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Laura Brophy
Green Point Software
222 NE Plymouth Circle
Corvallis, OR 97330
(503) 752-6113

Development of CropScope™, a personal computer database for orchard pest management

Background

Pest management today is information-intensive, requiring knowledge of pest and beneficial species biology, pest pressure, weather patterns, pest control techniques, pesticide regulations, and many other types of information. To locate and use pest-related data effectively, a good recordkeeping system is essential. Personal computers are accessible, affordable recordkeeping tools, but comprehensive recordkeeping software tailored to pest management has been unavailable in the past.

Through consultation with orchard consultants, fieldmen, extension specialists, and growers, Green Point Software has designed CropScope™ Pest Management Software. CropScope™ is an database package designed specifically for orchard pest managers. It keeps records of scouting data, recommendations written, pesticide use and other pest control practices, pesticide label information, weather and phenology models, and orchard culture. Data entry and analysis are quick and easy within CropScope™, and both user-designed and preformatted reports are available. A Pest Control Recommendation form is one example of a preformatted report produced by this software. CropScope™ runs on IBM-compatible personal computers using the DOS operating system.

Technical design goals and features

A pest management database should be easy to learn, flexible, highly powerful, and responsive to user needs. The interface (what the user sees on the computer screen) should be intuitive and convenient. Since the initial development of a software package is only "the tip of the iceberg" in terms of overall program costs, current software engineering techniques should be used to minimize the costs and time burden of program maintenance and upgrades.

Most agricultural software has fallen short of all these goals. Awkward interfaces have made many packages difficult to learn. Tree-structured menus have required users to repeat unnecessary steps to reach their goals, slowing down experienced users. Data entry screens often support a very limited range of management techniques. Many software packages provide only a small number of fixed report options and no integrated graphics; these programs can not function as good analytical tools. Since software maintenance often comprises 90% of all program costs, the use of outdated software engineering techniques has often resulted in difficult maintenance and upgrades, resulting in software that becomes obsolete rapidly and is unresponsive to user needs.

Current software engineering techniques incorporated into CropScope™ include a graphical user interface with full "point-and-click" mouse support for easy learning and convenient use, highly flexible custom report design, and object-oriented architecture that facilitates program maintenance and improvement.

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Role of database software in pest management

Green Point Software's consultation with pest managers and extensionists has defined several goals for a pest management database package. Goals fall into the categories of data collection, analysis, reporting, and overall program design.

In the area of **data collection**, the software should:

1. Facilitate a wide range of pest monitoring and pest management techniques
2. Encourage quantification and standardization of pest monitoring methods
3. Keep orchard cultural records needed for pest control decision-making

In the area of **analysis**, the software should:

4. Allow easy analysis of pest management results from the field
5. Provide convenient summaries of trap catches and other pest monitoring data
6. Make it easy to use pest phenology models

Reporting functions within the program should:

7. Provide a quick way to write an accurate, complete pest control recommendation
8. Improve communications between consultants, growers, and extensionists
9. Prepare reports based on user needs, not just a limited set of inflexible reports

These goals have guided the development of CropScope™. Specifically:

Versatile scouting data entry formats support a wide range of pest population monitoring methods, while encouraging quantification and standardization of observations.

Versatile data entry screens support a full range of pest management techniques; while some specific details are provided, users may specify their own choices to supplement defaults incorporated into the program.

Integrated phenology models use weather data entered into the program to calculate pest development and flag important events specified by the user.

Preformatted reports provide quick start-up for new users, and meet common needs such as output of pest control recommendation forms.

User-defined custom reports allow users of this database to extract and summarize information according to their own specifications, providing flexible and powerful analysis of field data. Custom reports also enhance communications between consultants, growers, and extensionists by letting the user provide exactly the right information for each recipient. Custom report formats are saved and can be easily repeated or modified.