An expert system for extension of weed control advice

G.M. Pasqual and R.W. Madin

Department of Agriculture, South Perth, Western Australia 6151

The success of Australian cropping programmes depends greatly on selecting weed control strategies which are reliable, safe and cost-effective. Extension workers and producers faced with a multitude of weed control options need easy, rapid and cheap access to advice. We are using expert system technology to improve the extension of weed control advice. We aimed to develop a microcomputer based expert system (Weed Adviser) to help extension workers identify and control common weeds in field crops in Western Australia(1).

Methods

The knowledge engineering steps undertaken have been described(1).

Results and discussion

Weed Adviser is a frame-based expert system using some 400 production rules with backward and forward chaining. The current problem domain covers the identification and pre- and post-seeding control of 37 common Western Australian weeds and their mixtures in crops of wheat, triticale, barley and oats. Weed Adviser uses graphics to help identify weeds, asks questions about the weed problem, tells how the problem can be controlled, indicates what treatments should not be used and can provide additional herbicide information (e.g. herbicide compatibility). To help determine the value of controlling grass weeds in wheat. Weed Adviser links to a weed competition programme called WEEDCOST[(2)] which predicts the value of losses using estimates of grass weed densities and anticipated wheat prices and yields.

Weed Adviser was designed to simulate the way weed experts use their knowledge and experience to make decisions. Mechanical, chemical and cultural Methods of control are considered and combinations of chemicals are also included (e.g. mixtures of herbicides A and B or sequential sprays of herbicides C and D). Knockdown chemicals and mechanical Methods are compared for pre-planting weed control, taking into account factors such as the availability of sheep and the suceptibility of soil to erosion. Advice given for the use of selective herbicides takes into consideration factors such as crop growth stage, crop variety and soil pH.

Weed Adviser is a moderately large research prototype and we are progressing towards development of a mature system by using feedback from domain experts and users to refine and update the system. Weed Adviser makes users more aware of factors that affect the choice of weed control strategies and can help train new extension workers by explaining the reasoning behind decisions. The wide range of crops and weeds currently covered by Weed Adviser demonstrates the flexibility of the system to be adapted to other cropping environments.

1. Pasqual, G.M. and Madin, R. (1988). Proc. SCA Workshop on The Impact of Computer-based Information Systems on Pasture and Crop Productivity, 36-40.

2. Poole, M., Gill, G. and Holmes, *J.* (1986). Technote No. 22/86, Western Australian Department of Agriculture.