

# Carbon Sequestration in Coffee Agroforestry Plantations of Central America

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## SUMMARY

The potential of coffee agroforestry (AGF) systems to act as a sink for carbon (C) is of high interest. Coffee farmers consider with interest the conversion of their coffee monoculture into AGF systems as an alternative to face the economical crisis of coffee prices, through diversification (e.g. timber production), production of high quality coffee and payment of incentives for environmental services such as C sequestration. For the last five years, research was undertaken on the potential of shade trees introduced in coffee (*Coffea arabica*) plantations in Central America to increase plant biomass and litter, and hence C sequestration. The work focused on gathering data from selected coffee systems (with or without shade trees) in long term experiments and coffee farms of Costa Rica. Finally a database on C stored in soil and plant biomass of coffee AGF systems in Central America was developed using published information and data collected in experiments and coffee farms. Compared to the amount of C in aerial phytomass (biomass + litter) of 7 year old full sun coffee systems, the total C in aerial phytomass of coffee systems shaded by *Eucalyptus deglupta* (110 shade trees ha<sup>-1</sup>) or by *Inga densiflora* (280 shade trees ha<sup>-1</sup>), was multiplied by 2.5. For approximately a ten year period, results from our experiments and published literature showed that the conversion of coffee monoculture to AGF system resulted in an additional mean annual increment in aerial phytomass varying from 1 t C ha<sup>-1</sup> y<sup>-1</sup> in the case of regulated shading by *E. poeppigiana*, to (1.7-3.1) C ha<sup>-1</sup> y<sup>-1</sup> in the case of shade timber tree. Depending on the derived products (fuel wood for coffee stems and *Inga* species; pallets, logs, etc for timber species) and their life span, various wood production and harvesting scenarios in coffee AGF systems can be considered with respect to C sequestration.