

Reference 7

Edeh, IG; Masek, O; Buss, W 2020 A meta-analysis on biochar's effects on soil water properties - New insights and future research challenges Sci Total Environ. 643:926–35. 10.1016/j.scitotenv.2020.136857

Background and objective

Biochar can significantly alter water relations in soil and therefore, can play an important part in increasing the resilience of agricultural systems to drought conditions. Quantify the effect of biochar with different characteristics on soil water properties.

Search strategy and selection criteria

An extensive literature search was performed using key words such as: biochar and soil physical properties and/or hydraulic properties, and/or water retention, and/or available water capacity, and/or moisture characteristics. The treatment and control were established as being identical for this MA with regards to all variables other than the addition of biochar. Therefore, only studies including a control (no biochar) and biochar treated soils were collected. Studies without replicated treatments and control as defined were excluded from the MA. Studies that measured water holding capacity (by drainage method) as field capacity were excluded because water holding capacity does not include water potential, which describes how freely water drains in soils and how much is available for plant use

Data and analysis

The log transformed data were used in calculating overall effect and 95% confidence intervals for each group. For each parameter, groups with fewer than three treatments were excluded from the analysis. All data treatment and processing were done using Microsoft Excel 2010.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
37	Laboratory and field studies	Soil amendment with biochar	No amendment	Metric: Soil total porosity; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	0.5625

Results

- Biochar increased the total porosity irrespective of the soil texture.

Factors influencing effect sizes

- Soil texture : Biochar increased the TP for both fine and coarse-textured soil types, although the increment was greater in coarse-textured soils (7.9%)

Conclusion

Biochar increased the total porosity irrespective of the soil texture.