SINGLE-IMPACT FICHE
SOIL AMENDMENT WITH LIME OR GYPSUM

IMPACT: GREENHOUSE GAS EMISSIONS

Data extracted in April 2021

Note to the reader: This fiche summarises the impact of soil amendment with lime or gypsum on greenhouse gas emissions. It is based on 1 peer-reviewed synthesis research paper including 19 individual studies.

1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:

Liming, compared to no-liming, showed an uncertain effect on greenhouse gas emissions (see **Table 1**). According to the reviewed synthesis paper, liming does not alter GHG emissions per ton of maize. Following our review procedure, we consider the results uncertain because they were not obtained from direct measurements of greenhouse gas emissions, but from models. No results were available for soil amendment with gypsum.

The reviewed synthesis paper did not include data collected in Europe (it was focused on Kenya).

Table 1. Summary of effects. The effect with the higher score is marked in bold and the cell coloured. 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
Decrease GHG emissions	Lime	No lime	0 (0)	0 (0)	0 (0)	**1 (1)**

- 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 this document*

As shown in the "Quality score" in **Table 2**, the quality level is of 56%.

2. IMPACTS

The main characteristics and results of the synthesis paper are summarized in **Table 2**. Detailed results of each synthesis study are reported in the summary reports.

Table 2. Main characteristics of the synthesis paper reporting impacts of soil amendment with lime or gypsum on greenhouse gas emissions.

Reference	Population	Geographical scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Hijbeek R, van Loon MP, Ouaret W, Boekelo B, van Ittersum MK 2021	Maize	Kenya	19	Lime	No lime	GHG emissions per yield unit	Liming does not alter GHG emissions per ton of maize. However, following our review procedure the result is uncertain, because GHG were estimated from emission factors, not from measurements.	56%

3. KNOWLEDGE GAPS

R.Hijbeek et al. GHG emission was computed from emission factors and not estimated from measurements. Further research could investigate liming effects for crops other than maize and analyse GHG emission from transport of fertiliser and lime.

4. SYSTEMATIC REVIEW SEARCH STRATEGY

Keywords	Search equations WOS	*TOPIC: ("liming" OR "limest*" OR "chalk*" OR "marl*" OR "gypsum") AND TOPIC: (soil) AND TOPIC: ("meta-analy*" OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis")*
	Search equations SCOPUS	*TITLE-ABS-KEY (("liming" OR "limest*" OR "chalk*" OR "marl*" OR "gypsum")) AND TITLE-ABS-KEY (soil) AND TITLE-ABS-KEY (("meta-analy*" OR "systematic* review*" OR "evidence map" OR "global synthesis" OR "evidence synthesis" OR "research synthesis"))*
Search dates	No time restrictions	
Databases	Web of Science and Scopus, run in March 2021	
Selection criteria	The main criteria that led to the exclusion of a synthesis paper were if the paper: (1) was out of the scope; (2) was not a meta-analysis; (3) was a MA of experimental trials (i.e. no systematic review process); (4) did not deal with soil amendment with lime or gypsum; (5) did not deal with environmental or productivity outcome; (6) did not clearly stated the intervention and comparator treatments; (7) was not written in English. Synthesis papers that passed the relevance criteria were subject to critical appraisal carried out on paper-by-paper basis. The systematic search provided 35 synthesis papers (after removing the duplicates) potentially relevant for the practice object of our fiches. From this set of potentially relevant synthesis papers, 7 synthesis papers were selected, among which 1 was relevant for the impact considered in this fiche.	