

PULSE & CANOLA- Frost Identification: THE BACK POCKET GUIDE

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Frost

Frost damage reduces crop yield and grain quality. Early identification of symptoms allows timely crop salvage decisions to be made.

Inspect pulse and canola crops between bud formation and during pod growth if night air temperature (recorded 1.2m above ground) falls below 2°C and there was a frost.

Check low lying, light coloured soil types and known frost prone areas first. Then check other areas.

Symptoms may not be obvious for 5 to 7 days after the frost.

To identify frost damage:

- you MUST PEEL OPEN *FLOWERS* and *PODS* on plants so that you can clearly see parts that are affected,
- a magnifying glass and fine tweezers or a needle can be useful.

How to use this guide

This field guide will help you to identify the common symptoms of frost damage in pulse and canola crops. It also contains pictures of other plant symptoms often confused with frost damage in these crops.

Consult your local agronomist if in doubt.

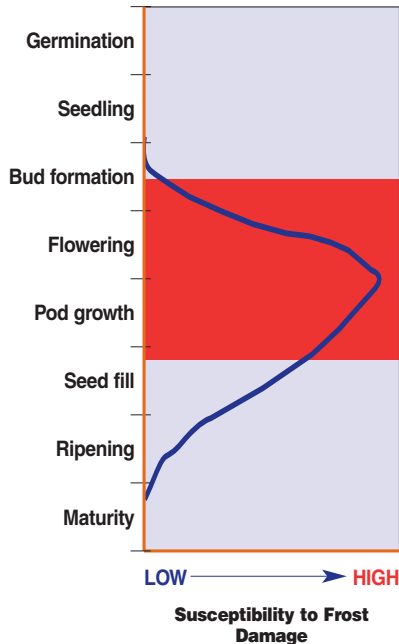


Common Terms used in this guide:

Denoted throughout in *colour*

<i>Bud</i>	Immature flower
<i>Flower</i>	Reproductive organ of a plant
<i>Pod</i>	Fruit or seed case of a legume or canola
<i>Seed</i>	Reproductive unit of a plant containing an embryo

PULSE & CANOLA SUSCEPTIBILITY TO FROST DAMAGE



Factors affecting frost damage

Frost damage in crops tends to be patchy, with great variability occurring within paddocks and on the same plant. This is caused by many factors including: temperature, soil type, soil moisture, cloud cover, wind speed, position in landscape, crop species, crop nutrition and crop density.

Period of risk

Pulse and canola crops are most susceptible to frost damage around early flowering to late *pod* growth and *seed* fill (see diagram left).

Frost damage management to date has focused on avoiding susceptible crop stages coinciding with the period of greatest frost risk in the area.

Which parts are susceptible?

Buds, *flowers*, *pods* and *seeds* can all be affected by frost. In some circumstances all of these parts may be affected on a single plant, as the stages coincide with a damaging frost.

Will the plant recover or compensate?

Time of flowering affects tolerance, and the ability to compensate after the frost has occurred. For example, chickpea often loses early flowers to frost but it can continue flowering as long as water is available, thus compensating for the loss of early flowers.

Canola flowers for a 30–40 day period, so compensatory growth can sometimes occur. A series of consecutive frosts can result in a forced delay of pod set, leading to poor seed fill, especially if a dry finish occurs.

Monitor pod development and seed fill by tagging some reference plants and checking them a few days later for development or senescence (dying).

LUPIN

Tolerance

Lupins have a low tolerance to frost and are generally unable to compensate after flowering.

Symptoms

- In the vegetative phase, leaves are scorched and withered.
- *Flowers* and developing *seeds* in *pods* are shrivelled or killed completely.
- It is often difficult to detect external damage to the *pod*.



Scorched/withered leaves and pods.



Shrivelled seeds in the pod. Unaffected on left.



Scorched and withered leaves.

FABA BEAN



Remaining flower stalk.

Tolerance

Faba beans have a medium tolerance to frost due to thick *pod* walls which provide insulation to the developing *seeds*.



Missing faba bean seed.



Distorted growing points lead to crookshank distortion and disease invasion.

Symptoms

Growing points are sometimes distorted (bent) during early vegetative and flowering stages. This weakens the cells of the stem, allowing disease such as chocolate spot to invade easily.

- *Flowers* are killed by frost, leaving the *flower* stalk.
- White/green mottling & blistering of *pods*.
- Developing *seeds* in the *pod* are shrivelled or absent.
- Affected *pods* feel 'spongy' & the *seeds* inside turn dark black.

FIELD PEA

Tolerance

Field peas have low tolerance to frost due to thin *pod* walls and exposure of pods to the atmosphere.

Symptoms

- *Flowers* are killed by frost.
- Developing *seeds* in the *pod* are shrivelled or absent.
- White/green mottling & blistering of *pods*.
- Affected *pods* feel 'spongy' & the *seeds* inside turn brown/ black.



White mottling of pod.



Blistering of pod.

FIELD PEA - DAMAGED SEEDS



Seeds damaged by frost.



Seeds are killed and turn a brown/black colour.

Chickpea

Tolerance

Chickpeas have low tolerance to frost due to the exposed nature of the *flowers*.

Symptoms

- Leaf margins are bleached.
- *Flowers* are killed.
- Growing points are sometimes distorted (bent) during early vegetative and flowering stages.
- *Pods* may develop, but *seeds* abort.

Even after a frost, chickpeas will continue to flower and set pods well into spring.



Aborted chickpea flowers.



Bleached leaf margins.



Pod killed by frost.

Lentil

Tolerance

Lentils are least tolerant to frost injury at flowering due to the exposed nature of the *flowers*, and the small size of *pods*.

Symptoms

- *Flowers* are sometimes killed.
- *Pods* may develop, but *seeds* abort.
- Whole *pods* can be killed.

CANOLA

Tolerance

Canola is least tolerant to frost damage from flowering to the clear watery stage (approx 60% moisture).

Symptoms

- Yellow/green discolouration of *Pods*.
- Scarring of external *pod* surfaces
- Abortion of *flowers*.
- Shrivelling of *Pods*.
- *Pods* eventually drop off.
- Shrivelling and absence of *seeds*.



Stunted pods which have dropped off.



Yellow/green discolouration of pods at top. Healthy at the bottom.



Canola plant showing various stages of pod loss and flower abortion.

CANOLA

Canola flowers for a 30–40 day period, allowing *pod* set to continue after a frost. Open *flowers* are most susceptible to frost damage, *pods* and unopened *buds* usually escape. If *seed* moisture content is below 40% when frost occurs oil quality will not be affected.



Missing and shrivelled seeds.



Yellow/green discolouration of pods.

OTHER PROBLEMS WITH SIMILAR SYMPTOMS

There are many other problems that are confused with frost damage.

The main ones are those which cause distortion of the plant, absence of the seeds or are unusual in colour. Management and recent environmental conditions should be taken into account when identifying any crop disorder.

It is important to remember that frost damage is quite random and sporadic, and not all plants (or parts of plants) will be affected, whilst most disease, nutrient and moisture related symptoms will follow soil type.



Aphids on canola flower stem.



Sulphur deficiency and aphids. Flower petals retained and pods stunted and yellow/reddening.



Herbicide damage in lupins.

FURTHER INFORMATION

Further information is available from:

Department of Agriculture Western Australia
Dryland Research Institute
(Gt Eastern Hwy) Merredin
Western Australia 6415

Website: <http://www.agric.wa.gov.au>
(Search for “Frost”)

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