



# Diseases

## Key messages

- Ascochyta blight, Botrytis Grey Mould and Rust can cause major yield loss in vetch.
- Rust in vetch crops can cause abortions if fed to livestock.
- To limit the risk of disease in vetch and other pulses in the cropping sequence, vetch should be limited to no more than once in every four years in a particular paddock.<sup>1</sup>
- Test seed for disease inoculum and only sow disease free seed.
- Monitor crops regularly, especially in conditions that favour disease development.

The foliar diseases, rust, ascochyta blight and botrytis grey mould can significantly reduce grain and dry matter production and quality of hay, silage and grain in vetch.

## 9.1.1 Integrated disease management

To reduce the risk of disease damage, each year growers need to implement an integrated disease management strategy. This strategy should include sowing healthy seed, knowing variety resistance ratings, using seed dressings, paddock selection and actively monitoring crops for diseases to ensure timely foliar fungicide and/or insecticide application. Key steps in the integrated management of vetch diseases include crop rotation, stubble management, fungicide or pesticide application, variety selection and seed testing.

Disease management is critical when growing a vetch crop regardless of the end use, where possible disease resistant varieties should be planted as a preference (Table 1).

**Table 1:** Disease resistance ratings for vetch varieties.

Variety	Ascochyta blight	Botrytis Grey Mould	Rust
<b>Common Vetch Varieties</b>			
Blanchefleur	MS	S	VS
Cummins	MS	S	VS
Morava(Δ)	S	VS	R
Rasina(Δ)	MS	S	R
Volga(Δ)	MS	S	R
Timok(Δ)	MS	S	R
<b>Purple Vetch</b>			
Popany	S	VS	R
<b>Woolly Pod Vetch Varieties</b>			
Haymaker(Δ)	S	VS	R
Capello(Δ)	S	VS	R
Namoi	S	VS	R
RM4(Δ)	MR	VS	R

Source: [SARDI](#)

<sup>1</sup> R Matic (2010) Vetch summary 2010. SARDI. Online Farm Trials. <http://www.farmtrials.com.au/trial/14055>

## 9.1.2 Foliar fungicide use in vetch

Foliar fungicides are necessary for controlling some destructive pulse diseases (Table 2). They are most effective when applied before or at the first sign of disease, or immediately prior to weather conditions favourable for disease development as a preventative spary. Do not wait until the disease is established; i.e. apply ahead of rain fronts. The duration of protection varies with the product used, how rapidly the plants are growing, and the rainfall experienced. Any new growth after spraying is not protected. If disease persists, additional sprays will be required and should be applied prior to rain. Waiting until after a rain event allows infection to occur.

Uniform coverage of the crop foliage is important for prevention of disease. This is best achieved by using high water rates (preferably 100 L/ha by ground and 30 L/ha by air) with water pH not exceeding pH7, nozzles with a fine or extra fine droplet spectrum and an operating pressure of 400 kPa is suggested. Application onto a wet plant (heavy dew) can assist in coverage of the product. <sup>2</sup> if the dew is not so heavy as to be at the point of run off.

**Table 2:** Fungicides for use in Vetch. Always read the label before use. Use higher rate for dense crops and if disease severe.

Active ingredient and (group)	Product	Rate	Botrytis grey mould	Ascochyta blight	Rust
Mancozeb 750 g/kg (M3)	Dithane Rainshield® Neo Tec Manfil® Manzate® DF Manzeb® Mancozeb®  Unizeb® Disperss 750 DF	1.0–2.2 kg/ha	✓	✓	✓
Carbendazim 500 g/L (1)	Howzat® Spin Flo® Boomer® Carazim® Carbendazim	500 mL/ha	✓	-	-
Metiram 700 g/kg (M3)	Polyram DF®	1.0–2.2 kg/ha	✓	✓	✓

Source: [Pulse Australia](#)

Check the [APVMA website](#) for up to date chemical registrations and labels.

## 9.1.3 Useful tools

### Crop Disease Au app

The app [Crop Disease Au](#), developed by the National Variety Trials, allows the user to quickly:

- Identify crop diseases.
- Compare disease-resistance ratings for cereal, pulse and oilseed varieties.
- Potentially, facilitate the early detection of exotic crop diseases.

