Pulse and canola frost identification: the back pocket guide

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Recommended Citation
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Bulletin 4401 [Reviewed April 2004]

June 2000

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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 right air temperature (recorded 1.2 m above ground) falls below 2°C and there was a frost.

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

To identify frost damage

You MUST OPEN *FLOWERS* and *PODS* on plants so that you can clearly see the plant parts that are affected.

A magnifying glass and fine tweezers or a needle can be useful.

Common terms used in this guide:

- **Bud**: Immature flower
- **Flower**: Reproductive organ of a plant
- **Pod**: Fruit or seed case of a legume or canola
- **Seed**: Reproductive unit of a plant containing an embryo
How to use this guide

This field guide will help you 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.

PULSE AND 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).

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?

Bud, 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 shriveled or killed completely.
- It is often difficult to detect external damage to the *pod*.

*Scorched/withered leaves and pods*

*Scorched and withered leaves*
FABA BEANS

Tolerance

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

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 and blistering of pods.
- Developing seeds in the pod are shriveled or absent.
- Affected pods feel spongy and the seeds inside turn dark black.

Remaining flower stalk

Missing faba bean seed
Distorted growing points lead to crookshank distortion and disease invasion

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 shriveled or absent.
- White/green mottling and blistering of pods.
- Affected pods feel spongy and the seeds inside turn dark black.

FIELD PEA - DAMAGED SEEDS
Seeds damaged by frost

Seeds are killed and turn a brown/black colour.

CHICKPEA/LENTIL

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.

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.

Bleached leaf margins.

CANOLA

Tolerance

Canola is least tolerant to frost damage from flowering to the clear watery stage (approximately 60 per cent moisture).

Symptoms

- Yellow green discolouration of pods.
- Scarring of external pod surfaces.
- Abortion of flowers.
- Shrveling of pods.
- Pods eventually drop off.
- Shrveling and absence of seeds.
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 per cent when frost occurs oil quality will not be affected.

**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  
(Great Eastern Highway)  
MERREDIN WA 6415