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The role of biological nitrogen fixation in the cacao agroforestry system in Central Sulawesi Indonesia

Biological nitrogen fixation (BNF) plays a major role in tropical agroforestry systems. This study presents a comparison of nitrogen-15 isotope methods for estimating the proportion of nitrogen derived from the atmosphere by the leguminous tree species *Gliricidia sepium* as part of cacao agroforestry systems. The role of BNF in the nitrogen balance of the system was assessed. Nitrogen fixation is affected by site conditions. Nitrogen measurements, however, were influenced by isotope methods, reference plant and sampling strategies. *Gliricidia* plays a major role in maintaining the nitrogen balance in the traditional cacao agroforestry system as compared to the 'full-sun' cacao plantations where nitrogen losses due to harvesting and leaching have to be balanced by mineral fertilizer applications.