

SINGLE-IMPACT FICHE

ORGANIC FARMING SYSTEMS

IMPACT: NUTRIENT LEACHING AND RUN-OFF

Data extracted in October 2021

Note to the reader: This fiche summarises the impact of organic systems on NUTRIENT LEACHING AND RUN-OFF (nitrogen and phosphorous). It is based on 2 peer-reviewed synthesis research papers¹, including 9 and 72 studies, respectively.

1. WEIGHT OF THE EVIDENCE

- **CONSISTENCY OF THE IMPACT:** The effect on NUTRIENT LEACHING AND RUN-OFF of organic farming systems, as compared to conventional systems are reported as:
 - per unit of area: for cropping systems, positive effects were reported for nitrate leaching (decrease) by 2 synthesis papers and no significant effects for phosphorous losses by 2 synthesis papers. For livestock/mixed farming systems, no significant effects were reported for nitrate leaching by one synthesis paper.
 - per unit of product: for cropping systems, different effects were reported, with one synthesis paper reporting no significant effects and another one reporting negative effects, both regarding nitrate leaching. Specific results for livestock/mixed systems are not available.

The 2 synthesis papers included studies conducted in Europe.

Table 1. Summary of effects of nutrient leaching and run-off. The numbers between parentheses 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. Some synthesis papers reported effects for more than type of system.

Impact	Metric	Impacts per unit of agricultural land				Impacts per unit of product			
		Positive	Negative	No effect	Uncertain	Positive	Negative	No effect	Uncertain
Organic cropping systems									
Decrease Nutrients loss	Nitrogen	2 (2)	0	0	0	0	1 (1)	1 (1)	0
	Phosphorous			2 (2)					
Organic livestock systems									
Decrease Nutrients loss		0	0	1 (1)	0				

¹ Research synthesis papers include a formal meta-analysis or systematic reviews with some quantitative results. Details can be found in the methodology section of the WIKI.

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 the methodology section of this WIKI.*

2. IMPACTS

The main characteristics and results of the 2 synthesis papers are summarized in **Table 2**. Summaries of the meta-analyses provide fuller 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.

Table 2. Main characteristics of the synthesis papers reporting impacts on nutrients loss.

Reference	Population	Geographical scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Mondelaers, K; Aertsens, J; Van Huylenbroeck, G. 2009	Studies assessing the performance of organic systems in comparison to conventional systems.	Global	9	Organic systems	Conventional systems	N leaching; P losses	Nitrate leaching is significantly lower for organic farming. Results for phosphate losses are less clear.	50%
Tuomisto HL; Hodge ID; Riordana P; Macdonald DW 2012	Field studies, modelling studies and Life Cycle Assessment studies assessing the performance of organic systems in comparison to conventional systems in Europe.	Europe	71	Organic systems	Conventional systems	Nitrate leaching and P losses per unit of area; Nitrate leaching per unit of product	Nitrate leaching per unit of area is significantly lower for organic farming. Changes for phosphorous losses per unit of area are not significant. Nitrate leaching per unit of product are significantly higher for organic farming.	69%

3. KNOWLEDGE GAPS

The authors did not report knowledge gaps in the reviewed synthesis papers.