

Forest Dieback at Horton Plains, Sri Lanka: The Potential Role of Arbuscular Mycorrhizae in Enhancing the Growth of the Native Tree Species, *Syzygium rotundifolium*

P.N. Yapa¹, S. Madawala² and C.T. Bamunuarachchige¹

¹*Department of Biological Science, Faculty of Applied Sciences, Rajarata University of Sri Lanka*

²*Department of Botany, Faculty of Science, University of Peradeniya*

One of the most striking observations that one could make during a visit to Horton Plains is the dying of trees at an alarming rate, which is termed 'forest dieback'. Although research has been performed on forest dieback in montane forests, the aetiology of forest dieback at Horton Plains remains largely unresolved. This preliminary study was undertaken to investigate the effect of arbuscular mycorrhizae on forest dieback in Sri Lanka. The findings would make a significant contribution to the conservation and sustainable management of this montane forest.

Twenty four permanent plots (20 m x 20 m) were established randomly to cover an affected area in the Horton Plains National Park. Four treatments; control (T1), addition of compost (T2), compost with native montane mycorrhizae (T3) and native montane mycorrhizae only (T4) were used. The treatments were initiated in September 2008 and were repeated every six months, to five randomly selected *Syzygium rotundifolium* saplings in each plot. After 18 months composite soil samples from each experimental plot were analysed. Roots of *S. rotundifolium* saplings were also assessed for arbuscular mycorrhizal colonisation. Certain soil physical, chemical and biological properties were determined.

Syzygium rotundifolium saplings showed higher arbuscular mycorrhizal colonisation in T2, T3 and T4 than in the control (T1). The addition of native arbuscular mycorrhizae significantly increased ($P < 0.05$) the arbuscular mycorrhizal colonisation in *S. rotundifolium* compared to the control. Soil analyses showed a relatively low fungal spore count compared to studies done in similar ecosystems. Soil pH, soil organic matter content and total nitrogen showed no significant difference between treatments. However, total phosphorus content significantly increased in plots with mycorrhizal addition compared to the control. Foliar heavy metal levels decreased in compost and arbuscular mycorrhizae added treatments (T2 and T3). Results suggest that addition of native arbuscular mycorrhizae together with compost can enhance certain edaphic characteristics and thereby enhance the growth of *S. rotundifolium* saplings. These findings may highlight the significance of using arbuscular mycorrhizae and compost to enhance the regeneration potential of native saplings in forest dieback areas in Horton plains.