

entomoLOGIC and hydroLOGIC - WHAT'S HAPPENING?

L.D. McKewen, S.D. McFarlane and W.R. Madden,

CSIRO Cotton Research Unit, Narrabri

Introduction

A change of direction for entomoLOGIC and some improvements to hydroLOGIC will provide growers and consultants in the 1992/93 season with effective, low cost decision support systems for irrigation and pest management. These improvements have been brought about by feedback received from growers and consultants who have used the packages in recent seasons.

EntomoLOGIC is a computerised pest management system designed for on-farm management of insect pests and for keeping records of insect pressures, spray applications and costs. A prototype entomoLOGIC has been available for the Apple Macintosh for the past 2 seasons. However the appeal of the package will be greatly broadened by the release of the IBM PC version at this conference. It will run on most industry-standard personal computers and is also suitable for modern portable computers, for use by consultants and others on the move.

hydroLOGIC - Model-based Irrigation Management

HydroLOGIC is an irrigation management package which runs on IBM PC and compatible computers¹. It incorporates the OZCOT cotton crop model² to estimate water usage and fruit development through the season and to predict yield and harvest date for each field.

A new version of hydroLOGIC, to be released before the 1992/93 season, includes the capability to transfer neutron probe measurements directly from a data logger on

the probe. The crop model is also being updated in line with recent improvements to OZCOT. Daily weather data for the current season is essential for the operation of the crop model. A facility to download this data from the Myall Vale Research Station is currently being developed and will be available shortly. These new features will greatly enhance the speed and ease of use of hydroLOGIC, as well as its accuracy. The user interface now features optional mouse support, so that those who prefer to use a mouse can gain additional speed. Without a mouse, the package operates the same as before.

EntomoLOGIC for Macintosh to Continue

EntomoLOGIC for the Macintosh has also been improved following two seasons of field testing. The improvements include updating of the chemical selections, rationalisation of minor pest data and a new spray costing system. EntomoLOGIC now includes the *Heliothis* development model which predicts the densities of *Heliothis* eggs and larvae over the next 2 days. This will lead to more precise pest management decisions for *Heliothis*.

The speed of entomoLOGIC on the Macintosh is constrained by its HyperCard environment, which was used to construct the prototype. It is thought that substantial improvements in speed may be obtained by compiling the Hypercard scripts, using a new software product called CompileIt. This work will take some time, but the benefits should appear in future versions.

EntomoLOGIC - an IPM System for Growers and Consultants

The current conference marks the release of entomoLOGIC for the IBM PC. This package has been designed using an industry-standard database file structure which is the most efficient way of storing crop, insect and spray data. Modern C++

programming techniques have been used to optimise the efficiency of accessing this data, to ensure good performance on most computers. Users contemplating the purchase of a new computer could acquire either a desktop or laptop machine ideally suited to running entomoLOGIC for under \$3000, and these prices are dropping all the time. Of course the same machine can be used for hydroLOGIC and many business applications on the farm.

The database in entomoLOGIC has been designed to operate over multiple seasons and for multiple farms. This feature will be valuable for consultants, who can keep separate files for each of their clients. The new relational database is also compatible with dBase IV, so the data be accessed directly by applications such as Excel, XtreeGold and MapInfo for further processing if desired.

The data in entomoLOGIC PC is stored separately from the program, so that the database can be retained when updating to new versions of the program. This means that data entered in late 1992 will be accessible by all future versions of entomoLOGIC.

The first release version of entomoLOGIC (Version 1.00) will process insect counts and compare them with pre-set thresholds to indicate which management units require spraying. It will also keep records of sprays and other crop information. The next release (1.10), due early in the 1992/93 season, will include specific chemical recommendations after these have been updated in the Macintosh version. Inclusion of the *Heliothis* model in the PC version is also expected with Version 1.10. At this point, users who have already set up their management units in Version 1.00 will be able to easily upgrade the software without any loss of data or interruption to operations.

As with the Macintosh version, CSIRO will make version 1.00 of entomoLOGIC for PC freely available to growers and consultants who wish to use it during the 1992/93 season. Copies can be obtained at the Conference or by contacting the authors. There may be a nominal charge for subsequent versions to cover the costs of software distribution and backup support. Workshops will be held in each growing region during September to provide more information and familiarise users with each of the packages. Details can be obtained from CSIRO or local state government agronomists.

The Future

HydroLOGIC will be upgraded to Version 2.0 in 1993 and will use the same relational data base and user interface as entomoLOGIC, and also a new version of the OZCOT crop model, incorporating an improved soil nitrogen and water model.

Version 2.0 of EntomoLOGIC will also incorporate the improved OZCOT model, to relate crop nutrition and water usage with insect feeding and mortality. This will increase the versatility and flexibility of the program by allowing the effects of what-if don't spray/can't spray scenarios to be simulated. However the predictions of the model in estimating plant response to damage have yet to be fully validated. A new research project arising from the work of Brook and Hearn³ has just been commenced and should lead to validation or improvement of the model. However the release of entomoLOGIC 2.0 may be delayed until these results are available (2-3 years).

The same data and crop model will then be used for irrigation management, yield prediction and pest management decision making. However it will still be possible

to run hydroLOGIC and entomoLOGIC separately to concentrate on specific aspects of crop management. The aim is to provide an integrated system which can be as complex or as simple as the user requires and in which the components can be used independently or together.

Therefore in the present packages we have the basis for providing a true Siratac replacement which can be run on the desktop or on lightweight portable computers. It will be capable of simulating complex interactions between soil, water, plant and pests but will be equally suited to rapid data storage and on-farm decision making. We look forward to reporting on this objective in 1994.

References

1. Wells, A.T. and Marsden, S., "Hydrologic - a new approach to irrigation management", The Australian Cottongrower, Vol. 10, No. 3, 7-9, 1989.
2. Wells, A.T. and Hearn, A.B., "OZCOT: A Cotton Crop Simulation Model for Management", Mathematics and Computers in Simulation 33 (1992) pp 433-438.
3. Brook, K and Hearn, B., "Earliness, Pest Damage and Compensation. Facts to fuel the debate", The Australian Cottongrower, Vol. 13, No. 2, 14-26, 1992.

Trademarks

Macintosh and HyperCard are trademarks of Apple Computer, Inc.
 IBM and PC are trademarks of International Business Machines Corp.
 CompileIt is a trademark of Heizer Software
 dBase is a trademark of Borland International.
 Excel is a trademark of Microsoft, Inc.
 XtreeGold is a trademark of Executive Systems, Inc.
 MapInfo is a trademark of MapInfo Corporation.

