

## Effect of $\alpha$ -Pinene on the Soil Bacterial and Fungal Population and Soil Organic Carbon in Eucalyptus Plantations

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Nutrient cycling is essential for the stability of an ecosystem where soil microorganisms play a significant role. Some allelochemicals such as  $\alpha$ -pinene produced by certain plant species may suppress the activity of these microorganisms. Eucalyptus, which is a popular plantation species in Sri Lanka, is known to emit  $\alpha$ -pinene. However, its effect on soil microorganisms and soil fertility is not well known. The present study investigated the relationship between  $\alpha$ -pinene content, soil microorganisms and soil organic carbon content in 7-year-old *Eucalyptus grandis* and *Eucalyptus torelliana* plantations. As the control plantation, an adjacent Patna grassland (previous land-use before afforestation) was used. Three subplots (20 × 20 m) were established within each site and soil was sampled up to 15 cm depth. Soil organic carbon content was measured according to the Walkley-Black method. Following a serial dilution, bacteria and fungi were cultured and CFU mL<sup>-1</sup> was calculated. The  $\alpha$ -pinene in soil samples was extracted using petroleum ether and was analyzed using GC-MS. According to the results, there was a significant ( $P < 0.05$ ) variation between organic carbon,  $\alpha$ -pinene content and bacteria quantity between the plantations and the adjacent grasslands. However, there was no significant ( $P > 0.05$ ) variation in fungi quantity. The highest organic carbon content was observed in *E. torelliana* plantation (2.08% ± 0.3), however; the highest  $\alpha$ -pinene content was found under *E. grandis* plantation (0.14% ± 0.09). Interestingly, the highest bacterial count was recorded under *E. grandis* plantation (3.0 × 10<sup>5</sup> CFU mL<sup>-1</sup>) while the highest fungi count was recorded in grassland. There were no significant ( $P > 0.05$ ) correlations between the soil  $\alpha$ -pinene content, soil bacterial and fungal count fungal and the organic carbon. There is no significant effect ( $P > 0.05$ ) of  $\alpha$ -pinene content on the bacterial and fungal counts and organic carbon in young *E. grandis* and *E. torelliana* plantations.

**Keywords:** Eucalyptus,  $\alpha$ -pinene, Bacteria, Fungi, Organic carbon