The app brings together disease-resistance ratings, disease information and also features an extensive library of quality images that make it easier for growers to diagnose crop diseases and implement timely management strategies. Live feeds

<sup>2</sup> W Hawthorne, J Davidson, K Lindebeck (2011) Australian Pulse Bulletin PA 2011 #15: Pulse seed treatments and foliar fungicides. [http://pulseaus.com.au/storage/app/media/crops/2011\\_APB-Pulse-seed-treatments-foliar-fungicides.pdf](http://pulseaus.com.au/storage/app/media/crops/2011_APB-Pulse-seed-treatments-foliar-fungicides.pdf)

 **MORE INFORMATION**[Field Crop Diseases Manual online](#)[GrowNotes Alert™](#)

from the Australian National Variety Trials (NVT) database means the app is always up to date with the latest varieties.

If a disease cannot be identified there is also a function that allows the user to take a photo of their crop and email it to a friend or an adviser.

The precursor for this app was the Victorian Department of Economic Development, Jobs, Transport and Resources (DEDJTR) Crop Disease app developed by a team of grains pathologists. Crop Disease Au functions similarly to the old app, but provides information for all Australian grain-growing regions.

### 9.1.4 GrowNotes Alert™

GrowNotes Alert is a free nationwide system for delivering urgent, actionable and economically important pest, disease weed and biosecurity issues directly to you, the grower, adviser and industry body, the way you want. Real-time information from experts across Australia, to help growers increase profitability.

A GrowNotes Alert notification can be delivered via SMS, email, web portal or via the iOS App. There are also three by dedicated regional Twitter handles – @GNAlertNorth, @GNAlertSouth and @GNAlertWest – that can also be followed.

The urgency with which alerts are delivered can help reduce the impact of disease, pest and weed costs. GrowNotes Alert improves the relevance, reliability, speed and coverage of notifications on the incidence, prevalence and distribution of these issues within all Australian grain growing regions.

## 9.2 Ascochyta blight

Ascochyta blight is the most economically damaging disease of pulses, with an estimated cost to the Australian industry of more than \$120 million in annual disease control and yield loss.<sup>3</sup>

Ascochyta occurs in earlier stages of vetch crop development and can reduce grain and dry matter production.<sup>4</sup>

Seed discoloured as a result of ascochyta infection is often heavily discounted in price and may be rejected by some buyers. Ascochyta is favoured by cool, wet conditions and is likely to be a problem in years with wet winter conditions and in high rainfall areas.

The disease is characterised by dark leaf spots show through both sides and become grey with age. Leaf spots are circular, becoming elongated; with pale centres may fall out leaving holes in leaf. Tiny black fruiting bodies develop within lesions.

Herbicide damage (particularly simazine) can be mistaken for Ascochyta blight but is usually confined to leaf margins and spots do not have grey centres with black specks.

Stems develop elongated, dark, sunken lesions; stems may split and break, causing plants to lodge.

Pods develop black, sunken lesions, which can penetrate the pod and infect the developing seed. Badly infected seeds have brown or black stains.

Ascochyta first appears on leaves of seedlings when wet, cold conditions occur, usually well before flowering. Progresses to infect upper leaves, flowers, stems and pods. Infection on mature pods leads to seed staining, especially when late rains occur preharvest.

The disease can develop on pods of windrowed crops.

3 GRDC. GroundCover Issue 116: Nationally coordinated effort to tackle ascochyta blight of pulses. <https://grdc.com.au/resources-and-publications/groundcover/ground-cover-supplements/ground-cover-issue-116-foliar-fungal-diseases-of-pulses-and-oilseeds/nationally-coordinated-effort-to-tackle-ascochyta-blight-of-pulses>

4 L Sigel, J Brand, J Fanning, H Richardson (2017) Pulse Disease Guide 2017. Agriculture Victoria. <http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/plant-diseases/grains-pulses-and-cereals/pulse-disease-guide>

 **MORE INFORMATION**[GRDC Trials](#)

### 9.2.1 Varietal resistance or tolerance

Woolly pod vetch variety RM4(D) has the highest resistance to ascochyta blight with a rating of moderately resistant. All other woolly pod vetch, purple vetch and common vetch varieties are rated as moderately susceptible or susceptible to ascochyta blight.

For varietal disease ratings to ascochyta blight in vetch, see Table 1.

### 9.2.2 Conditions favouring development

Ascochyta blight can be both seed and stubble borne. Wind borne spores from infected stubbles can blow into adjacent paddocks and infect new crops. Infection can occur at any stage of plant growth, but is more significant during late flowering and pod fill. Rain splash spreads spores onto new crop growth within the crop, including pods.

