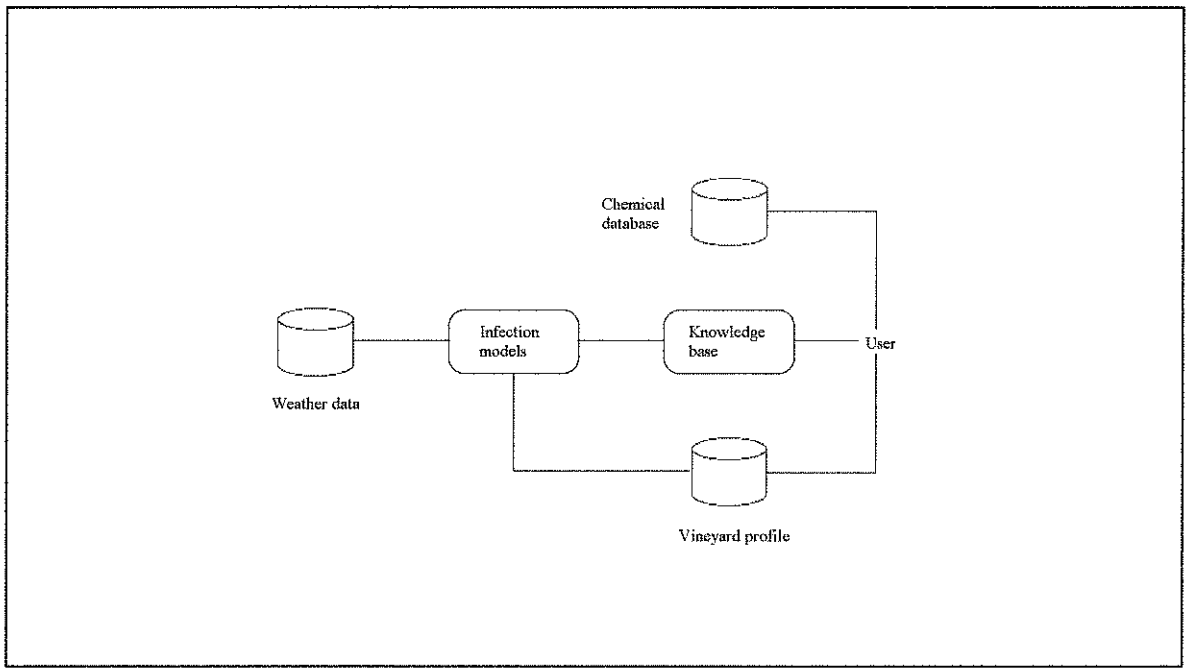
CHARLES STURT
UNIVERSITY

Grape and Wine
Research and
Development Corporation

Development of a computer based decision support system for vineyard management



FINAL REPORT to

GRAPE AND WINE RESEARCH & DEVELOPMENT CORPORATION

Project Number: **UCS 92/3**

Principal Investigator: **Dr G Ash**

Research Organisation: **Charles Sturt University**

Project Title:	Development of a computer based decision support system for vineyard management
Project Number:	UCS 92/3
Organisation:	Charles Sturt University
Location:	Wagga Wagga
Supervisor:	G Ash
Time Span:	1992-1993

EXECUTIVE SUMMARY

Objectives:

- The prime aim of this project was to facilitate technology transfer of grapevine management information to grape growers. This is a joint project between the GWRDC and the Cooperative Research Centre for Viticulture.
- Improved management allows timely pest and disease control strategies. AusVit will support vineyard managers in reducing chemical use in the vineyard and make the enterprise more productive and efficient. AusVit does not aim to take over the running of a vineyard; rather it is to be used to assist managers in making informed decisions. AusVit developments to date have focused on pests and disease management but future development involves the nutritional and irrigation aspects of vineyard management.

Description:

The computer system currently consists of a number of interlinked modules that store data about the vineyard, interpret it and make recommendations to the user. After processing of the weather data collected from automatic weather stations on site, the knowledge base is able to make the informed recommendations on what needs to be done.

The knowledge base is a model that simulates the decision making process that an expert would use. The final recommendations are based on spray history, cultural practices, infection predictions or day degree values, vineyard specifications and weather predictions.

Methodology and Achievements:

AusVit is now in a prototype stage. It now has the capacity to test the strategies of the experts who provided the knowledge for the decision making. Decision making strategies have been generated for downy mildew, powdery mildew, *Botrytis*, black spot and mealy bugs. Weather driven models for *Botrytis*, mealy bugs and light brown apple moth (LBAM) are providing data on conditions favourable for these pests and diseases. These values are then interpreted to give the recommendations. Development this season will see more sections of the system being completed, including the downy mildew infection model, black spot infection model, LBAM recommendations, phomopsis management and possibly mite control and petiole analysis recommendations.

Chemical database

One of the inputs required for AusVit is an up-to-date database of pesticides and fungicides for use in the vineyards, their registrations as well as application notes. The chemical database is designed to be an independent stand-alone database and also an integral part of AusVit. As an independent program it will provide chemical label information that can be accessed and presented in a variety of ways. As part of AusVit it will provide this information to support the management recommendations.

The database contains details of insecticides, miticides and fungicides registered for use in Australian vineyards. Information is stored on product, chemical group, action, active ingredient, withholding period, supplier and application rate. All this information is cross-referenced to the pest organisms themselves and to the Australian State in which the pesticide is registered. Additional information is also available on restraints, safety and pest specific name. The database is easily expandable to include more information on other aspects of the chemical product.

To access the database, the user selects the chemical, pest or action required and chooses a **Query**, **Browse** or **Report** option from the main screen.

Query – A user may select to query the database by specifying the pest and State from the scroll boxes. This supplies information on the pesticides registered in that State. Alternatively the user may query the database by product and State.

Browse – By selecting this option the user can browse through all the records in a database (in alphabetical order for registered product name). A user may also find a specific chemical using this option (by using the find option). The formation displayed can also be printed.

Report – This option prepares and displays (or prints by selecting print option) a summary table of information sorted according to a "user defined" request. There are several standard report types allowing the selection of chemicals based on state and product or pest.

AusVit testing:
Following on from the outcomes of this project, extensive testing will be required. In the 1993/94 season, there will be twelve integrated pest and disease management (IPM) sites operating in Victoria and New South wales. The main purpose of these test sites is to test the management strategies of the experts who have provided knowledge for the construction of AusVit during this project. AusVit will also be tested to determine whether it is able to give recommendations consistent with those of the experts. A large part of this testing will involve setting up automatic weather stations that record a number of environmental factors such as rainfall, leaf wetness, relative humidity, ambient temperature and canopy temperature. After this initial testing, it is planned to use AusVit in a larger scale grower testing program. This large scale testing is scheduled for the 1994/95 growing season.

Future development:
Future development of AusVit will require a focus on refinement of the existing prototype and incorporation of some new functions. A detailed analysis and evaluation of the vineyard manager's needs and how best to address then with AusVit is necessary.

Areas for the development of other AusVit modules are:

- short term predictions of the management impact if certain options were or were not taken.
- A better understanding of the role of varietal susceptibility in the management of diseases.
- An accurate model of how spray residues decline on the sprayed vine.
- A petiole analysis section that will give recommendations for actions based on analysis results.
- Refinement of the infection models.
- Irrigation and nitrogen modules that will help managers make more informed decisions about when to irrigate and when to apply nitrogen.