



Preface

Advances in systems approaches for agricultural development

In the last two decades significant progress has been made in the analysis and design of sustainable agricultural production systems using systems approaches and simulation modelling. Initially, individual scientists had the lead in developing these tools and approaches, but progress increased considerably when groups were formed with substantial critical mass, such as the International Benchmark Sites Network for Agrotechnology Transfer (IBSNAT) group, the Wageningen group and the Agricultural Production Systems Research Unit (APSRU) group in Australia. In the early 1990s, these three groups initiated the International Consortium for Agricultural Systems Applications (ICASA, <http://www.icasanet.org/>) as they realized that synergy could be generated through international collaboration. All three groups had their own standards and frameworks for models at different levels of scale (from plant and crop level to the regional level) but the basic science behind the models was not significantly different. However, different groups were focusing on different applications and thus the level of detail in the way different processes were modelled varied among the groups. At that time, the general scientific community and potential model users were still sceptical about the usefulness of the models. The models had been used mostly for scientific purposes to understand system behaviour; not many examples of practical applications were available. However, this perception has changed dramatically in the last decade. An overwhelming number of studies were conducted in which models were successfully used in decision support systems, policy making (e.g. climate change studies), land use planning, etc.

As many research groups worldwide are developing and using systems approaches in agricultural research, there is a need for a platform to exchange information and to stimulate international collaboration for the development of compatible frameworks and tools. ICASA was established to be such a platform. At the third international symposium on Systems Approaches for Agricultural Development (SAAD-III) held in Lima, Peru, 8–10 November 1999, a special session was organized by ICASA to review developments in the application of systems approaches for sustainable agriculture. The symposium was hosted by the International Potato Centre (CIP) and the National Agrarian University La Molina (UNALM). This special edition of *Agricultural Systems* presents these developments, which are the result of 10 years of collaboration. The papers review the state of the art with respect to development

and application of models at different scales ranging from field to the farm and regional levels. Topics covered include a description of ICASA initiatives and results, overviews of the applications at the field level, including new developments such as modular approaches to modelling, new data standards, and applications in plant breeding, precision agriculture, decision support, climate prediction, crop–livestock system optimization and regional land use studies.

Hopefully, this special issue will contribute to the further collaborative development of joint frameworks and compatible tools so that the efforts of individual scientists can focus on the specific issue for which they want to use the tools. Through exchange of models, modules data and other agricultural systems analysis tools, ICASA aims to facilitate the development of a toolkit that will enhance the efficiency of this type of work and improve quality of agricultural systems research.

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