

IMPACT: SOIL NUTRIENTS

Data extracted in October 2021
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Note to the reader: This fiche summarises the effects of Organic farming systems on SOIL NUTRIENTS. It is based on 1 synthesis paper¹ containing 102 primary studies.

1. WEIGHT OF THE EVIDENCE

CONSISTENCY OF THE IMPACT

The effect of organic farming systems on soil nutrients is reported in **Table 1**.

The table below shows the number of synthesis papers with statistical tests reporting i) a significant difference between the Intervention and the Comparator, that is to say, a significant statistical effect, which can be positive or negative; or ii) a non-statistically significant difference between the Intervention and the Comparator. In addition, we include, if any, the number of synthesis papers reporting relevant results but without statistical test of the effects. Details on the quality assessment of the synthesis papers can be found in the methodology section of this WIKI.

- Non-statistically tested results were reported on the effect of organic cropping systems, as compared to conventional systems on soil nitrogen, phosphorous and sulfur stocks.

The selected synthesis paper included studies conducted in Europe (see **Table 2**).

Table 1: Summary of effects. Number of synthesis papers reporting positive, negative or non-statistically significant effects on environmental and climate impacts. The number of synthesis papers reporting relevant results but without statistical test of the effects are also provided. When not all the synthesis papers reporting an effect are of high quality, the number of synthesis papers with a quality score of at least 50% is indicated in parentheses. The reference numbers of the synthesis papers reporting each of the effects are provided in **Table 3**.

Impact	Metric	Intervention	Comparator	Statistically tested			Non-statistically tested
				Significantly positive	Significantly negative	Non-significant	
Increase soil nutrients	Soil nutrients per unit of area	Organic cropping systems	Conventional	0	0	0	1 (0)

QUALITY OF THE SYNTHESIS PAPERS

The quality of each synthesis paper was assessed based on 16 criteria regarding three main aspects: 1) the literature search strategy and primary studies selection; 2) the statistical analysis conducted; and 3) the evaluation of potential bias. We assessed whether authors addressed and reported these criteria. Then, a quality score was calculated as the percentage of these 16 criteria properly addressed and reported in each synthesis paper. Details on quality criteria can be found in the methodology section of this WIKI.

2. IMPACTS

The main characteristics and results of the 1 synthesis paper is reported in **Table 2** with the terminology used in those papers, while **Table 3** shows the reference numbers of the synthesis papers reporting for each of the results shown in **Table 1**. Comprehensive information about the results reported in each synthesis paper, in particular about the modulation of effects by factors related to soil, climate and management practices, are provided in the **summaries of the synthesis papers** available in this WIKI.

Table 2: Main characteristics of the synthesis paper reporting effects on soil nutrients.

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref14	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 ⁻²)	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%

Table 3: Reference numbers of the synthesis papers reporting for each of the results shown in **Table 1**.

¹ Synthesis research papers include either meta-analysis or systematic reviews with quantitative results. Details can be found in the methodology section of the WIKI.

Impact	Metric	Intervention	Comparator	Statistically tested			Non-statistically tested
				Significantly positive	Significantly negative	Non-significant	
Increase soil nutrients	Soil nutrients per unit of area	Organic cropping systems	Conventional				Ref14

3. FACTORS INFLUENCING THE EFFECTS ON SOIL NUTRIENTS

No factors were found.

4. KNOWLEDGE GAPS

Table 5: Knowledge gap(s) reported by the authors of the synthesis papers included in this review.

Ref Num	Gap
Ref14	Conclusions may be biased towards North America and Asia.

5. SYNTHESIS PAPERS INCLUDED IN THE REVIEW

Table 6: List of synthesis papers included in this review. More details can be found in the summaries of the meta-analyses.

Ref Num	Author(s)	Year	Title	Journal	DOI
Ref14	Kopittke, PM; Dalal RC; Finn D; Menzies NW	2016	Global changes in soil stocks of carbon, nitrogen, phosphorus, and sulphur as influenced by long-term agricultural production.	Global change biology 23, 2509-2519	10.1111/gcb.13513

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