compost and montane mycorrhizae, alongside the control made up the four treatments used in this study. Treatments were applied to five randomly selected *Syzygium rotundifolium* saplings in each plot. Key soil chemical properties (N, P, K, Ca, Mg, pH, EC, Pb, Cd, SOM) were compared from soil samples collected at 0.20m and 0.50m depths and 0.3m-0.5m away from each sapling. These comparisons were done - for samples collected at four different dates encompassing two consecutive rainy periods, a distinctive dry period and another rainy period. Foliar samples were collected from the 'treated' saplings, and were analyzed to investigate the nutrient status of N, P, K, Ca, Mg, and levels of Pb and Cd. During the experimental period, the selected saplings were closely monitored and changes in height and health were duly recorded.

Both soil and foliar analysis illustrated clear indications of Pb and Cd contamination influences during rain, impairing plant metabolism and leading to dieback. Effect of treatment by standard compost and montane mycorrhizae on protecting saplings from stressful conditions was significant (p = <0.001) while levels of Pb and Cd in the soil showed significant decline (p = <0.001 and p = <0.001) during the dry period when compared with the wet periods. Significant relationships of soil organic matter with Cd (p = 0.01) and Pb (p = 0.01) were observed and compost and mycorrhizae appeared to be effective in reducing Pb and Cd in the soil. The relationships between soil Cd and leaf Cd were also found to be significant (p= 0.002) as were soil Pb and leaf Pb (p = 0.001).

Contamination of the soil with Pb and Cd appears to have strong links with the forest dieback. Improvement of the soil with standard compost and native montane mycorrhizae will be effective in regeneration of the deteriorated areas.