

IMPACT: SOIL BIOLOGICAL QUALITY

Data extracted in February 2021
Fiche created in May 2024

Note to the reader: This fiche summarises the effects of Soil amendment with lime and gypsum on SOIL BIOLOGICAL QUALITY. It is based on 1 synthesis paper¹ containing 59 primary studies.

1. WEIGHT OF THE EVIDENCE

CONSISTENCY OF THE IMPACT

The effects of soil amendment with lime and gypsum, as compared to no-amendment, 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.

- Soil amendment with gypsum, compared to no amendment, showed significant positive effect on soil biological quality (soil bacteria, fungi, actinomycetes) in the only synthesis paper reviewed. No results were available for liming.

The selected synthesis paper did not include 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 biological quality	Soil biological quality	Gypsum	No gypsum	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
Ref3	Saline-sodic soil types	China	59	Soil amendment using flue gas desulfurization gypsum (FGDG)	No-amendment control under identical experimental conditions	Soil bacteria, fungi, actinomycetes	Soil amendment using flue gas desulfurization gypsum (FGDG) significantly increased the numbers of soil bacteria, fungi, and actinomycetes.	62%

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

Impact	Metric	Intervention	Comparator	Statistically tested			Non-statistically tested
				Significantly positive	Significantly negative	Non-significant	
Increase soil biological quality	Soil biological quality	Gypsum	No gypsum	1	0	0	0

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	Gypsum	No gypsum	Ref3		

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	Ref3, Ref3, Ref3, Ref3, Ref3, Ref3, Ref3 and Ref3

4. KNOWLEDGE GAPS

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

Ref Num	Gap
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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
Ref3	Wang Y, Wang Z, Liang F, Jing X, Feng W	2021	Application of flue gas desulfurization gypsum improves multiple functions of saline-sodic soils across China.	Chemosphere. 277:130345	10.1016/j.chemosphere.2021.130345

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