

IMPACT: CARBON SEQUESTRATION

Reference 2

Alvarez, R 2021 Organic farming does not increase soil organic carbon compared to conventional farming if there is no carbon transfer from other agroecosystems. A meta-analysis Soil Research 60(3) 211-223 10.1071/SR21098

Background and objective

Organic farming is based on the non-use of synthetic fertilisers and pesticides. Nitrogen inputs are derived from symbiotic fixation and organic fertilisers, which also contribute carbon to the agroecosystem. Soil organic carbon (SOC) generally increases in organically managed soils, but it is unclear whether the increase is due to carbon transfer from off-site or can be achieved without carbon transfer from other production systems. This study aims to determine how carbon transfer is achieved to increase SOC under organic farming systems.

Search strategy and selection criteria

NA Data were collected from 66 experiments that generated 83 direct comparisons of organic vs conventional management. The data were divided into three groups: no carbon transfer between agroecosystems (no off-site effects, n = 15), with carbon transfer (off-site effects, n = 43), and undefined carbon management (n = 25).

Data and analysis

The response ratio was used as the effect size and the 95% confidence interval was calculated.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
132	Studies comparing organic crops (Cereals, legumes, vegetables, others) with conventional crops.	organic systems with and without biomass transfer	Conventional systems	Metric: SOC; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	87.5

Results

- In experiments with no off-site effects, SOC did not differ between organic and conventional systems.
- In contrast, in experiments where manure-compost was transferred to organic systems from off-site or crop residues were harvested in conventional treatment, SOC was 22% higher in organic system.
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- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

These results indicate that organic farming increases SOC only when carbon is transferred between agroecosystems.