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Research Article

Organic agriculture and the global food supply

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Abstract

The principal objections to the proposition that organic agriculture can contribute significantly to the global food supply are low yields and insufficient quantities of organically acceptable fertilizers. We evaluated the universality of both claims. For the first claim, we compared yields of organic versus conventional or low-intensive food production for a global dataset of 293 examples and estimated the average yield ratio (organic:non-organic) of different food categories for the developed and the developing world. For most food categories, the average yield ratio was slightly <1.0 for studies in the developed world and >1.0 for studies in the developing world. With the average yield ratios, we modeled the global food supply that could be grown organically on the current agricultural land base. Model estimates indicate that organic methods could produce enough food on a global *per capita* basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base. We also evaluated the amount of nitrogen potentially available from fixation by leguminous cover crops used as fertilizer. Data from temperate and tropical agroecosystems suggest that leguminous cover crops could fix enough nitrogen to replace the amount of synthetic fertilizer currently in use. These results indicate that organic agriculture has the potential to contribute quite substantially to the global food supply, while reducing the detrimental environmental impacts of conventional agriculture. Evaluation and review of this paper have raised important issues about crop rotations under organic versus conventional agriculture and the reliability of grey-literature sources. An ongoing dialogue on these subjects can be found in the Forum editorial of this issue.

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