

Frost and Crops
Frost Prediction and Plant Protection
By William Ireland

A Review
By Andrew Hodson

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In the preface the stated objective of this book is to be a comprehensive reference book for growers and consultants about frost prediction and protection. The book has been divided into three main sections. They are the effect of frost on plants, prediction and control.

Chapters one to five are devoted to how plants respond to sub-zero temperatures. This section is well researched and referenced, although the section on winter chilling is quite old. I am sure a few kiwifruit growers will present valid arguments about other factors involved. The section on observed frost statistics is very good. All growers should use the methods presented to identify the risk for their area. You can get frost data for the whole country from: <http://cliflo.niwa.cri.nz/> They have got frost records there stretching back decades and provides a valuable, free tool for growers to use.

The next section covering chapter six revolves around predicting whether a frost will occur. The chapter focuses on prediction after or close to sunset but that may be too late for many growers. Helicopters need to be ordered and trees sprayed. More warning may be required. Frequently growers will phone us in the morning to decide whether a helicopter should be ordered. Our own Metwatch Online system has a frost forecast 2 days in advance. The prediction methods presented work well and should be able to be used by most growers.

The remaining chapters cover frost protection methods. Methods include passive e.g. site selection as well active methods e.g. wind machines. A section related to sensor selection and calibration would have been good. My own personal experience says that the sensors bought from your local merchant are very variable and should be calibrated. Most horticultural areas are close to sea level and a simple ice bath calibration would do. Drift over time experienced by these units is low so one calibration should be enough

The AD590 temperature sensor shown in figure 11.2 is more trouble than it's worth. I used these sensors a few years back and they suffer from line noise damping out any signal. In theory they output a current instead of a voltage so the signal should carry a long way. The problem mentioned can be partially fixed with capacitors but a digital sensor has my vote these days. We even sell a

calibrated digital sensor. See our website for details. These units are ideal for frost monitoring and mapping.

Also a section on local council bylaws would have been good. Councils are typically concerned with pollution caused by chemicals and noise. Recent advances in four blade wind machines are designed to make them quieter during use. They are also increasingly interested in water allocations during the frost period. Several areas simply don't have enough water. I can remember being unable to take a shower in Te Puke because all the water available was being used to fight frosts.

Several frost control methods commonly used seem to be missing or don't get the attention they deserve. Use of Urea and return stack heaters are good examples. These methods are commonly used by growers and their efficiency and performance should be included.

In conclusion this would not be the only book I owned about frost but it is well worth having. I am not completely sure but I think the book is intended for a NZ audience. The chapters related to how frost affects plants is worth a read by any grower in frost prone areas. The chapter related to short term frost prediction is thorough and should be easy to use by most people. Growers may find the maths involved and too hard to deal with but I'm sure help is close to hand. The specific gaps I identified in the book are frost prediction prior to sundown, local council bylaws in New Zealand, sensor calibration and a more comprehensive list of chemicals available for growers to use. All important practical areas.

The list of internet sites listed below should fill any gaps.

Council bylaws relating to wind machine use

<http://www.maf.govt.nz/mafnet/publications/rmupdate/rm6/rm6002.html>

Frost in grapes

<http://www.nzwine.com/reports/>

Urea for frost protection

<http://www.ravensdown.co.nz/Products/Liquids/WaterSolubleFertilisers/Low+Biuret+Urea.htm>

Return stack heaters

<http://www.skeltons.co.nz/files/Grapevine%20Intelligence%20August%202007.pdf>