OPIL, A COMPUTER KNOWLEDGE BASE FOR ORGANIC FARMING

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Lack of technical and economic information on organic farming is a barrier to adoption of chemical-free farming methods (Fisher 1989). This lack of information increases the perceived risk of adopting organic methods, and reduces the profitability of organic production. Knowledge bases, which are computer programmes that simulate the problem-solving ability of a human expert, can be used to make research results on organic farming available to growers.

OPIL, the Organic Production Information Library, is a knowledge base that provides tailored management recommendations to producers. OPIL allows a MAF consultant to enter information about a client's property, and to produce an individualised report for a particular crop, pest or other topic. Sources of expertise on organic farming include researchers, producer groups, scientific papers and established organic producers. The output from OPIL is a word processed technical report for a producer.

Decision rules and the user-interface are written in the VPEXpert language, VPInfo is used for databases, and WordPerfect is used for page layout. OPIL runs on IBM-compatible personal computers that include a hard disk.

Fig. 1: The modular structure of OPIL.

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The modular structure of OPIL is shown in Figure 1. In the central module, the user first selects a topic. Topics currently available include general reports (for example marketing, industry contacts), and technical information on particular crops (for example buttercup squash), chemical residues, fertilisers and animal diseases. During 1990/91, the scope of the knowledge base will be expanded to include other technical topics along with databases of organically acceptable pest control products, and international organic production standards.

After selecting a topic, the user is asked if the report is to be produced for a client who owns a property. If the client does own a farm, information is obtained about the property and the report is tailored to the client. Otherwise, a general report on the topic is produced. Basic details about individual clients (producer name, enterprises, location, area) are stored in a client database. The user can choose or edit an existing client record, or add a new record.

After specifying a file name for the report, the user chains to the topic module, for example chemical residues in soil and produce. OPIL draws logical inferences from the property details contained in the client database, and asks additional questions specific to the chosen topic. For example, the following rule is used in the chemical residue section:

IF the property is located in eastern North Island or eastern South Island¹

AND animal enterprises are included on the farm²

AND organochlorine pesticides have been used³

THEN the following statement is included in the report: "Organochlorine tests of soil and fat tissue are strongly recommended. Some properties in your region that have applied organochlorine pesticides have been unable to market animal products as 'organic' due to unacceptably high organochlorine residues."

Conclusions drawn from the property details are copied into an ASCII text file and are also shown in summary on the screen. The ASCII text file contains markers for underlining, bolding, and other page layout requirements. In the print menu, the user can review the ASCII file or shell out to WordPerfect where macros interpret the page markers.

The expert system approach taken by OPIL has advantages over published material for other agricultural domains. A knowledge base can be more readily updated than a published book by changing facts or decision rules. A user can interact with a knowledge base to ask why conclusions are reached, and investigate different scenarios with 'What if . . . ?' questions. Whereas a book or technical bulletin needs to provide more general information to cater for a wide range of situations, knowledge bases improve the quality of advice provided to a producer, and retain most of the knowledge (a difficult commodity to own exclusively) within the consulting agency. Knowledge bases therefore provide a useful and timely tool for technology transfer.

REFERENCES

- Fisher, P.R., 1989. Barriers to the adoption of organic farming in Canterbury. Master of Applied Science Thesis, Lincoln College.

¹Location is known from the client database in the main module.

²Enterprises are also known from the client database.

³The user is asked in the chemical residues module if organochlorine pesticides have been applied.