Seed can remain infected for several years. Sowing infected seed can give rise to infected seedlings, and the appearance of symptoms at the seedling stage. Previously infected stubble is an important source of fungal inoculum. Spores are produced on old stubble and are spread to plants by rain splash. Further spread from plant to plant within crops then occurs through rain splash. The development of ascochyta blight epidemics is largely determined by the prevailing environmental conditions, especially the presence of moisture. Infection can occur at any stage of plant growth. Wet conditions late in the season, provides ideal conditions for pod infection which can result in seed discolouration.<sup>5</sup>

### 9.2.3 Management of disease

Ascochyta blight management begins with the use of disease-free seed. Test retained seed if there is any doubt about the disease status of the seed. Sow into paddocks that are free of infected stubble and avoid close rotations of vetch in the same paddock. Vetch has limited resistance to ascochyta so it is recommended that it is not sown in paddocks with history of the disease. If vetch must be sown, use varieties that have higher resistant ratings e.g. RM4(D) (MR).

Destroying infected stubble by grazing and cultivation will reduce disease risk by minimising the number of spores available to infect new crops. Infected self-sown vetch volunteers that may germinate over summer must also be controlled to prevent carry-over of the disease.

Follow the recommended regional sowing rates and sowing dates. Avoid early sowing at high seeding rates as this increases exposure of seedlings to the ascochyta pathogens and produces crops with a large canopy, increased lodging and high humidity; all of which increase the risk of developing disease.

Fungicidal seed dressings registered for use on ascochyta blight, when applied correctly, will control seed-borne disease and protect young plants from early infection. Where seed is to be inoculated, apply the fungicide first and allow to dry. Apply the inoculum immediately prior to sowing. Fungicides and inoculant should never be mixed together.

Check the [APVMA website](#) for up to date chemical registrations and labels.

#### Detection

Monitor vetch for disease throughout the growing season but especially for ascochyta during the earlier growth stages.

When inspecting crops, look for signs of wilting in upper foliage and small areas of dead or dying plants. Check in a range of locations across the field following a 'V'

<sup>5</sup> T Bretag, L Sigel, (2016). Ascochyta blight of lentil. Agriculture Victoria. <http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/plant-diseases/grains-pulses-and-cereals/ascochyta-blight-of-lentil>



## MORE INFORMATION

[Ascochyta to be assessed in Predicta®B tests.](#)

or 'W' pattern. Spend at least 1 to 2 hours inspecting each crop for ascochyta blight. Ensure good hygiene when moving between crops and farms.<sup>6</sup>

If ascochyta is detected in any crop rotation actions should be taken to reduce the risk of the disease in the following crop.

New South Wales and Queensland growers can now potentially make more informed decisions on paddock selection in future seasons now that the DNA-based soil test Predicta® B will incorporate a test for *Phoma rabiei* (Ascochyta blight).<sup>7</sup>

### 9.3 Botrytis Grey Mould

Botrytis grey mould is a foliar disease caused by the fungal pathogen *Botrytis cinerea*. Botrytis grey mould (BGM) has been reported in many pulse growing countries of Asia and America but appears to be more severe in Australia. Flowers are especially vulnerable to BGM infection. *B. cinerea* does not infect cereals or grasses.

Botrytis Grey Mould can reduce grain and dry matter production in vetch in cool/wet growing seasons with high amounts of vegetative growth.

In the Northern region, *B. cinerea* has been recorded on over 138 genera of plants in 70 families. Legumes and asteraceous plants comprise approximately 20% of these records. As well as being a serious pathogen, *B. cinerea* can infect and invade dying and dead plant tissue. This wide host range and saprophytic capacity means inoculum of *B. cinerea* is rarely limiting. If conditions favour infection and disease development, BGM will occur.

*B. cinerea* also causes pre- and post-emergent seedling death. This happens when seed infected during a BGM outbreak, is used for sowing. Seedling disease does not need the wet conditions that are usually required for infection and spread of BGM later in the crop cycle.<sup>8</sup>

#### 9.3.1 Varietal resistance or tolerance

There is little difference between vetch varieties in their resistance to BGM; varieties like Morava(Δ), which produce greater levels of vegetative growth and denser canopies, will be more prone to this disease in higher rainfall areas.

All vetch varieties are rated as susceptible or very susceptible to Botrytis grey mould (see Table 1).

