SINGLE-IMPACT FICHE
MANURE PROCESSING TECHNIQUES

IMPACT: SOIL BIOLOGICAL QUALITY

Data extracted in July 2021
Fiche created in February 2024

Note to the reader: This fiche summarises the effects of Manure processing techniques on SOIL BIOLOGICAL QUALITY. It is based on 1 synthesis paper[1] containing 92 primary studies.

1. WEIGHT OF THE EVIDENCE

CONSISTENCY OF THE IMPACT

The effects of manure processing techniques (namely anaerobic digestion and composting) on soil biological quality are 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.

- According to 1 synthesis paper, soil fertilisation with composted or digested manure, as compared to raw manure, showed a positive effect on different metrics, such as soil microbial carbon and soil enzymatic activity.

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**.

				Statistically tested			Non-statistically tested
Impact	Metric	Intervention	Comparator	Significantly positive	Significantly negative	Non-significant	
Increase soil biological quality	Soil biological quality	Composting/Anaerobic digestion	Conventional management	1	0	0	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 biological quality.

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref6	Arable land	Global	92	Fertilisation using composted/digested manure (Mixed, Cattle, Pig, Poultry)	Fertilisation using untreated manure (Mixed, Cattle, Pig, Poultry)	Soil microbial carbon; Soil enzymatic activity	The addition of composted/digested manure had a significantly greater effect on soil microbial carbon and on most biochemical properties than non-composted manure.	69%

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

	Statistically tested	Non-statistically tested

[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	Significantly positive	Significantly negative	Non-significant	
Increase soil biological quality	Soil biological quality	Composting/Anaerobic digestion	Conventional management	Ref6			

3. FACTORS INFLUENCING THE EFFECTS ON SOIL BIOLOGICAL QUALITY

Table 4: List of factors reported to significantly affect the size and/or direction of the effects on soil biological quality, according to the synthesis papers reviewed.

Factor	Reference number
NA	Ref6, Ref6, Ref6, Ref6, Ref6, Ref6, Ref6 and Ref6

4. KNOWLEDGE GAPS

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

Ref Num	Gap

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
Ref6	Liu, SB; Wang, JY; Pu, SY; Blagodatskaya, E; Kuzyakov, Y; Razavi, BS	2020	Impact of manure on soil biochemical properties: A global synthesis	SCIENCE OF THE TOTAL ENVIRONMENT, 745, 141003.	10.1016/j.scitotenv.2020.141003

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