



IMPACT: ENERGY USE

Data extracted in September 2020

Note to the reader: This fiche summarises the impact of organic systems on ENERGY USE. It is based on three peer-reviewed synthesis research papers¹, including 71, 62 and 164 studies, respectively.

1. WEIGHT OF THE EVIDENCE

- **CONSISTENCY OF THE IMPACT:** The synthesis papers¹ reported positive effects (decrease of energy use) of organic systems compared to conventional systems, both per unit of area and per unit of product (see **Table 1**). One synthesis paper reported variable effect depending on the type of products: lower energy use for dairy products, cereals, oil crops and pulses, higher energy use for vegetables, and no noticeable effect for meat and fruits. All the synthesis papers¹ included results of experiments conducted in Europe.

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 papers¹ with a quality score of at least 50%. Details on quality criteria can be found in the next section.

Impact	Effects per unit of area (e.g., per ha)				Effects per unit of product (e.g., per ton)			
	Positive	Negative	No effect	Uncertain	Positive	Negative	No effect	Uncertain
Decrease energy use	1 (0)	0	0	0	3 (2)	1	1	0

- **QUALITY OF THE SYNTHESIS PAPERS¹:** [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 ranges from 44% to 69%. The least frequently satisfied quality criteria were “Individual studies weighted” and “Publication bias analysed” (never satisfied).

2. IMPACTS

The main characteristics and results of the 3 synthesis papers¹ are summarized in **Table 2**. The references are ordered chronologically with the most recent publication date first.

¹ 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 energy use. 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	Clark, M; Tilman, D. 2017	Organic and conventional agricultural production systems.	Global*	Organic systems	Conventional systems	Depending on product types, organic systems show variable effects on energy use compared to conventional systems.	62%	Positive, Negative, or No effect depending on product types (per unit of product)
2	Lee K.S., Choe Y.C., Park S.H. 2015	Organic and conventional systems	Global	Organic systems	Conventional systems	Better energy efficiency in organic farming in most cases.	44%	Positive (both per unit of area and per unit of product)
3	Tuomisto HL; Hodge ID; Riordana P; Macdonald DW. 2012	Organic and conventional systems	Europe	Organic systems	Conventional systems	This meta-analysis has shown that organic farming in Europe has generally lower energy consumption than conventional farming.	69%	Positive (per unit of product)

*In Clark and Tilman (2017), the majority of LCA publications included in these analyses 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 papers¹ 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 3 meta-analyses or systematic reviews.
--	--