EDITORIAL FOREWORD

New Generation of Agriculture Systems Models for Sustainability and Policy Implementation

Enormous policy efforts are made by governments around the world to induce practice change by farmers. The results, if quantified at all, are often ineffective because of a range of system effects: e.g., costs to farmers are too large due to interactions and trade-offs within the farm system; there is insufficient farm capital, or other resources; practice change is risky or difficult to trial on-farm. Furthermore, policies intended to promote practice change can, through system trade-offs, curb the potential beneficial effects of other policies. For example, a subsidy policy for fertilizer may compromise an extension policy that aims to promote nitrogen-use efficiency. It is therefore not surprising that the agricultural systems in developed countries, have taken decades to evolve their approach to agricultural policy (e.g., regulations, price support, environmental interventions) and knowledge exchange for technical innovation (e.g., information networks, farm advisors, training schemes). Much of this structure has evolved through trial and error over time, drawing on long term and contemporary data. This evolutionary approach does not meet the urgent agricultural development needs of developing countries.

Discussions about agricultural development with almost any developing country stakeholder (e.g., senior policy staff, extension service, water managers, smallholders) invariably results in 'what if' questions: When/what should I plant? What will the price be? Should we delay the availability of water? Should price support extend to a wider range of crops? Meaningful answers to these types of questions are directly relevant to the development of both policy and the extension packages recommended to farmers. The accelerated approach, in which agricultural systems models are used to frame and support agricultural development through the evaluation of relevant scenarios for policy and/or agricultural practice recommendation.

However, data in resource poor farming systems is both scarce and uncertain and many potentially useful models, such as crop models designed to capture the effect of changing farm management on crop production, are hungry for precise and extensive data a parsimonious but comprehensive modelling approach to capture all policy-relevant components of the agricultural systems are recent developments. This type of new generation system models captures the policy effectiveness, and data uncertainty though omission of complex data requirements. Further, it is particularly important that the system models are able to fully couple the prediction of crop yield in response to environment and management within the overall systems framework. The current crop models are, unfortunately, complex and data intensive, and do not lend themselves to integration within agricultural systems models. An agricultural systems model which is fully coupled with the underlying crop production sub-components are timely needed with comprehensive, rather than detailed, in order to represent the whole system. While this is an approximate approach there are good reasons to believe it is a better way to represent an overall system than considering a few components of the system in great detail.

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