

## 3.9 USING THERMOMETERS EFFECTIVELY

### Fact Sheet Objectives

- Describe how to use thermometers effectively
- Illustrate how to calibrate thermometers

#### Can you answer yes to all of the following?

- My thermometer is calibrated regularly.
- I leave the thermometer long enough in one spot for the temperature to settle.
- I take more than one reading to check my result.
- I keep the thermometer where temperature is close to ambient (outside).
- I choose the same position(s) in the block each time I sample.

### Using Thermometers

Sometimes it is useful to make point measurements of temperatures, for example to record fruit temperatures in a coolstore or to find cold patches in an orchard or vineyard block.

If you haven't answered yes to all the points listed on the left then you may not be using your thermometer as effectively as possible.

Like any piece of equipment: your car, your sprayer, your scales, thermometers need to be 'tuned' regularly. You need to check that the thermometer is giving you the right information so you can make informed decisions (like when to turn the frost protection on).

When making temperature measurements, you must leave the probe in the fruit long enough for the probe temperature to register the correct fruit flesh temperature (equilibration). It is unlikely that the air temperature surrounding the probe and the fruit flesh temperature are identical therefore the probe needs to be left in one spot long enough for the temperature to settle.

In case you rushed taking the first temperature reading, take a second reading of the fruit to check your result.

When it is not in use, store the thermometer in a place that is going to be close to ambient (outside) temperature – this will reduce the time taken for the thermometer reading to settle or equilibrate when you use it. If you keep the probe in a warm building it will take a lot longer to settle when you take it outside into the cold night air.

Finally to monitor weather conditions between days and improve the information you have about any weather event, you should select the same spots in the vineyard each time you take a reading. Ideally choose the coldest spots in your vineyard or orchard - you are aiming to protect the most at risk fruit - the rest will then be taken care of. Over time you will build up a record of temperature behaviour in response to weather conditions which can further improve your decision making.

## Calibrating Thermometers

All temperature recording equipment should be calibrated at the Ice Point temperature (0°C).

You can do this yourself:

- A mixture of crushed ice (2-5mm diameter) should be packed into a thermos flask and water added to fill the gaps between the ice crystals. Stir the mixture and leave for 5 minutes to reach equilibrium.
- Immerse the thermometer in the ice mixture and leave until a stable reading is achieved. Your thermometer should read  $0 \pm 0.1^\circ\text{C}$ .
- If the temperature reading is not 0°C, make any adjustments necessary. If you cannot make the adjustments yourself, contact the manufacturer or buy a new one!

## Ice Point

The ice point is the temperature at which equilibrium between ice and saturated water is reached. To create this you must only have just enough water to fill the gaps between the crushed ice held in a thermos flask. If you are using this flask over a period of time, then as the ice melts, excess water needs to be drained off, ice replaced to the top of the flask, and the mixture left to reach equilibrium again.



*Ice bath calibration of temperature sensors*

<http://www.temprecord.com/icepoint.html>

## Summary

To summarise – the five C's for effective operation of a thermometer are:

- Calibration
- Count to 10 (once you have the thermometer where you want to measure)
- Check your reading
- Cool thermometer temperature to start with
- Constant sampling position

## Further Information

Temperature Monitoring. Factsheet 2.2 in this series

