

## IMPACT: SOIL BIOLOGICAL QUALITY

### Reference 29

Kaschuk, G; Alberton, O; Hungria, M. 2010 Three decades of soil microbial biomass studies in Brazilian ecosystems: Lessons learned about soil quality and indications for improving sustainability. *Soil Biology & Biochemistry* 42: 1–13. 10.1016/j.soilbio.2009.08.020

### Background and objective

Three decades after publication of the first method for soil microbial biomass (MB-C) evaluation, several studies have been made on in ecosystems in Brazil, most of which are published in national journals and proceedings in Portuguese. Soil microbial biomass-C is the living portion of soil organic matter, constituted by archaea, bacteria and ukaryotes, excluding roots and animals smaller than 5000  $\mu\text{m}^3$ . The purpose of this paper is to review many Brazilian studies, identifying patterns in soil microbial biomass responses to various land uses (including organic farming) in Brazilian ecosystems, emphasizing gaps in knowledge to inspire future research.

### Search strategy and selection criteria

Authors reviewed more than a hundred studies in which microbial biomass-C (MB-C), microbial quotient (MB-C/TSOC, total soil organic carbon) and metabolic quotient ( $q\text{CO}_2$ ) were evaluated. Studies reporting on organic farming effects.

### Data and analysis

Data were extracted manually from studies. Increase was calculated as:  $(\text{Organic}/\text{Conventional} - 1) \times 100$ .

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
7	Studies conducted in Brazil assessing the performance of organic systems in comparison to conventional systems.	Organic systems	Conventional systems	Metric: 1) Soil microbial biomass-C (MB-C); 2) microbial quotient (MB-C/TSOC, total soil organic carbon); 3) metabolic quotient ( $q\text{CO}_2$ ); Effect size: Relative differences. Increase was calculated as: $[(\text{Organic}/\text{Conventional}) - 1] \times 100$	37.5

### Results

- Few studies dealing with the effects of organic agriculture on soil MB-C, most of which were performed with permanent crops
- The majority of these studies indicated that organic agriculture improved soil quality by increasing MB-C and MB-C/TSOC and reducing  $q\text{CO}_2$ , probably as a result of organic manure amendments and removal of agrochemicals application.
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### Factors influencing effect sizes

- No factors influencing effect sizes to report

### Conclusion

The majority of these studies indicated that organic agriculture improved soil quality. However, the results are rated as uncertain, due to the lack of statistical analysis.