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“Can agroecological farming feed the world?
Farmers’ and academia’s views”

Assessing the energy metabolism of agroecological farming systems: Understanding the role of the Ecovida Agroecology Network in Southern Brazil

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Abstract

Food production remains dependent on fossil fuel-based external inputs. Soil fertility loss and global warming are some consequences of this dependency. Agroecological farming practices, such as biological nitrogen fixation and natural fertiliser use, can reduce the consumption of these inputs. Recent evidence from Brazil suggests that farming systems organised in Agroecology Networks (AEN) tend to achieve even higher autonomy and lower external input requirements because the farm-to-farm interactions create a circular compensatory movement within the components. Nevertheless, it lacks quantitative evidence to what extent the network dynamics contribute to the energy efficiency of the farms. This research gap might occur because energy assessments of farming systems commonly underestimate the energy flows exchanged within the socio-economic context. We present a conceptual framework to measure the energy efficiency of farming systems that acknowledges the interactions within AEN. We integrate two specific methods: the Agroecological Energy Analysis (AEA) and The Multi-Scale Integrated Analysis of Social and Ecosystem Metabolism (MuSIASEM). In a case study approach, we applied this framework to farming systems of The Nucleus Litoral Catarinense, located in Southern Brazil and institutionally organised under the Rede Ecovida de Agroecologia [Ecolife Network of Agroecology]. Integrating these methods is innovative because it combines the social metabolism approach with agroecological Energy Return On Investment (EROI) indicators at the farm level. Based on preliminary evidence, this framework advances in understanding how exchanged matter flows within an AEN may affect the energy efficiency of farming systems in quantitative terms.

Keywords: Agroecology, alternative food networks, energy efficiency, socio-economic metabolism