



## IMPACT: EUTROPHICATION

Data extracted in September 2020

**Note to the reader:** This fiche summarises the impact of organic systems on EUTROPHICATION. It is based on three peer-reviewed synthesis research papers<sup>1</sup>, including 14, 71 and 164 studies, respectively.

### 1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:** In two synthesis papers, the results showed that the eutrophication potential was higher in organic systems compared to conventional systems. In these synthesis papers, the effects were expressed per unit of product, and the negative effects reported for organic systems were partly due to the lower yields obtained in organic systems compared to conventional systems. Another synthesis paper reported a decrease of nitrate leaching and phosphorus output per unit area in organic systems compared to conventional systems (see **Table 1**). All syntheses included studies 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 papers<sup>1</sup> 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 eutrophication	<b>1</b>	0	0	0	0	<b>1</b>	0	1

- 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” of the table in section 2, the quality level ranges from 50% to 69%. The least frequently satisfied quality criteria were “Search string reported”, “Individual studies weighted”, “Dataset available”, “Method of data extraction”, “Heterogeneity of the results analysed”, and “Publication bias analysed”.

### 2. IMPACTS

The main characteristics and results of the 3 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 eutrophication. 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	Organic systems show higher eutrophication potential than conventional systems.	62%	Negative (per unit of product)
2	Tuomisto HL; Hodge ID; Riordana P; Macdonald DW. 2012	Organic and conventional systems	Europe	Organic systems	Conventional systems	There is not a single organic or conventional farming system, but a range of different systems, and thus, the level of many environmental impacts depend more on farmers' management choices than on the general farming systems.	69%	Uncertain (per unit of product)
3	Mondelaers, K; Aertsens, J; Van Huylenbroeck, G. 2009	Organic and conventional systems	Global	Organic systems	Conventional systems	Nitrate leaching is significantly lower for organic farming. Results for phosphate losses are less clear.	50%	Positive (per unit of area)

In Clark and Tilman (2017), 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 3 meta-analyses or systematic reviews.