#### 9.3.2 Conditions favouring development

Factors that favour infection and spread of BGM in favourable seasons include:

- early sowing (mid-April to early May) and narrow rows
- frequent overcast, showery weather
- limited supply of effective fungicides
- lack of BGM tolerant/resistant varieties

High biomass crops and early canopy closure often results in high in-crop humidity and poor penetration of fungicides. If the crop becomes lodged the situation is exacerbated.

Rainy weather not only favours the disease but wet paddocks also limit the spray opportunities for ground rigs.

6 Pulse Australia (2009) Northern Pulse Bulletin: Ascochyta blight detection in chickpea. [http://www.pulseaus.com.au/storage/app/media/crops/2009\\_NPB-Chickpea-Ascochyta-ID-manage.pdf](http://www.pulseaus.com.au/storage/app/media/crops/2009_NPB-Chickpea-Ascochyta-ID-manage.pdf)

7 S Jeffrey (2017) Ascochyta to be assessed in Predicta®B tests. GRDC. <https://grdc.com.au/news-and-media/news-and-media-releases/north/2017/04/ascochyta-to-be-assessed-in-predicta-b-tests>

8 M Ryley, K Moore, G Cumming, L Jenkins (2015) Australian Pulse Bulletin – Chickpea: Managing Botrytis Grey Mould. Pulse Australia. <http://www.pulseaus.com.au/growing-pulses/bmp/chickpea/botrytis-grey-mould>

Following a season where widespread BGM infection has occurred in a district there is often a shortage of disease-free seed for planting and there is a high quantity of infected crop residue across a large area. Both of these factors will increase the disease risk for the following year. Whether BGM becomes a problem the following year will depend on seasonal conditions.<sup>9</sup>

### 9.3.3 Management of disease

#### Stubble management

It is likely that the pathogen can remain viable and capable of survival for as long as infected stubble remains on the soil surface. Burial of stubble removes the ability of *B. cinerea* to produce spores that can be blown around, and increases the rate of stubble breakdown by soil microbes.

Although burning of infected residues will also significantly reduce the amount of infected residues on the soil surface, it will not guarantee freedom from BGM in the following season.

Burying or burning stubble can significantly increase the risk of soil erosion and reduce water infiltration.

#### Volunteer control (the green bridge)

Volunteer plants growing in or near paddocks where BGM was a significant problem are a likely method of carry-over and must be managed by application of herbicide or cultivation. This will also reduce carryover of ascochyta

#### Seed source and treatment

Obtain seed from a commercial supplier, or from a source known to have negligible levels of BGM. Irrespective of the source, all seed must be thoroughly treated with a registered fungicide seed dressing. Thiram based fungicide seed dressings are effective in significantly reducing, but not entirely eliminating, BGM from infected seed.

In areas where there may be a risk of BGM, sow varieties with higher resistance to the disease (see Table 1).

#### Seedling emergence

Research on harvested seed has shown a germination test does not accurately predict emergence. Accordingly, growers are advised to conduct their own emergence test, as follows:

- After grading and treatment, sow 100 seeds at least 5 cm deep in the paddock that you intend for sow for the season and water if necessary.
- Count the number of seedlings that have emerged after one, two and three weeks and note their appearance. Note if they look healthy or if they are stunted and distorted.
- To get an idea of variability in emergence and the paddock, replicate the test; i.e. sow 100 seeds in 3–4 different locations in the paddock. This will also help identify potential herbicide residue problems.

#### Paddock selection

Paddocks in which crops were affected by BGM should not be re-sown to pulses in the following season. Nor should vetch be sown beside paddocks where BGM was an issue the previous season.

Vetch should be grown as far away from paddocks in which BGM was a problem as is practically possible.

<sup>9</sup> M Ryley, K Moore, G Cumming, L Jenkins (2015) Australian Pulse Bulletin – Chickpea: Managing Botrytis Grey Mould. Pulse Australia. <http://www.pulseaus.com.au/growing-pulses/bmp/chickpea/botrytis-grey-mould>

However, under conducive conditions, this practice will not guarantee that crops will remain BGM free, because of the pathogen's wide host range, ability to colonise dead plant tissue, and the airborne nature of its spores.

### Sowing time and row spacing

If long-term weather forecasts suggest a wetter-than-normal year (e.g. La Nina), consider sowing in the later part of the suggested sowing window for your district and on wider rows (e.g. 100 cm). Planting on wider rows results in increased air movement through the crop and reduced humidity within the canopy.

