

## TYPES OF FROST

### (a) RADIATION FROST

This occurs when there is rapid heat loss from the earth's surface to the sky due to a lack of cloud cover which would otherwise retain the warmth. This results in a great heat loss from the surface of an object causing it to freeze. Radiation frost occurs on calm, clear nights.

### (b) ADVECTION FROST

Advection frost is the result of a large cold air mass moving into an area. It can result in a moderate to severe frost.

### (c) WHITE FROST {HOAR FROST}

This is caused when the air has cooled to a saturation point\* (dew point) below freezing. The water vapour in the air then condenses in the form of ice crystals onto exposed surfaces. If the temperature is more than 0°C then dew will form.

\* Saturation point - the temperature at which air can no longer hold any more moisture is called saturation point or dew point. The water vapour in the air then condenses onto exposed surfaces.

### (d) BLACK FROST

If the air is too dry for a white frost to form then a black frost will result. The term "black frost" alludes to the colour of the damaged tissue after this extreme degree of frost has been experienced.

### (e) COLD WIND DAMAGE

Some areas experience tremendously cold winds in winter and these winds can often cause more damage to a garden than frost itself. Trees with soft bark can suffer damage to the stem and should be protected by wrapping the stem in one or more layers of sacking. This sacking should be kept dry as far as possible.

#### MECHANICS OF FROST

As the sun shines during the day the earth's surface absorbs heat. As soon as the sun sets, this heat begins to be released from the earth. The heat loss is greater during cloudless nights as clouds retain and reflect warmth back to the earth, thus keeping the temperatures slightly higher. As the temperature drops, the water vapour in the air condenses on exposed surfaces (this is called dew point) and this is how dew is formed.

If temperatures drop below freezing, the water vapour changes directly into ice crystals forming frost.

Frost is a series of ice crystals on exposed surfaces that forms when water vapour in the air freezes. It is usually found near the ground ( $\pm 2\text{m}$ ), due to the cold air sinking to ground level.

On windy nights, the cold air is mixed with the warmer air, reducing the occurrence of frost. However, cold wind damage may occur.

Frost occurs mainly on calm, cloudless nights when air temperatures drop below 0°C.

Frost damage occurs when the cell sap of the plant freezes and expands thus rupturing the cell wall and reducing the tissue to a gooey mess.

## RESISTANCE TO FROST

It can be rather confusing that some seemingly soft plants can survive heavy frost while other rather tough plants may be badly damaged. There are many factors that influence a plant's resistance to frost e.g. water content of the plant tissues, inherent resistance, dissolved salt content of the plant tissues, degree or type of frost, and wind chill factor. Although many books indicate that aloes are tender to frost it is generally only the flowers that are damaged. Frost may also sometimes damage the leaves, but this soon grows out during the following summer. In instances where the flowers are burnt by frost, summer-flowering varieties can be used. It should be borne in mind that many of these summer flowering varieties with soft leaves may become deciduous during the colder months, but will grow out again quickly with the onset of summer.