Potential of Nutrient Return to the Soil through litterfall in Selected Agroforestry Systems: A Short-Term Study

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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 the litterfall and its potential nutrient return to soil in three agroforestry systems; homegardens, gliricidia-coffee mixed and teak monoculture plantations. The study was conducted at the University of Peradeniya Experimental Station at *Dodangolla* during a four-month period from September-December 2022. Litters were collected into 2m×2m litter traps established from 1m above the ground level in each agroforestry system. Initial soil samples were collected from 1m distance away from the downside of litter trap at two soil depths (0-15 cm and 15-30 cm). An ingrowth core (15 cm diameter and 30 cm depth) was established at 1m distance from the litter trap. Amount of litterfall, Nitrogen (N), phosphorus (P), and potassium (K) contents of the litter, and N, P, and K contents of soil collected from two soil depths, and root growth into the ingrowth core were measured. There were no significant difference of soil nutrients in two soil depths except increased P contents in the homegarden at 0-15 cm depth compared to the gliricidia-coffee and teak plantations. The highest total litterfall was recorded in teak plantation followed by homegardens and gliricidia-coffee mixed plantation. The greatest root growth into ingrowth core was observed in gliricidia plantation whereas homegarden showed the lowest. Gliricidia-coffee plantation produced litters with the highest N content and return of N through litterfall was also the highest, while homegarden and teak plantation had the highest K and P return respectively. Species composition and the temporal variation of litterfall in different agroforestry systems could determine the type and the amount of nutrient return to the soil through litterfall.

Keywords: Home garden, Litterfall, Nutrient cycling, Root growth, Soil nutrients

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