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**Variation of soil nutrients, root growth, and litterfall production across three agroforestry systems: A short-term study**

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**Abstract**

Litterfall and subsequent decomposition is a fundamental process underlying the input of nutrients to the soil in terrestrial ecosystems. The aim of this study was to investigate soil nutrients, root growth, litterfall and potential nutrient return to soil in three diverse agroforestry systems; home gardens (*Mangifera indica*, *Artocarpus heterophyllous*, *Coffea spp.*) gliricidia-coffee mixed plantation, and teak monoculture plantations. The study was conducted at the University of Peradeniya Experimental Station at Dodangolla during September-December 2022. Litter samples were collected into 2 m × 2 m litter traps, which were established 1 m above the ground in each agroforestry system. Initial soil samples were collected at 1 m distance away from the downside of litter traps at two soil depths (0-15 cm and 15-30 cm). Ingrowth cores (15 cm diameter and 30 cm depth) were inserted at 1 m distance from the litter traps and roots grown in to the cores were sampled after 4 months. The amount of litterfall, nitrogen (N), phosphorus (P), and potassium (K) contents in the litter and soil samples, and root growth into ingrowth cores were measured. Soil nutrient contents did not change significantly across agroforestry systems, except the higher P contents in the samples from home gardens (0-15 cm depth) than those from others. The highest total litterfall was recorded in teak plantation (823 g/4m<sup>2</sup>±107.8) followed by home gardens (748 g/4m<sup>2</sup>±111.8) and gliricidia-coffee mixed plantation (536 g/4m<sup>2</sup>±30.77). The greatest root growth was observed in gliricidia-coffee plantation, while home gardens showed the lowest. Gliricidia-coffee plantation produced litters with the highest N(6015.61mg±428.9) contents and return of N through litterfall was also the highest, while home gardens and teak plantation had the highest K(875.29mg±62.83,1591.74mg±106.95) and P(3409.44mg±357.17,2494.46mg±173.59) return respectively. Species composition could determine the type and the amount of nutrient return to the soil through litterfall.

**Keywords:** Home gardens, Litterfall, Nutrients, Plant nutrients in the soil, Root growth

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