Recovery from hail damage

Hail damage can occur any time during the growing season.

A hard impact early in the season could cause a very deep depression and deformation of the fruit.

Later-season damage could appear more bruiselike.

1. Assessment
2. Management of hail-damaged trees
Hail can impact in various ways:

- Trees can be completely stripped of leaves and fruit.
- Leaves can be bruised, torn, tattered, have holes in them or completely knocked off the plant.
- Stems and branches can be broken or bruised.
- Flowers can be damaged.
- Fruit can be bruised, have chunks of flesh removed or be knocked to the ground.
- Trees with broken limbs and may need retraining.
- Pests and diseases can enter fruit and bark.
- Fallen fruit can harbour pests and diseases.
Hail can impact in various ways:
Hail can impact in various ways:
Hail can impact in various ways:
Hail can impact in various ways:

The whole cluster damaged
Hail can impact in various ways:

Apple – Pink Lady
Hail can impact in various ways:
It is important to inspect damage of fruit trees as soon as possible after a hail event.
Damage Assessment

Economic decision has to be made on block-by-block basis.

A ‘windshield survey’ is not sufficient.

Assessment method:

- block-by-block

- cross section of entire block

Reference: Cornell University, Ithaca NY
Damage Assessment

Assessment method:

- sample at least 10 trees in each block
- sample diagonally (X) from the corners of the block
- 5 representative trees per each axis
- 2 limbs per each tree (one on the east and one on the west side)

Reference: Cornell University, Ithaca NY
Damage Assessment

Calculation:

\[
\frac{\text{Number of Damaged Apples (Pears)}}{\text{Total Number of Apples (Pears)}} \times 100 = \% \text{ damage}
\]

Reassessment

3-4 weeks after first assessment
The same method to be used

Reference: Cornell University, Ithaca NY
Management of hail-damaged trees

- Hail wounds need fungicides to prevent disease entry.
- Wounds are a key infection site for disease (fungi and bacteria).
- Severely damaged stems and branches should be pruned.
- Remove fruit that has fallen to the ground (pests and diseases).
- Replacement of young trees in case of severe damage.
- Fertilizers and irrigation applied at optimum levels (stress management).
- Regular inspections (pests and diseases).
- Large wounds should be covered with a water-based paint.
- Summer pruning to retrain young trees and optimise new growth.
- Use fruit thinning to selectively remove hail-damaged fruit and to improve yield and quality of remaining fruit.

Reference:
Management of hail-damaged trees

How Does Infection Occur?

Susceptible Host Plant

Favourable Environment

Pathogen
Management of hail-damaged trees

This is the high-risk period for infection with apple scab and brown rot.

Fungicide protection of injured tissues is necessary immediately after a hailstorm to prevent fungal colonization of wounds.
Management of hail-damaged trees

**Apple Scab (Venturia inaequalis)**

**Pear Scab (Venturia pirina)**
Management of hail-damaged trees

Apple and Pear Brown Rot
*Monilinia fructigena*

Stone fruit Brown Rot
*Monilinia fructicola*
Management of hail-damaged trees

For this purpose, a combination of two fungicides is recommended, one preventive and one postinfection, curative

Preventive + Curative
Management of hail-damaged trees

If symptoms of apple scab appear, an eradication of scab lesions has to be done with another two treatments in short intervals.

Balanced application of foliar fertilizers with fungicide treatments can also be applied to plants to overcome the effects of stress caused by hail.
Management of hail-damaged trees

Besides apple scab, brown rot infection need also to be on growers minds, especially in those orchards with the history of brown rot.

Besides fungicide treatments, sanitation practices that reduce the amount of fungal inoculum are integral to brown rot control.
Management of hail-damaged trees

brown rot
Management of hail-damaged trees

Preventive fungicides (Multi-Site fungicides)

Preventive fungicides work by killing the fungal pathogen on the surface of the plant.

For apples and pears the protectant fungicides include:

- **mancozeb, metiram, thiram and ziram** (activity group M3)
- **captan** (activity group M4)
- **cyprodinil** (activity group 9)
- **kresoxim-methyl and trifloxystrobin** (activity group 11)
- **dithianon** (activity group M9)

Reference: Integrated Pest Management for Australian Apples & Pears
Management of hail-damaged trees

Curative fungicides

Penetrate within the plant and kill fungi after infection.

<table>
<thead>
<tr>
<th>Active ingredient</th>
<th>Kickback period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dodine</td>
<td>1½ days</td>
</tr>
<tr>
<td>Pyrimethanil</td>
<td>3 days</td>
</tr>
<tr>
<td>Triforine</td>
<td>3 days</td>
</tr>
<tr>
<td>Fenarimol</td>
<td>4 days</td>
</tr>
<tr>
<td>Hexaconazole</td>
<td>4 days</td>
</tr>
<tr>
<td>Penconazole</td>
<td>4 days</td>
</tr>
<tr>
<td>Difenconazole</td>
<td>5 days</td>
</tr>
<tr>
<td>Fluquinconazole</td>
<td>5 days</td>
</tr>
<tr>
<td>Myclobutanil</td>
<td>5 days</td>
</tr>
<tr>
<td>Flusilazole</td>
<td>5 – 6 days</td>
</tr>
</tbody>
</table>

Reference: Integrated Pest Management for Australian Apples & Pears
Other Properties of Fungicides

Side Effects

Preventive

Curative

Reference:
Other Properties of Fungicides

Side Effects