COMPUTERISED DECISION SUPPORT FOR IPM IN NEW ZEALAND APPLE ORCHARDS

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ABSTRACT

New Zealand apple growers face a dilemma. Export fruit must be of the highest possible quality and free from quarantine pests, but contain increasingly fewer pesticides in lower amounts. The objective of this study was to define and develop decision support tools that may assist in the improved timing and/or reduction of pesticide usage.

Fifty randomly selected growers were interviewed in 1992 to determine their pest and disease problems, use of existing IPM methodology and requirements for an improved decision support service. The survey found more then 20% of growers had difficulties with common pests and diseases and many used IPM techniques. Most growers perceived a problem with pesticide residues and pest and disease resistance; they also expected to reduce pesticide usage and better target applications through improved technology in the future. Decision-support using fax and computer technology appeared feasible, subject to support from their advisers.

In 1993, twenty-seven Hawkes Bay apple pest and disease control "advisers" were interviewed to determine their role in growers' pest and disease spray decision-making. Horticultural merchant representatives believed they were the main spray decision-maker for 40% of growers, and half of the latter expected the horticultural merchant representatives to know more about the problems in the orchard than they did. Other advisers played an important role in strategic pest and disease advice to the industry. Introducing more complex spray-saving techniques, or taking full advantage of those that already exist, would require many growers either to upskill themselves, or employ consultants to manage their orchards. Basic pest and disease identification and biology, together with knowledge of pesticides were regarded as being essential to manage pests and diseases successfully. Nutritional problems and resistance development were two particular areas where growers required more knowledge.

Using the survey findings, a problem tree was created focussing on the question "Was pesticide use excessive in New Zealand apple orchards?". This conceptual model showed that pesticide use was excessive, and better grower education and training may

partly alleviate the problem. Using the data from the surveys, two computerised training tools were defined and developed to assist with this solution viz SPRAYCHECK and DIAGNOSIS.

SPRAYCHECK was developed to analyse grower black spot fungicide spray programs during the period of primary inoculum release. Using a series of models, incorporating weather data, infection periods and information from growers' spray diaries, grower black spot control decision-making was analysed and a recommended spray schedule for the season in question provided. Model construction revealed a lack of quantitative information on fungicide behaviour and the levels required to fully protect against black spot on apple foliage. A sensitivity analysis showed the rate of cover decay was very important in determining the number of fungicides required to fully protect a crop.

DIAGNOSIS is a training aid for teaching pest and disease diagnosis skills to crop protection trainees. This program simulates field and laboratory scenarios, in which trainees must actively seek clues and interpret observations on the cause of plant problems, in apples or other crops. Once trainees have recorded their diagnosis, justification and recommendations for action, they receive an automatic de-briefing on their problem-solving approach. Trainee input is recorded to disk for later tutor assessment.

Two decision-support tools were defined, developed and validated. One has been commercialised and the models in the other are likely to be used in an existing Decision Support System. During this exercise, knowledge was gained regarding the New Zealand apple industry in Hawkes Bay, in particular the close relationship between the growers, and horticultural merchant field representatives and their advisers. This relationship could either help or hinder IPM and improved decision support in the future.

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