SINGLE-IMPACT FICHE
IL AMENDMENT WITH LIME AND GYPSUM

IMPACT: GHG EMISSIONS

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 GHG EMISSIONS. It is based on 1 synthesis paper[1] containing 19 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 GHG emissions 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 the reviewed synthesis paper, liming decreases yield-scaled GHG emissions from soil (as CO_2 eq per ton of maize), in the case of sub-optimal fertilisation rate (25-75 kgN /ha). In the case of higher fertilisation rates, liming has non-significant effect on yield-scaled GHG emissions.

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**. Some synthesis papers may report effects for more than one impact or more than one effect for the same impact.

				Statistically tested			Non-statistically tested
Impact	Metric	Intervention	Comparator	Significantly positive	Significantly negative	Non-significant	
Decrease ghg emissions	Yield-scaled aggregated GHGs emissions (as CO_2eq)	Lime	No lime	1	0	1	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 ghg emissions.

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref2	Maize	Kenya	19	Lime	No lime	GHG emissions per yield unit	Liming does not significantly alter GHG emissions per tonne maize. At low-fertilisation rates, it significantly decreases GHG emissions per tonne of maize.	56%

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	
Decrease ghg emissions	Yield-scaled aggregated GHGs emissions (as CO_2eq)	Lime	No lime	Ref2		Ref2	

3. FACTORS INFLUENCING THE EFFECTS ON GHG EMISSIONS

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

Factor	Reference number
NA	Ref2, Ref2, Ref2, Ref2, Ref2, Ref2, Ref2 and Ref2

4. KNOWLEDGE GAPS

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

Ref Num	Gap
Ref2	GHG emission was computed from emission factors (Tier 1 method) and not estimated from measurements. Further research could investigate liming effects for crops other than maize and analyze GHG emission from transportation of fertiliser and lime.

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
Ref2	R.Hijbeek; M.P.van Loon; W.Ouaret; B.Boekelo; M.K.van Ittersum	2021	Liming agricultural soils in Western Kenya: Can long-term economic and environmental benefits pay off short term investments?	Agricultural Systems 190, 103095	10.1016/j.agsy.2021.103095

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