Mathematical Models in Agricultural Science

Journal Policy

The Journal will publish papers involving detailed mathematical models provided the models have a real practical application in agriculture or agricultural research. Models should normally be based on real data sets but exceptionally non-data based models may be considered. However, the Journal is concerned to publish papers with direct practical applications in agriculture and prospective authors are advised to consult the Editors before submitting non-data based models.

Method of Presentation

Modelling papers need to be set out in a careful and logical way. The paper should explain:

a) Why a model is needed and what the model is intended to achieve
b) How the model is constructed and parameterised
c) How well the model fits the available data
d) How the model can be used in practice
e) What has been achieved and what future developments are possible.

Authors should aim to make their papers as accessible as possible to the general readership of the Journal. Complicated mathematics should be avoided unless absolutely essential. Where appropriate, mathematical details can be presented as a technical appendix.

Guidelines

1) The Journal will publish papers in the traditional areas of deterministic and stochastic modelling but is also interested in newer areas such as neural networks and expert systems. However, the utility of the model for agriculture or agricultural research must be fully demonstrated preferably by using real data.

2) Models should not be extended unnecessarily. Complex models will require both theoretical and practical justification to show why they are needed. Such justification could include improved insight into a system, improved explanation of a system or a more general understanding of a system.

3) The method of parameter estimation for a model should be stated explicitly and, where appropriate, standard errors of the parameters should be given.

4) Goodness of fit tests showing how well a model fits a suitable set of real data will almost always be necessary. Wherever possible goodness of fit tests should be based on rigorous statistical tests. Simulated data alone is unlikely to be sufficient to justify a model except, perhaps, for studies of high-level systems models where individual model components have been previously validated. Simulated data may, however, be used to explore and further generalise data based models.

5) Where real data is used to fit and test models, the source of the data should be fully described. For data from designed experiments, full details of the experiment must be given. For observational data, a full description of the methods used to sample and record the data will normally be required. For data from a published literature source, full details of the data together with the full literature reference should be given.

6) The operational range of a model should be fully explored and stated. Some exploration of model sensitivity to model assumptions will usually be desirable. If a model is sensitive to assumptions, the implications for model reliability and use should be explained. Wherever possible robust model formulations should be used.