

Preface

Renewable Agriculture and Food Systems is a multi-disciplinary journal which focuses on the science that underpins economically environmentally and socially sustainable approaches to agriculture and food production. The journal publishes original research and review articles on the economic, ecological and environmental impacts of agriculture; the effective use of renewable resources and biodiversity in agro-ecosystems; and the technological and sociological implications of sustainable food systems.

It also contains an open discussion Forum, which presents lively discussions on new and provocative topics. However, the opinions of the Forum and responses are solely those of the authors and do not necessarily reflect the opinions of *Renewable Agriculture and Food Systems* or Cambridge University Press.

John W. Doran
Editor-in-Chief, *RAFS*

Can organic agriculture feed the world?

Catherine Badgley and Ivette Perfecto

Forum

The prospect that organic agriculture has the potential to feed the world is welcome news in light of the contradictions of modern agriculture¹. These include the massive productivity of green-revolution agriculture yet the stubborn persistence of hunger and malnutrition, the loss of small farms even though they are more productive and contribute more to local economies than do large farms², and the pervasive environmental destruction by agricultural biocides and synthetic fertilizers even as more and more ecological services of agricultural landscapes are being recognized³. Organic agriculture *per se* cannot resolve all of these contradictions, but its potential to provide enough food to feed the entire world opens the door to the creation of a new kind of food system based on agroecological production principles. We (Badgley et al. in this issue) have demonstrated two critical points. The first is that the relative yields of organic versus non-organic methods (green-revolution methods in the developed world, low-intensive methods in the developing world) suffice to provide enough calories to support the whole human population eating as it does today. This conclusion is based on a global dataset of 293 yield ratios for plant and animal production. The second point concerns nitrogen fertility. Data from 77 published studies suggest that nitrogen-fixing legumes used as green manures can provide enough biologically fixed nitrogen to replace the entire amount of synthetic nitrogen fertilizer currently in use. Thus, the principal arguments from critics of organic agriculture are invalid. These results are controversial, partly from prejudice and vested interests in the current agricultural

system and partly from disputed aspects of the analysis. While this study claims that organic yields and nitrogen fertility methods *could* feed the world, it does not forecast yields for any particular crop or region, nor does it claim that a global organic food system would necessarily increase food security anywhere. Food security depends on policies and prices as much as on yields.

Our study is not the only one to reach this conclusion. In 1990, Stanhill⁴ came to a similar conclusion about organic production based on a compilation of data from North America and Europe (his average yield ratio was the same as ours for the developed world). More recently, Halberg et al.⁵ modeled scenarios of conversion to organic agriculture in Europe, North America and sub-Saharan Africa, using a globalized market model. They concluded that large-scale conversion to organic agriculture would not severely diminish either the global food supply or food security in developing regions. They noted that food policies favoring local food availability, rather than export crops, would enhance the impact of conversion to organic farming and increase food security in sub-Saharan Africa.

Reviewers raised issues that merit dialogue beyond the context of the article. The first issue concerns the differences in crop-rotation patterns between organic and conventional grain agriculture. The second concerns the reliability of different kinds of sources (i.e. peer-reviewed versus gray literature) for agronomic data.

Rotation effect. Organic grain production frequently uses a different rotation cycle than conventional production. This difference complicates the comparison of yields