

# SINGLE-IMPACT FICHE – ORGANIC SYSTEMS

## IMPACT: SOIL NUTRIENTS

Data extracted in October 2021

**Note to the reader:** This fiche summarises the impact of organic systems on SOIL NUTRIENTS<sup>1</sup>. It is based on 1 peer-reviewed synthesis research paper<sup>2</sup> containing 102 individual studies.

### 1. WEIGHT OF THE EVIDENCE

- **CONSISTENCY OF THE IMPACT:** uncertain results were reported on the effect of organic cropping systems, as compared to conventional systems on SOIL NUTRIENTS stocks. This is due to the lack of synthesis papers presenting statistical test comparisons. No results are available for livestock/mixed farming systems, neither per area nor per product unit.

The synthesis paper included studies conducted in Europe.

**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.

Impact	Metric	Impacts per unit of agricultural land				Impacts per unit of product			
		Positive	Negative	No effect	Uncertain *	Positive	Negative	No effect	Uncertain *
<b>Organic cropping systems</b>									
Increase Soil nutrients		0	0	0	1 (0)				

\* Number of synthesis papers that report relevant results but without statistical test comparison of the intervention and the control.

- **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 the synthesis paper retrieved was 44%. The least frequently satisfied quality criteria were: “Search string”, “Number of studies of each step”, “Individual effect sizes”, “Individual studies weighted”, “Heterogeneity of results analysed” and “Publication bias analysed”.

### 2. IMPACTS

The main characteristics and results of the synthesis paper are summarized in **Table 2**.

**Table 2.** Main characteristics of the synthesis papers reporting impacts on soil nutrients. All detailed results of each synthesis study are reported in the summary reports [→](#).

<sup>1</sup> Stock of nutrients in soil.

<sup>2</sup> Research synthesis papers include a formal meta-analysis or systematic reviews with some quantitative results

Reference	Population	Geographical scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Kopittke, PM; Dalal RC; Finn D; Menzies NW 2016	Long-term studies (minimum 5 years) assessing the performance of organic systems in comparison to conventional systems.	Global	102	'Organic agriculture': a cropping system in which inorganic fertilizers are largely replaced with organic amendments (including farm yard manure and green manure) and in which synthetic pesticides are generally not used (overall practices vary widely, depending upon local guidelines).	Conventional systems	Stock of Nitrogen, Phosphorous and Sulfur in soil (kg m <sup>-2</sup> )	Organic systems increase soil nitrogen stock by 8%, compared to conventional systems. However, the result is rated as uncertain, due to the lack of statistical tests.	44%

### 3. KNOWLEDGE GAPS

**Kopittke et al., 2016**

Conclusions may be biased towards North America and Asia.

### 4. SYSTEMATIC REVIEW SEARCH STRATEGY

<b>Keywords</b>	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")  TOPIC: ((organic near/4 farm*) OR (organic near/4 agric*) OR (organic near/4 produc*) OR (organic near/3 livestock) OR (organic near/3 animal)) AND TOPIC: ("animal*" OR "livestock" OR "ruminant*" OR "small ruminant*" OR "cattle" OR "dairy cattle" OR "dairy" OR "beef cattle" OR "sheep" OR "ewe*" OR "lamb*" OR "swine" OR "pig*" OR "porcine*" OR "goat*" OR "rabbit*" OR "poultry" OR "chicken*" OR "broiler*" OR "turkey*" OR "hen*" OR "horse*" OR "mule*" OR "milk" OR "egg" OR "beef" OR "cheese" OR "meat" OR (animal near/2 protein*) OR "yogurt" OR "bacon" OR "pork") AND TOPIC: ("meta-analy*" OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis")
<b>Search dates</b>	No time restrictions
<b>Databases</b>	Web of Science and Scopus, run for the first time in July 2020 and updated in September 2021 and October 2021.
<b>Selection criteria</b>	Four 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 report results on the effect of specific farming practices (e.g. organic fertilisation, green manure, alternative pest control techniques, etc.) which are part of organic systems, instead of the effect of the whole farming system; (4) the paper is neither a meta-analysis nor a systematic review including quantitative results. Synthesis papers that passed the relevance criteria were subject to critical appraisal carried out on paper-by-paper basis. From the 220 potentially relevant

synthesis papers, 140 were excluded after reading the title and abstract, and 50 after reading the full text according to the above-mentioned criteria. Finally, 30 synthesis papers were selected for organic farming systems, from which 1 were relevant for this impact.