
W eather-Related Disorders

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An Overview Of Weather-related Disorders Of Saskatoon Orchards	
Primary Symptoms	Possible Cause
Death of entire plant	Cold injury, drought
Death of new wood, leaf buds, flower buds	Cold injury, drought
Light browning, then yellowing and loss of flower buds, flowers, young leaves	Frost damage
Leaves with hard, brown edges, often torn	Wind damage
Light brown or grey scabs on fruit	Wind damage
Discoloured, bubbled bark, or splitting bark	Sunscauld
Ripe fruit with large cracks in the skin	Excessive rain, or irrigation during ripening

Frost Damage

Symptoms

Symptoms of spring frost damage include light browning of flowers and leaves, which may drop off. Flowers and newly-set fruit are especially susceptible to frost damage. Such damage may be restricted to the internal parts of these parts and may not be noticeable except under magnification (Figures 16.1 & 16.2). A substantial loss of flowers and newly-set fruit may result from frost damage.

Symptoms of fall frost damage may

include splits in the bark of stems and branches, some of which may be partially healed as indicated by smooth, inward-rolling tissue.

Cause

Killing frosts are defined as -2.2°C or lower; at this point, most actively growing plant tissues are killed.

Frost cracks are prime sites for the entry of decay-causing fungi and *Cytospora* canker.

Control

Overhead irrigation may be used when temperatures approach freezing. Water releases heat as it freezes on the plant, thereby slightly elevating the temperature of the plant parts above those of the surrounding air. Overhead irrigation can provide protection to about -4 to -6°C.

Wind Damage

Symptoms

Torn, ragged leaves; leaves with a leathery texture; leaves may have holes of various shapes and sizes, or missing pieces along the leaf margins; leaf margins may be brittle and brown; fruit may have light brown or grey scabs; fruit may be deformed below the scabs; reduced growth and yields.

It may be difficult to distinguish abrasion from symptoms associated with drought, herbicide drift, or some diseases.

Cause

Wind may have both direct and indirect effects on fruit plants; the type and extent of wind damage dependent on wind speed.

Direct effects include abrasion, tearing and desiccation of leaves. Leaves and new shoots are susceptible to wind damage. Fruit can also be affected, grey or light brown scabs forming (fruit russett or dry scab) (Figure 16.3). Desiccation is associated with leaf moisture loss. Plants are also exposed to evaporative cooling.

Indirect effects include reduced yields and fruit quality, increased winter damage, interference with pollination, suppression of growth, and increased soil moisture loss because of increased evaporation from the soil.

Control

Provide adequate windbreaks, and ample irrigation or groundcover management.

Cold Injury

Symptoms

Symptoms may include death of an entire plant, or death of more susceptible plant parts such as new wood, leaf buds and flower buds; death of entire plants or parts of plants results in buds not breaking dormancy. Gently scraping a bit of bark off of a branch will indicate if the underlying cambial tissue is still living (moist and green colored), or dead (dry and grey-brown). Less severe symptoms include delayed bud-break, reduced growth, small leaves, fewer leaves than normal, or a variable pattern of flowering within plants, or within the orchard. These symptoms may not become noticeable until mid-June.

Cause

Cold injury is associated with prolonged extreme cold temperatures, or sudden extreme drops in temperature following a warm spell. Prolonged, extreme cold can affect roots and root crowns, especially if there is little or no insulating

snow cover. Sudden, extreme drops in temperature will more likely affect buds and shoots because the soil insulates roots against such rapid changes in temperature. Increasing susceptibility to such temperature changes is as follows: older shoots, most recent shoots, leaf buds, flower buds.

Cold injury is, in part, associated with the development of winter hardiness and dormancy. The development of winter hardiness (a process called hardening-off) and dormancy allow a woody plant to survive our winters. The requirement for a period of dormancy is often referred to as a chilling requirement. If this chilling requirement is not met, abnormal growth and development, or no growth, may result. Dormancy requires, and follows hardening-off, which is a physiological process initiated by decreasing daily temperatures and shorter days. Inadequate hardening-off predisposes a plant to cold injury.

Symptoms of both cold injury and desiccation are similar and often associated. Warm, dry winds can be followed by sudden drops in temperature. Cold injury can allow the subsequent entry of dieback and decay fungi such as *Cytospora* canker.

Control

Prune injured and dead branches to help prevent infection by disease-causing organisms.

The development of adequate winter hardiness requires low levels of soil moisture and fertility in late-summer and fall. The use of excess nitrogen must be avoided throughout the growing season.

Irrigation should be reduced in August and September; allowing weeds, grass or cover crops to grow during August will help reduce soil moisture levels. Fertilization after harvest is not suggested. Low-lying sites with a high water table also may delay hardening-off, and increase the susceptibility of the orchard to frost damage because of poor air drainage.

Desiccation

Symptoms

Symptoms of both cold injury and desiccation are similar and often associated. Symptoms may include death of an entire plant, or death of more susceptible plant parts such as new wood, leaf buds and flower buds; death of entire plants or parts of plants results in no bud-break. Less severe symptoms include delayed bud break, reduced growth, or a variable pattern of flowering within plants, or within the orchard.

Cause

Desiccation is caused by relatively warm dry winds that have effects when the ground, and consequently a plant's roots, are still frozen; the aboveground parts of the plant lose water to the warm, dry winds, but this water cannot be replaced because the roots are frozen.

Control

Irrigation after leaf-fall, but prior to soil freeze up is important if soils are dry, because this will help reduce desiccation in

winter and early-spring. Windbreaks are important for reducing the drying effects of strong, persistent winds.

Sunscald

Symptoms

Bark on stems or branches appears discolored and perhaps bubbled. Sunken areas with cracked or split bark may be present.

Cause

Sunscald, which is a bark injury, can occur in both summer and winter. Bark exposed to the hot summer sun can discolor and bubble, subsequently forming cankers. On cold, sunny days during the winter, bark that is exposed to the sun and reflection from the snow may become warmer than the air, allowing some sap movement to occur, and then cool rapidly after sunset; splitting and subsequent canker development can occur. Such injury allows access by disease organisms.

Control

Prevention of these problems is associated with proper site selection and management practices.

A slight NE slope to the orchard will help prevent sunscald; a spray of white exterior latex paint can also be used to reflect sunlight and help reduce the extreme temperature fluctuations. This may also help delay flowering in the spring.

Fruit Cracking

Symptoms

Large cracks in the skin of ripe saskatoon fruit (Figure 16.4).

Cause

Fruit cracking is associated with high soil water levels and high humidity. Ripening fruit can only lose excess water by transpiration through the skin; conditions that reduce the fruits' ability to transpire, including high humidity and minimal air movement within the plant's canopy, are likely to increase the incidence of fruit cracking following rain. Cultivars may also vary in their susceptibility to fruit cracking. The saskatoon cultivar Pembina may be more susceptible to fruit cracking than other cultivars.

Control

Depending on soil moisture levels, irrigation should be reduced or not applied once fruit begin to ripen. Plants must be adequately thinned to maintain an open canopy in order to maximize the circulation of air and exposure to sunlight.

Plate 16. Weather-related Disorders



Figure 16.1: Typical frost-damaged flower bud; internal browning indicates tissue damage; 17 times actual size.



Figure 16.2: Saskatoon flower damaged by frost; internal browning and browning of a flower petal indicates tissue damage; 12 times actual size.



Figure 16.3: Russetting of saskatoon fruit.



Figure 16.4: Cracking of saskatoon fruit from excessive uptake of water.

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