



## IMPACT: AGRICULTURAL AREA

Data extracted in September 2020

**Note to the reader:** This fiche summarises the impact of organic systems on AGRICULTURAL AREA (the area of agricultural land required to produce a certain amount of output). It is based on 2 peer-reviewed synthesis research papers<sup>1</sup>, including 71 and 164 studies, respectively.

### 1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:** The two synthesis papers<sup>1</sup> dealing with agricultural area use show negative effects of organic systems, revealing that organic systems require larger agricultural areas than conventional systems to produce the same quantity of products (food) (see **Table 1**). All results are expressed per unit of product. Both papers include results of experiments conducted in Europe. Organic farming systems impacts were always compared to conventional systems. One of the two studies (the second in the table below) indicated that organic systems required 25%-110% more agricultural area, depending on the product considered.

**Table 1.** Summary of impacts. The effect with the higher score is marked in bold and the cell coloured. The numbers between parenthesis indicate the number of synthesis papers<sup>1</sup> with a quality score of at least 50%. Details on quality criteria can be found in the next section.

Effects per unit of product (e.g., per ton)				
Impact	Positive	Negative	No effect	Uncertain
Decrease of agricultural area	0	<b>2</b>	0	0

- QUALITY OF THE SYNTHESIS PAPERS<sup>1</sup>:** [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" of the table in section 2, the quality level of the two studies is 62% to 69%, respectively. The least frequently satisfied quality criteria were "Individual studies weighted" and "Publication bias analysed" (not satisfied in any of the 2 synthesis papers).

### 2. IMPACTS

The main characteristics and results of the 2 synthesis papers<sup>1</sup> are summarized in **Table 2**. The references are ordered chronologically with the most recent publication date first.

<sup>1</sup> Research synthesis papers include a formal meta-analysis or systematic reviews with some quantitative results

**Table 2.** Main characteristics of the synthesis papers reporting impacts on agricultural area. All detailed results of each synthesis study are reported in the summary reports .

Nr	Reference	Population	Geographical scale	Intervention	Comparator	Conclusion	Quality score	Global effect
1	Tuomisto HL; Hodge ID; Riordana P; Macdonald DW. 2012	Organic and conventional systems	Europe	Organic systems	Conventional systems	This meta-analysis showed that organic farming requires more land than conventional farming.	69%	Negative (per unit of product)
2	Clark, M; Tilman, D. 2017	Organic and conventional agricultural production systems.	Global	Organic systems	Conventional systems	Organic systems show higher land use than conventional systems.	62%	Negative (per unit of product)

The majority of LCA publications included are from agricultural systems in Europe, North America, and Australia and New Zealand (86% of systems are from these regions). Systems from China (2%), Japan (2%), the rest of Asia (5%), south America (4%), and Africa (.4%) are much less common. The results presented here are therefore indicative of highly industrialized systems and should be interpreted with this in mind.

### 3. KNOWLEDGE GAPS

The synthesis papers did not indicate relevant knowledge gaps.

### 4. SYSTEMATIC REVIEW SEARCH STRATEGY

Keywords	TOPIC: ("organic farm*" OR "organic agriculture" OR "organic system*" OR "organic product*") 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 on 20 July 2020
Selection criteria	Three main criteria led to the exclusion of a synthesis paper: (1) the paper does not deal with organic systems; (2) the paper does not assess the impacts of organic systems in comparison to another cropping system; (3) the paper is neither a meta-analysis nor a systematic review. Synthesis papers that passed the relevance criteria were subject to critical appraisal carried out on paper by paper basis. From an initial number of 122 synthesis papers, we finally selected 2 meta-analyses or systematic reviews.