SINGLE-IMPACT FICHE
SOIL AMENDMENT WITH LIME OR GYPSUM
IMPACT: CARBON SEQUESTRATION

Data extracted in April 2021

Note to the reader: This fiche summarises the impact of soil amendment with lime or gypsum on CARBON SEQUESTRATION, reported ad soil organic carbon. It is based on 2 peer-reviewed synthesis research papers[1], which include 20 and 59 individual studies.

1.WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:

Compared to no soil amendments, amendment with gypsum showed a positive effect on soil organic carbon in one synthesis paper, while amendment with lime showed no effect in the other synthesis paper (see **Table 1**).

Among the 2 reviewed synthesis papers, only 1 includes data collected in Europe (on lime with no effect on soil organic carbon).

Table 1. Summary of effects. 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	Intervention	Control	Positive	Negative	No effect	Uncertain
Increase soil organic carbon	Gypsum	No gypsum	1 (1)	0	0	0
	Lime	No lime	0	0	1 (1)	0

- 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 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 of soil amendment with lime or gypsum on soil organic carbon. The references are ordered chronologically with the most recent publication date first.

Reference	Population	Geographical scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Wang Y, Wang Z, Liang F, Jing X, Feng W 2021	Saline-sodic soil types	China	59	Soil amendment using flue gas desulfurization gypsum (FGDG)	No amendment control under identical experimental conditions	Soil organic carbon	The application of flue gas desulfurization gypsum (FGDG) significantly increased SOC content.	62%

[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

Reference	Population	Geographical scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Eze, S; Palmer, SM; Chapman, PJ. 2018	Grasslands	Global (including Europe)	20	Liming intensity categorised into three rates: low lime, < 3 t/ha lime; moderate lime, 3–5 t/ha lime; and high lime, > 5 t/ha lime.	No-liming under same ecosystem and similar environmental characteristics.	Soil organic carbon stock	Liming results in a marginal, non-significant increase in soil C stocks of grasslands at global scale.	100%

3. KNOWLEDGE GAPS

Wang Y et al	A few studies have estimated soil C sequestration capacity in organic and inorganic forms induced by FGDG application. The magnitude of soil C sequestration potential due to FGDG application at large spatial scales is largely unknown. Large temporal variations occur and it may take years to observe the impacts of FGDG application on them. Unfortunately, most studies of FGDG application measure these soil properties only once, which cannot inform the long-term impacts.
Eze S et al.	The understanding of the mechanisms of interactions between climate change and management activities in temperate grasslands is still poor.