Media release

More microbes in organic soil

Soils in organic farming contain on average 59 percent more biomass from microorganisms, which are up to 84 percent more active compared to those in conventional farming. These were the findings of a global meta study by FiBL, which has recently been published in the academic journal PLOS ONE.

(Frick, 25 September 2017) Soils in organic farming contain on average 59 percent more biomass from microorganisms, which are up to 84 percent more active compared to those under conventional farming. These were the findings of a global meta study by FiBL that took 57 systematically selected international publications (149 pairwise comparisons) into account. The study was published in PLOS ONE, a renowned international scientific journal of the Public Library of Science (PLOS).

Further results of the study:

- The metabolism of microbes in organic soils is significantly more active, which in turn leads to a faster conversion of organic matter like compost into plant-available nutrients.
- The positive effect of organic farming on the activity of microbes is significantly increased in warm and dry climates.
- Organic fertiliser, a diverse crop rotation and the inclusion of leguminous plants in the crop rotation have positive effects on microbial abundance and activity.
- Organic farming has a positive effect on the soils' pH and soil carbon, which in turn has a positive effect on the microbes.

The paradox: Lower yields in organic farming

Large amounts of microbial biomass and an active soil life provide an excellent base for a high crop yield. However, the paradox is that the yields in organic farming are on average still 20 % lower. This is due to the lack of adapted varieties in organic farming and the avoidance of chemical plant protection agents and synthetic fertilisers as well as herbicides. However, there is mounting evidence that organic farming systems using adapted varieties produce more stable yields in drought conditions. The higher biomass in the soil is also significant for the climate: Organically farmed soils contain more humus, which helps in the sequestration of the greenhouse gas CO_2.

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FiBL study on microbial biomass

Lori, Martina; Symnaczik, Sarah; Mäder, Paul; De Deyn, Gerlind; Gattinger Andreas (2017) Organic farming enhances soil microbial abundance and activity—A meta-analysis and meta-regression. PLOS ONE. July 12, 2017: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0180442

Studies on yields and humus formation in organic farming

Adamtey, Noah; Musyoka, Martha W.; Zundel, Christine; Cobo, Juan Guillermo; Karanja, Edward; Fiaboe, Komi K.M.; Muriuki, Anne; Mucheru-Muna, Monica; Vanlauwe, Bernard; Berset, Estelle; Messmer, Monika M.; Gattinger, Andreas; Bhullar, Gurbir S.; Cadisch, Georg; Fliessbach, Andreas; Mäder, Paul; Niggli, Urs and Forster, Dionys (2016) Productivity, profitability and partial nutrient balance in maize-based conventional and organic farming systems in Kenya. Agriculture, Ecosystems and Environment, 235, pp. 61-79. Available at www.sciencedirect.com/science/article/pii/S0167880916304935

Forster, Dionys; Andres, Christian; Verma, Rajeev; Zundel, Christine; Messmer, Monika M. and Mäder, Paul (2013) Yield and Economic Performance of Organic and Conventional Cotton-Based Farming Systems – Results from a Field Trial in India. PLOS ONE, 8 (12), pp. 1-15. Available at http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081039

Gattinger, Andreas; Müller, Adrian; Haeni, Matthias; Skinner, Collin; Fliessbach, Andreas; Buchmann, Nina; Mäder, Paul; Stolze, Matthias; Smith, Pete; El-Hage Scialabba, Nadia und Niggli, Urs (2012) Enhanced top soil carbon stocks under organic farming. Proceedings of the National Academy of Sciences - PNAS, 109 (44), S. 18226-18231. Available at www.pnas.org/content/109/44/18226.short

Schneider, M.; Andres, C.; Trujillo, G.; Alcon, F.; Amurrios, P.; Perez, E.; Weibel, F. and Milz, J. (2016) Cocoa and total system yields of organic and conventional agroforestry vs. monoculture systems in a long-term field trial in Bolivia. Experimental Agriculture, pp. 1-24. Further information under https://www.cambridge.org/core/journals/experimental-agriculture/article/cocoa-and-total-system-yields-of-organic-and-conventional-agroforestry-vs-monoculture-systems-in-a-longterm-field-trial-in-bolivia/C1C9C3C537F9731E07ADF5CD353432A6

Seufert, Verena; Ramankutty, Navin; Foley, Jonathan A (2012): Comparing the yields of organic and conventional agriculture. Nature. 2012; 485(7397):229±32. https://doi.org/10.1038/nature11069

Weblinks

- DOK, the world's most significant long-term field trial comparing organic and conventional cropping systems http://www.fibl.org/en/switzerland/research/soil-sciences/bw-projekte/dok-trial.html
- Syscom project (long-term trial) in India: www.systems-comparison.fibl.org/en/scp-project-activities/scp-india.html

Supporter

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Since 1973, the Research Institute of Organic Agriculture FiBL has been finding intelligent solutions for a regenerative agriculture and sustainable nutrition. About 280 employees carry out research, advisory services and training at various site to support organic agriculture.

- Homepage: www.fibl.org
- Video: www.youtube.com/watch?v=U84NrJlORFc