SINGLE-IMPACT FICHE
INTERCROPPING

IMPACT: CARBON SEQUESTRATION

Data extracted in May 2021

Note to the reader: This fiche summarises the impact of intercropping on CARBON SEQUESTRATION. It is based on 1 peer-reviewed synthesis research paper[1], including 180 individual studies.

1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:
  Intercropping of multiple crop species (i.e., crop mixture cropping) has a positive effect on carbon sequestration compared to monoculture. The one reviewed synthesis paper reported an increase in soil organic carbon in response to intercropping (see **Table 1**).

  The one reviewed synthesis paper did not include data collected in Europe (see **Table 2**).

Table 1. Summary of effects. The effect with the higher score is marked in bold and the cell coloured. 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.

		All studies				Only studies including EU			
Impact	**Intervention**	**Positive**	**Negative**	**No effect**	**Uncertain**	**Positive**	**Negative**	**No effect**	**Uncertain**
Increase Carbon sequestration	Crop mixture	**1 (1)**	0	0	0	0	0	0	0

- QUALITY OF THE SYNTHESIS PAPERS: *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 this document →.*

As shown in the "Quality score" in **Table 2**, the quality level is 62%. The least frequently satisfied quality criteria were "Number of studies at each step", "Individual_effect_sizes", "Dataset_available", "Publication_bias_analyzed", "Individual_studies_weighted" and "Search_string".

[1] Research synthesis papers include a formal meta-analysis or systematic reviews with some quantitative results

2. IMPACTS

The main characteristics and results of the synthesis papers are summarized in **Table 2**. Detailed results of each synthesis study are reported in the summary reports.

Table 2. Main characteristics of the synthesis papers reporting impacts of intercropping on carbon sequestration. The references are ordered chronologically with the most recent publication date first.

Reference	Population	Geographical scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Daryanto, S; Fu, BJ; Zhao, WW; Wang, S; Jacinthe, PA; Wang, LX 2020	Grain legumes and cereals	Africa	180	Grain legume and cereal intercropping	Monoculture	Soil organic carbon	Intercropping increased carbon sequestration by 15%	62%

3. KNOWLEDGE GAPS

Authors of this synthesis	Lack of studies in Europe.
Daryanto et al., 2020	Studies that focus on indigenous African grain legumes or cereals should be encouraged because, with the exception of cowpea and teff, most past studies have focused on non-native species.

4. SYSTEMATIC REVIEW SEARCH STRATEGY

Keywords	TOPIC: (intercrop* OR "inter crop*" OR "mult* variet*" OR "mult* crop*" OR "Companion crop*" OR "Companion plant*" OR "polycultur*" OR "crop diversity" OR "mix* crop*" OR "crop* mix*" OR "cult* mix*"OR "variety mix*" OR "row crop*" OR "strip* crop*" OR "row crop*" OR "relay crop*") AND TOPIC: ("meta-analy*" OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis")
Search dates	No time restrictions
Databases	Web of Science and Scopus, run in May 2021
Selection criteria	The main criteria that led to the exclusion of a synthesis paper were if the paper: (1) does not deal with intercropping; (2) does not include results for cropland (e.g. pastures, forests); (3) deals with agroforestry (e.g. alley cropping); (4) experimental treatment included other practices as well (e.g.

	crop rotation); (5) intercropping treatment included non-cash crops (e.g. companion plants that were not harvested, dual-purpose cropping); (6) presents the same dataset as previous studies and similar analyses; (7) is a simple review or a non-quantitative systematic review. Synthesis papers that passed the relevance criteria were subject to critical appraisal carried out on a paper-by-paper basis. The search returned 109 synthesis papers potentially relevant for the practice object of our fiche. Searches for other farming practices added another 2 potentially relevant synthesis papers. From the 111 potentially relevant synthesis papers, 54 were excluded after reading the title and abstract, and 32 after reading the full text according to the above-mentioned criteria. Finally, 25 synthesis papers were selected for intercropping, from which 1 was relevant for this impact.