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“Development on the margin”

## The Potential of Latin American Coffee Production Systems to Mitigate Climate Change

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### Abstract

A carbon footprint is used to define the amount of greenhouse gas (GHG) emissions emitted along supply chains and is the first step towards reducing GHG emissions. Carbon footprint standards have emerged as new market requirements for producers of agri-food products to retailers in developed countries and are likely to become a comparative advantage. In the coffee sector specifically little literature and data on the carbon footprints of different coffee production systems and supply chains exists. Therefore GHG data from different coffee production systems have been compiled for this study and compared regarding on-farm carbon stocks and the carbon footprint.

To quantify the on-farm carbon stocks and carbon footprints a GHG quantification model; the Cool Farm Tool (CFT) has been used. The CFT uses the Tier II methodology of the Intergovernmental Panel on Climate Change (IPCC) and is based on empirical GHG quantification models build from hundreds of peer-reviewed studies. Field data have been collected in five countries across Latin America from the following coffee production systems: (i) traditional polycultures, (ii) commercial polycultures, (iii) shaded monocultures, and (iv) unshaded monocultures.

The results show low mean carbon footprints of coffee produced in traditional polycultures (3.7 kg CO<sub>2</sub>-e kg<sup>-1</sup>) and commercial polycultures (3.9 kg CO<sub>2</sub>-e kg<sup>-1</sup>) versus high mean carbon footprints at shaded monocultures (9.2 kg CO<sub>2</sub>-e kg<sup>-1</sup>) and unshaded monocultures (9.4 kg CO<sub>2</sub>-e kg<sup>-1</sup>). The same trend is observed concerning on-farm carbon stocks; polycultures (70.9 t C ha<sup>-1</sup>) versus monocultures (17.8 t C ha<sup>-1</sup>). Based on the results a framework for site-specific mitigation has been developed to assist coffee farmers in defining climate friendly farm practices and accelerate climate change mitigation in Latin American coffee production.

**Keywords:** Carbon footprint, climate change, *Coffea arabica*, Coffee eco-system conservation, cool farm tool, Latin America, site-specific mitigation