FARMING PRACTICE
SOIL AMENDMENT WITH BIOCHAR

IMPACT: HEAVY METALS POLLUTION

Reference 11

Hu, YM; Zhang, P; Yang, M; Liu, YQ; Zhang, X; Feng, SS; Guo, DW; Dang, XL 2020 Biochar is an effective amendment to remediate Cd-contaminated soils-a meta-analysis Agric For Meteorol. 278:107625. 10.1007/s11368-020-02726-9

Background and objective

Cd immobilization can be affected by many factors, among which the soil pH, soil organic matter (SOM), and amendment types are the most critical factors that have been considered in many previous studies. The objective of this study was to find the amendments with best performance for Cd remediation in soils with different range of soil pH and SOM.

Search strategy and selection criteria

The data were collected from China National Knowledge Infrastructure (CNKI) published between 2000 and 2020. The search terms were "Cd contaminated soil amendment" or "stabilization" or "immobilization" and "remediation effect of Cd in soil", and combining retrospective search. The properties of the test sites, soil types, and amendments were clear; control treatments were found in the experiments; each treatment was repeated at least 3 times in the experiment; Cd fractions in soils were analyzed by the Tessier continuous extraction method; the experimental crop was rice and the remediation was for single Cd-contaminated soil by amendments.

Data and analysis

We also applied a continuous randomized-effects model meta-analysis to test the relationships between the effect size of amendments on Cd uptake by rice and Cd fractions, soil pH, organic matter, total nitrogen, CEC, alkaline nitrogen, available phosphorus, available potassium, and the added Cd.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
51	Rice	Soil amendment with biochar	No amendment	Metric: Exchangable Cd concentrations in soil, Cd uptake by Rice; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	0.625

Results

- With biochar amendment, the inhibitory effect on rice Cd-uptake was significant (effect size = − 1.065; 95% CI: − 1.377 to − 0.639).
- Biochar amendment resulted in a reduction of Exchangeable-Cd of 27.4% (95% CI: 0.575 to 0.136).

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

Biochar greatly promoted the transformation of Cd from active to stable state in soil. Cd uptake in rice decreased most significantly after biochar application.