

IMPACT: GRASSLAND PRODUCTION

Data extracted in February 2021
Fiche created in May 2024

Note to the reader: This fiche summarises the effects of Soil amendment with biochar on GRASSLAND PRODUCTION. It is based on 1 synthesis paper¹ containing 44 primary studies.

1. WEIGHT OF THE EVIDENCE

CONSISTENCY OF THE IMPACT

The effects of soil amendment with biochar, as compared to no amendment, on grassland production 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.

- One synthesis paper reported significant negative effect on plant yield in grasslands amended with biochar. However, the result was derived by only 2 pairwise comparisons. Therefore it was reported here as non-statistically tested.

The selected synthesis paper included 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 grassland production	Crop yield	Soil amendment with biochar	No amendment	0	0	0	1

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 grassland production.

Reference number	Population	Scale	Num. papers	Intervention	Comparator	Metric	Conclusion	Quality score
Ref30	Grasslands	Global	44	1) Dicyandiamide in liquid form (DCD(L)); 2) dicyandiamide coated with zeolite (DCD(Z)); 3) pyrazole derivatives in liquid form (PD); 4) N-(n-butyl) thiophosphoric triamide in liquid form (NBPT); 5) NBPT and DCD in liquid form (NBPT + DCD(L)); 6) biomass-derived charcoal (biochar)	1) No inhibitor; 2) no biochar	Plant yield	Biochar has a negative effect on yield.	75%

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

	Statistically tested			Non-statistically tested
	Significantly positive	Significantly negative	Non-significant	

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 grassland production	Crop yield	Soil amendment with biochar	No amendment			Ref30

3. FACTORS INFLUENCING THE EFFECTS ON GRASSLAND PRODUCTION

No factors were found.

4. KNOWLEDGE GAPS

The authors did not report knowledge gaps in the reviewed synthesis papers.

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
Ref30	Cai, YJ; Akiyama, H	2017	Effects of inhibitors and biochar on nitrous oxide emissions, nitrate leaching, and plant nitrogen uptake from urine patches of grazing animals on grasslands: A meta-analysis	SOIL SCIENCE AND PLANT NUTRITION, 63(4), 405-414.	10.1080/00380768.2017.1367627

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