Frost & Cold Damage – Blueberries

Technical Note

The temperature at which freeze injury begins to occur will depend on the stage of development (from dormant flower buds through to young fruit).

As flower bud swell progresses, cold tolerance decreases.

By the time individual flowers begin to protrude from the bud, temperatures below -7°C will begin damaging the most exposed flowers. When corollas have reached half of their full length, temperatures below -5°C will kill the complete flowers. Blossoms on rabbiteye blueberries may receive corolla damage at temperatures as high as -1°C,. The exposure during this period will cause the corolla to wither, but usually remains attached.

When the blossoms are open, a temperature of -1.5°C for more than a few minutes causes damage. Immediately after corolla drop and before the berry begins to swell is one of the most sensitive stages. A few minutes below -2°C is a high risk incident for damage. As the berry begins to enlarge, susceptibility is similar to the critical temperature of -2°C for open blossoms.

Cold damage is not always obvious. Following temperatures well below the critical level, the complete flower or small fruit will develop a water-soaked appearance, shrivel and drop. However, a very brief time at the critical temperature may damage only the pistil. All or a portion of the damaged pistil will develop a brown appearance and prevent pollination and fruit set. Ovules, which develop into the seeds within the berry, can also be damaged without any exterior symptoms. Healthy ovules are plump and white, but become black with cold injury. If a large number of ovules or young seeds are black, the flower or fruit will probably drop. If only a few are damaged, fruit development usually continues, but the fruit will be later ripening and of smaller size than berries with a larger number of healthy seeds.

Phenology Stage	Critical Temperature	Likely Damage
Flower buds expanding	➢ -5°C	Abortion of flowers, pollination impacts
Open flowers	➢ -1.5°C	Damage and abortion of flowers, pollination impacts
Small fruit (post corolla drop)	➢ -2°C	Internal fruit browning and fruit abortion
Pea size fruit	➢ -3°C	Internal browning
Ripening Fruit	➢ -3°C	Internal browning

Generally significant frost damage to fruit can be detected from day 3 to day 5 post frost event. But less severe impacts and damage to fruit during pollination may not be so obvious until much later (2 weeks onwards).

Dissecting developing fruit (post corolla drop through to small pea sized green fruit) with a sharp knife and observing fruit for damage is easily conducted. Three to five days post frost event is an ideal time.

Common impacts and signs for freeze damage:

- Corolla damage – brown shrivel and drop
- Internal browning of fruit (from small developing fruit through to ripe berries)
- Irregular coloring/ripening of berries
- Water soaked / irregular colour to fruit calyx
- Irregular and misshapen berries (carried over from flower or developing fruit damage)

Discolouration and/or change in colour of calyx (calyx compared to berry)

Internal Browning of developing fruit

Fruit softening and internal browning

Irregular colour of Calyx