SINGLE-IMPACT FICHE – AGROFORESTRY

IMPACT: GREENHOUSE GAS EMISSIONS

Data extracted in June 2020

Note to the reader: This fiche summarises the impact of Agroforestry on GREENHOUSE GAS (GHG) EMISSIONS. It is based on a review of one peer-reviewed synthesis research paper, involving 56 primary research studies.

1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:
  The only synthesis paper available shows a positive effect of agroforestry on the reduction of greenhouse emissions at a global scale (**Table 1**). See **Table 2** for details.

Table 1. Summary of effects. The numbers between parenthesis indicate the number of synthesis papers with a quality score of at least 50%. Details on quality criteria can be found in the next section.

Impact	Comparator	Effects (all studies)				Effects (only studies including EU)			
		Positive	Negative	No effect	Uncertain	Positive	Negative	No effect	Uncertain
Reduction of greenhouse gas emissions	Croplands without trees	1	0	0	0	1	0	0	0

- QUALITY OF THE SYNTHESIS PAPER: *The quality score summarises 16 criteria assessing the quality of three main aspects of the synthesis papers: 1) the literature search strategy and studies selection; 2) the statistical analysis; 3) the potential bias. Details on quality criteria can be found in the methodology section of this WIKI.*

2. IMPACTS

The main characteristics and results of the synthesis paper are summarized in **Table 2**. Summaries of the meta-analyses provide fuller information about the results reported in each synthesis paper, in particular about the modulation of effects by factors related to soil, climate and management practices.

Table 2. Main characteristics of the synthesis papers reporting impacts of agroforestry systems on GHG emissions.

	Reference	Population	Geographical scale	Intervention	Control	Conclusion	Quality score	Global effect
1	Kim, DG; Kirschbaum, MU; Beedy, TL. 2016	Agroforestry practices applied to cropland: home gardens, intercropping, live fences, parklands, riparian buffer, shaded perennial-crop systems, shelterbelts, silvopasture, improved fallow, rotational woodlots, tree plantations on arable land, and shifting cultivation.	Global (not defined)	Agroforestry practices categorized into two distinct types: tree-crop coexistence types where trees and agricultural crops are grown together (type 1); and tree-crop rotation type where trees and crops are grown alternately on the same piece of land (type 2).	Cropland (for type 1 intervention) and adjacent agricultural lands (for type 2 intervention)	Overall, agroforestry was estimated to contribute to mitigating 27 +/- 14 t CO_2 equivalents ha-1 y-1 at least for the first 14 years after establishment.	75%	Positive, compared to cropland.

3. KNOWLEDGE GAPS

- Limited number of studies on soil CH_4 and N_2O emissions. Estimated values for N_2O are particularly uncertain, and uncertainty bounds based on the existing information range from possible quantitatively important positive to negative fluxes. No reported data for Europe.