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Final Report on Project SP16a: updating and supporting PEST-MAN

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Introduction

PEST-MAN is a forecasting system for top fruit pests based on computer models that simulate the development of the pests in the orchard. The original PEST-MAN software package was DOS-based and was designed to run on a personal computer (PC).

For codling moth and summer fruit tortrix moth, the PEST-MAN models predict:

- the start date for flight activity (a reminder of the date by which pheromone traps should be placed in the orchard)
- the timing of peak flight activity (this aids the interpretation of pheromone trap catches, allowing an informed decision to be made on the need for an insecticide application)
- the cumulative emergence of larvae (thus identifying the optimal "windows" for spray application)

For the pear psyllid, the model forecasts the timing of each life stage (egg, nymph, adult) in each of the three generations that occur every year. Based on these predictions, it highlights:

- the period just before the overwintered adults lay eggs in spring (i.e. a narrow "window" within which it is possible to use a broad spectrum insecticide)
- the periods during the summer when the majority of the psyllids are in the nymph stage (ie the windows within which selective insecticides, which do not damage predatory anthocorids, may be applied with maximum impact on the psyllids).

A fuller account of PEST-MAN is given in the July 1995 issue of APRC News.

The Project

Project SP16a was designed to improve the way that PEST-MAN interfaced with temperature loggers and handled temperature data files, to make some other minor software modifications, and to revise the PEST-MAN manual to take account of these changes.

Shortly after the project started, HRI's Information Technology Department began the development of MORPH, a standard software framework within which different

forecasting models can function. This was in recognition of the increasing range of mathematical models addressing various aspects of the management of different crops being developed by HRI, most of them needing to interface with sources of meteorological data. Rather than continue with the plan to make minor improvements to a stand-alone PEST-MAN, the opportunity was taken to integrate the PEST-MAN models into the development of MORPH. This represents a major advance for the top fruit pest models, allowing them to benefit from modern Windows software developments and from all future developments in the MORPH interface with meteorological equipment.

MORPH

The MORPH software framework can incorporate many pest, disease and other forecasting models into an integrated, user-friendly package, with the flexibility to add new models as they are developed. It provides a Windows mechanism to allow any compatible decision support system models to be launched using most types of meteorological data collector, and produce a large choice of text and graphical presentations. This is achieved by the use of independent components, such as weather data logger cartridges, which are accessible to all models. New components can be added as required. This structure, with shared use of components, enables the exploitation of new modelling and meteorological data gathering developments in a much more efficient and rapid manner than would be the case for stand-alone models or small groups of models.

MORPH provides a variety of output options, such as fully scaleable line graphs with options to print, and copy and paste. Multiple graphs can be viewed and their contents retained on screen after MORPH has been closed down.

The development of MORPH is the responsibility of Steven Walton of HRI's Information Technology Department.

The PEST-MAN models within MORPH

The original PEST-MAN was a DOS program. It has now been modified so that the pest forecasting models are Windows-compatible, allowing them to function within MORPH. This means that the program is now able to adopt all the user-friendly conventions associated with modern Windows-based software.

"Help" statements guide the user through the system.

The original PEST-MAN User's Manual has been revised to take account of these changes.

Publicising PEST-MAN/MORPH

The PEST-MAN top fruit pest forecasting models have been presented to growers and consultants on the following occasions since April 1996. In addition, these pest forecasting models have featured incidentally in a number of talks and presentations on the MORPH software system given by members of HRI's IT Department.

- 2 April 1996. Pest and Disease Modelling Workshop at HRI-East Malling. Talks, demonstrations and hands-on sessions, featuring the top fruit pest and disease models. Talk on APRC's perspective on forecasting systems by Dr Oliver Doubleday.
- 13 December 1996. EMRA Members' Day on APRC-funded Projects. Presentation on PEST-MAN/MORPH.
- 26 February, 18 and 24 March 1997. Workshops on Decision Support & Modelling in Fruit Growing, at HRI-East Malling. This was part of a MAFF-funded Technology Interaction Project on improving the uptake of forecasting models in horticulture.
- 4 September 1997. EMRA Members' Day on Pears at HRI-East Malling. Presentation on pear psyllid, featuring the use of the PEST-MAN forecasting model in pest management decision making.
- 17/18 February 1998. Hortex '98 at Harrogate. Demonstrations of PEST-MAN/MORPH on the HRI HortiTech stand.