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Book Review

Long-term Field Experiments in Organic Farming. Edited by Joachim Raupp, Carola Pekrun, Meike Oltmanns and Ulrich Köpke. 2006. International Society of Organic Agriculture Research (ISOFAR), ISOFAR Scientific Series 1, Verlag Dr Köster, Berlin, Germany. 204 p. 25 Euros, ISBN 3-89574-590-1.

The arrival of *Long-term Field Experiments in Organic Farming* signifies a coming of age for the burgeoning organic farming research community. Results from some of the older experiments—on the productivity of organic systems and their potential for energy reduction, carbon sequestration and other social benefits—have made a splash in mainstream science journals in recent years, and interest among researchers is up. This book pulls together reports from a large selection of the long-term organic field experiments for the first time, highlighting their origins, objectives and important findings in an especially lucid way.

This book is both a wonderful introduction to these long-term experiments and a valuable reference for those who are already familiar with them. The book opens with a short preface, and then 12 selected organic field experiments are presented in alphabetical order. The experiments in this compilation are being conducted in Austria, Denmark, Germany, Israel, Italy, Switzerland and the United States—representing a diversity of soils and climatic conditions—and range from just a few years old to nearly three decades old. Although this compilation lacks any internal structure guiding readers on how these experiments have varied over time and across continents, each experiment report is brief, stylistically similar and easy to read.

The reports on these experiments emphasize the need for long-term research to understand the ecological processes in agriculture, particularly in organic farming systems. For example, the Danish report on a crop rotation experiment indicates that fertility building using organic practices requires 'a long-term integrated approach, rather than the short-term and targeted solutions common in conventional agriculture ... It follows that, for studies of management effects on soil fertility, long-term cropping experiments are indispensable.'

Many of these experiments are collecting data on an exceptionally large number of variables, including soil properties (such as pH, organic matter, inorganic and total N, carbon dioxide, fungi and bacteria), weed populations, insect dynamics, plant growth, biomass, yield, energy use and economic performance. Grain and oilseed crops are the major focus of most of these experiments, but quite a few also have potatoes in the cropping system rotation, and one includes cabbage. Only one of the 12 long-term experiments, the experiment in Israel that compares fertility strategies for peaches, focuses exclusively on a specialty crop.

Three of the oldest experiments—one in Switzerland and two in the United States—compare several organic systems (manure- and legume-based) with a conventional system (synthetic fertilizer and herbicide-based), and report the most comprehensive findings in this book. The FiBL Research Institute of Organic Agriculture in Switzerland began the first long-term organic experiment in 1978, examining wheat, potatoes, corn, grass–clover and other crops in long rotations. The two experiments in the United States, started by the Rodale Institute in 1981 and by the University of Minnesota in 1989, both examine soybeans as well as corn, hay and other crops in rotations of varying lengths. In the FiBL experiment, mean yields of all seven crops during a 28-year study period averaged 80% of those in the conventional systems, while organic yields in Minnesota experiment were somewhat closer to conventional and the Rodale experiment found that overall organically managed crop yields could equal those from conventional systems.

These three experiments also included findings on soil properties, indicating that the organic systems had higher soil carbon content, decreased nitrate leaching and increased soil fungi during the study period. The Rodale experiment report illustrated the importance of these findings: 'If the 64 million hectares of conventional maize and soybean in the U.S. were converted to organic production, the transition would likely allow the U.S., to meet the Kyoto Accord greenhouse gas reduction targets (assuming no other increases in C emissions develop), as well as save energy by reducing use of synthetic fertilizer and pesticides.'

The late seventies and 1980s were a period of expanding interest in organic agriculture, and these earlier experiments were developed to fill a scientific void on this topic by providing direct comparisons of conventional and organic farming systems. Some of the newer experiments featured in this compilation have focused exclusively on organic farming systems, and are no longer including conventionally managed plots. The book includes three experiments begun in the mid-1990s, one in Denmark and two in Germany, which examine alternative crop rotations, biodynamic amendments and other variations of organic management. Another experiment in Denmark tests the potential for recycling nutrients from urban waste streams, including human urine (which is not currently allowed in organic farming systems) on stockless organic farms.

One of the strengths of this book is the inclusion of experiments from numerous countries. One interesting difference between countries in Europe and the United States is that most of the long-term experiments being developed in the United States still include a conventional trial, perhaps because the need still exists to document the benefits of organic farming. In Europe, a

political consensus developed over a decade ago to provide direct financial support for organic farming, and Europe has the highest adoption rates in the world for organic farming—in Italy, for example, 8% of agricultural land was under organic management in 2004. The United States has not yet developed a similar political consensus, and only 0.5% of the farmland in the United States is currently under organic management.

Nonetheless, the research focus of many of these long-term organic field experiments has broadened over time in experiments based in the United States as well as Europe. Some of the older experiments have added new research elements, such as food quality studies, and some of the more recently developed experiments are including a broader swath of the agricultural landscape in the study. An experiment that was established in 1994 in North Carolina—as a partnership between several universities and the North Carolina Department of Agriculture—is examining five diverse systems. In addition to conventional and organic cropping systems, this experiment is also examining a plantation forestry/woodlot system because of the predominance of woodlots on farms in the American South, and a successional ecosystem in an old field as a control for comparing the environmental impacts among farming systems. Similarly, a project developed in Austria in 2003 has a focus on improving the biodiversity of organic farming systems and is examining stockless organic and conventional crop rotations, and has also had included trials to measure the influence of hedges and other existing biotopes at the field margin.

The transition from organic to conventional production is still an important research feature in many of these long-term experiments. A 2003 project in Italy, at the University of Pisa, is comparing the long-term characteristics of organic and conventional cropping systems in a Mediterranean climate, and has imbedded 'playground' trials—on cover crop performance, cultivar performance and other topics—to provide quick-turnaround practical information to farmers as well as improve the experimental design. The North Carolina experiment and others have similarly nested short-term studies within the context of the overall experiment.

Important features of some of the long-term organic field experiments do yet appear to be standard. Only about half of the long-term experiments included in this volume appear to be collecting data on production costs, net returns and other indicators of the financial performance of organic systems. The Minnesota experiment report includes results from its economic analysis of organic and conventional systems, and illustrates the importance of including these indicators in the experiment. While the organic crops did not yield as high as the conventional crops, production costs were lower in the organic systems. And net returns for organic systems were equal to conventional systems without price premiums, and higher with premiums.

The shortcomings of this book are mostly stylistic. The book is a compilation of long-term organic field experiment reports, rather than an evaluation of this research. An executive summary would still have been a useful feature, as would a glossary of agricultural terms, which differ from country to country. The advantage of having a compilation of reports is that the focus of the book remains on the fascinating details of these experiments.

Long-term Field Experiments in Organic Farming is a useful— and inspiring—first offering on this topic from the International Society of Organic Agriculture Research (ISOFAR). In the foreword, Ulrich Kopke, the president of ISOFAR, writes that he hopes this book will attract 'widespread interest and might contribute to the cooperation of scientists, possibly even in a joint research project which assembles existing field trials.' A large, thorough evaluation of long-term organic field trial research is needed. This book is the perfect springboard for a more ambitious effort to tell a larger story—based on the analytical rigor of these experiments—about the sustainability of organic farming systems.

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