REACTING TO FROST - A COLD CALCULATION

In the last few weeks there have been record low temperatures across the state. They have produced widespread frosts, sometimes day after day. Damage to plants has been common, and in this edition I will examine how serious frost burn can be and how it can be treated.

I have lasting memories of my first experience of a really serious frost. As a schoolboy working in the May holidays on an orchard near Bindoon, we had three consecutive days of very heavy frosts, with minimum temperatures between –3 and –5C.

Varieties such as navel orange were in full crop close to harvest. Trees at the bottom of the block were completely iced over, while further up the hill, the damage was restricted to the lower parts of the trees. Within a couple of days of thawing out, leaves were black and brown, and in weeks there were dead twigs and branches everywhere. Some of the younger trees were just leafless skeletons.

Thinking the damage was terminal, some other growers bulldozed parts of their orchards straight away but we decided to wait until after the spring flush of growth to assess the level of permanent damage. And what a good decision that turned out to be. Apart from very young trees and a couple of rows of old trees on the lowest part of the property, damage was not as bad as it first appeared. Many hours were spent pruning out the dead wood, and within a year or two the trees were back to normal, minimising the cost of lost production.

The moral of the story? Don't rush into action after frosts, rather give the plants time for self-recovery.

How does frost damage plants?

Of the total mass of a plant, particularly winter annuals, water-based solutions make up a significant proportion. When water freezes it expands, and if there is no room to move its container will break. A leaf is made up of hundreds of micro containers, or cells, and if the temperature drops below freezing point for a considerable period, the cells cannot contain their frozen contents and therefore will burst. After thawing out, the tissue discolours and collapses.

New growth is the most sensitive, being made up of young succulent material. Both buds and blossom are affected. Leaves are obviously sensitive but in severe prolonged frost the sapwood can also be damaged. This may sometimes lead to the death of the plant.

Roots are seldom damaged, except for very shallow-rooted species after periods of prolonged frost.

For damage to occur, however, frosts usually have to be prolonged and sustained. Most of the time all we see are quite light harmless frosts, with just the moisture or dew on the surface of leaves freezing but not the leaf itself.

I have had a number of queries concerning lawns, especially species such as Queensland Blue and Saltene. While the tops have been burnt off, there is usually plenty of life left in the roots and stolons for the lawn to grow back as soon as the weather warms up.

What do we do?

The simple short answer is very little or nothing. Until the plants start growing again, treatments such as watering and fertilising have minimal affect. In fact, there is probably more chance of doing further damage through burning or waterlogging the roots.

Some may suggest pruning or mowing now to encourage new growth as quickly as possible. While this may make some sense, it can lead to further damage if there are more frosts in late winter and spring. This is because there will be a lot of very sensitive new growth, and the chances of plant death will be even greater.

Also, leaving the damaged material on the plant may even help protect it from the next lot of frosts. This is especially so with lawns because the dead leaf cover can act as a protective blanket.

So leave everything until new growth begins in spring when you will see the actual extent of the damage and where to prune back to.

Can we prevent frost damage?

As much as we would like to, we cannot change the weather. But there are things we can do to minimize its effects.

Firstly, plants differ widely in their frost resistance, in fact with some species you may find the frost tolerance stated in actual degrees. If you are in a frost-susceptible area, check with your nursery that plants you are buying are cold hardy.

Many plant species we like to grow are from warm temperate or sub-tropical regions and thus are not used to freezing conditions. Plants with more succulent leaves (high water content) tend to be more sensitive, as are many shallow-rooted winter annuals.

Deciduous plants are obviously more frost tolerant because they are dormant in winter. However, as they flower and throw out lush new growth in spring, they can suffer serious damage if there are sustained heavy frosts at that time.

Frosts occur more readily in open areas with no air movement. Often a more susceptible site is low lying relatively flat and exposed ground, or a steeper area with its air drainage trapped by forest or thick bush.

This is another reason that windbreaks should be semi-permeable, not solid, so that he cold air can drain away. In Europe and northern America, huge wind generators are used on horticultural properties to combat frosts by causing lateral air movement.

However, plants directly protected by trees or buildings are much less likely to suffer damage. If individual plants are protected by plastic guards or even hessian, the bottom should be off the ground so cold air is not trapped.

When frost does hit, one method used to minimize damage is to water the foliage. The idea is that the water will freeze at 0c and this layer of ice will actually act as a thermal barrier so the temperate inside will not be below –0.1C, which is the level that damage may start. However, this technique loses effectiveness after prolonged frosts. It also assumes that the water in the irrigation pipes hasn't already frozen!

Lightly hosing down sensitive plants at the end of a surface frost helps reduce any damage by melting the ice (this will have little effect if the leaves are actually frozen).

There is little we can do until new growth appears, and if we are confident there will be no more frosts, we can then prune or mow off any dead material. From then on it's a matter of normal fertilizing and watering practices and allow the plants to self recover.