SINGLE-IMPACT FICHE – AGROFORESTRY

IMPACT: GREENHOUSE GAS EMISSIONS

Data extracted in June 2020

This fiche summarises the impact of Agroforestry on GREENHOUSE GAS EMISSIONS. It is based on a review of one peer-reviewed synthesis research paper, involving 56 individual papers.

This fiche is part of a set of similar fiches synthesising all the impacts of agroforestry presented in the general fiche

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. See the table below for details.

		Effects (all studies)				Effects (only studies including EU)			
Impact	**Comparator**	**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. The scores can be found in the Excel database with all the data extracted from the synthesis papers]

  As shown in the "Quality score" of the table in section 2, the quality level is 75%. Several quality criteria were not satisfied: the description of the number of studies rejected at each step, weighting of individual studies, analysis of heterogeneity of the effects and analysis of publication bias.

- NUMBER OF SCIENTIFIC PAPERS: The number of papers included in the synthesis paper is 56.

2. IMPACTS

The main characteristics and results of the synthesis paper are summarized in the table presented below. For details follow this link

	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

[They are extracted from each meta-analysis, synthesized and consolidated]

- 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.

4. SYSTEMATIC REVIEW SEARCH STRATEGY

Keywords	TOPIC: (agroforestry OR "agro-forestry") AND TOPIC: (meta-analy*)
Search dates	No time restrictions
Databases	Web of Science and Scopus, run on 15 May 2020
Selection criteria	Three main criteria led to the exclusion of a study: (1) the study does not deal with agroforestry; (2) the study does not assess the environmental and climate impacts of the farming practice on greenhouse gas emissions; (3) the study is neither a meta-analysis nor a systematic review. Studies that passed the relevance criteria were subject to critical appraisal carried out on article by article basis. We finally selected 1 meta-analysis.