

SINGLE-IMPACT FICHE

SOIL AMENDMENT WITH BIOCHAR

IMPACT: AIR POLLUTANTS EMISSIONS

Data extracted in February 2021

Note to the reader: This fiche summarises the impact of soil amendment with biochar on AMMONIA EMISSION. It is based on 2 peer-reviewed synthesis research papers¹, each of them including 41 and 208 individual studies.

1. WEIGHT OF THE EVIDENCE

- CONSISTENCY OF THE IMPACT:

Soil amendment with biochar, compared to no-biochar-amendment, led either to a negative effect (increase in ammonia emission) in one synthesis paper or to no effect in the other synthesis paper (see **Table 1**). Therefore, the effects are inconsistent.

The reviewed synthesis papers did not specify the geographical locations of the experiments (see **Table 2**).

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	Metric	Positive	Negative	No effect	Uncertain
Decrease Air pollutants emissions	Ammonia emission	0	1 (1)	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 biochar Ammonia emission.

Reference	Population	Geographical scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Sha, ZP; Li, QQ; Lv, TT; Misselbrook, T;	Not specified	Global	41	Soil amendment	No amendment	Ammonia emission	Biochar addition did not have impact on ammonia volatilization, but this varied	88%

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
Liu, XJ 2019				with biochar			under different soil, biochar and experimental conditions.	
Liu, Q; Zhang, YH; Liu, BJ; Amonette, JE; Lin, ZB; Liu, G; Ambus, P; Xie, ZB 2018	Not specified	Global	208	Soil amendment with biochar	No amendment	Ammonia emission	Biochar significantly enhances soil ammonia volatilization. However, wood biochar tends to decrease soil NH ₃ volatilization.	69%

3. KNOWLEDGE GAPS

Sha et al., 2019	A significant publication bias was identified ($p < 0.05$), but use of the Fail-safe N. technique indicated that results were reliable.
Liu et al., 2018	The biochar effects synthesized in the current paper are mainly derived from experiments characterized by single-dose designs and relatively short-term time scales (months to a few years). Biochar effects with respect to longer-term and repetitive additions require further evaluation with future more relevant experimental data.