### Fungicide application and timing

In seasons and situations favourable to the disease, a preventative spray of a registered fungicide immediately prior to canopy closure, followed by another application 2 weeks later, will assist in minimising BGM development in most years.

If BGM is detected in a district or in an individual crop, particularly during flowering or pod fill, a fungicide spray should be applied before the next rain event.

None of the fungicides currently registered for the management of BGM have eradicant activity, so their application will not eradicate established infections. Consequently, timely and thorough application is critical.<sup>10</sup>

Check the [APVMA website](#) for up to date chemical registrations and labels.

## 9.4 Rusts

Rust, caused by the pathogen *Uromyces viciae-fabae*, is a serious disease of vetch in New South Wales and Queensland. Rust is found most commonly from mid spring.

Rust is not usually a problem every year in the southern part of the Northern region, and often occurs in years with good spring rainfall and mild temperatures.

### 9.4.1 Varietal resistance or tolerance

Morava(1), Rasina(1), Volga(1) and Timok(1) are resistant to rust and are the preferred varieties for grain in areas prone to rust infections (see Table 1).

### 9.4.2 Damage caused by disease

Rust epidemics can significantly reduce vetch yields. Care must be taken when growing rust susceptible varieties as grazing or feeding hay/silage from rust infected plants may induce abortions in pregnant livestock.

### 9.4.3 Symptoms

On the leaves there are numerous small, orange- brown pustules each surrounded by a light-yellow halo (Photos 1 and 2). As the disease develops, severely infected leaves wither and may fall from the plant. On stems, the rust pustules are similar, but often larger, than those on the leaves. Isolated rust pustules may appear on the pods. Severe infection may cause premature defoliation, resulting in reduced seed size.<sup>11</sup>

<sup>10</sup> M Ryley, K Moore, G Cumming, L Jenkins (2015) Australian Pulse Bulletin – Chickpea: Managing botrytis grey mould. <http://www.pulseaus.com.au/growing-pulses/bmp/chickpea/botrytis-grey-mould>

<sup>11</sup> CropPro (2014) Rust of Faba Beans. [http://www.croppro.com.au/crop\\_disease\\_manual/ch06s06.php](http://www.croppro.com.au/crop_disease_manual/ch06s06.php)



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**Photo 1:** *Rust spores on vetch leaves and stem.*

Photo: Stuart Nagel



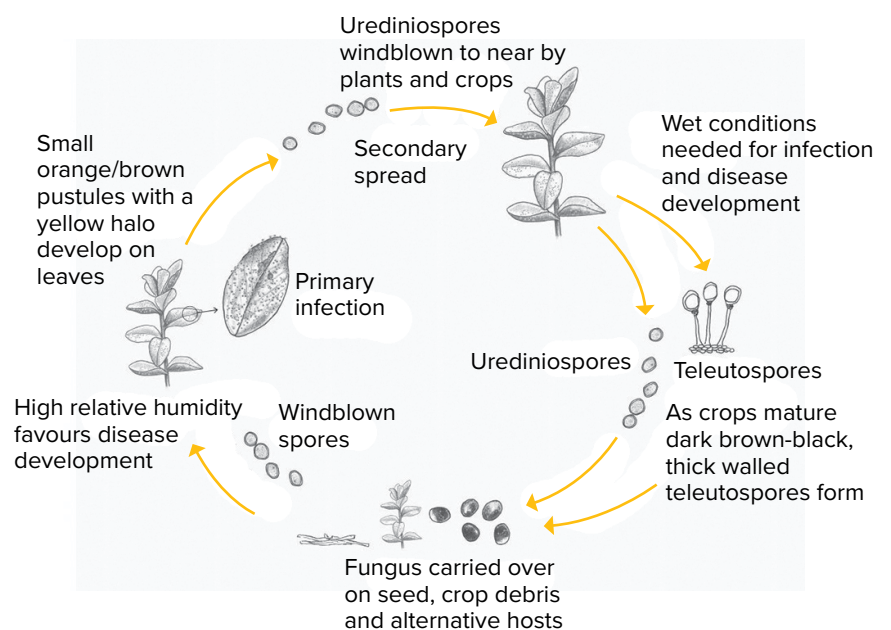
**Photo 2:** *Visible rust infection on the underside of vetch leaves.*

Photo: Stuart Nagel

### 9.4.4 Conditions favouring development

The rust fungus survives on stubble and self-sown volunteer plants. The teliospores produced can infect volunteer plants directly without the need for an alternate host. Infection of volunteer plants is thought to be an important factor in the early development of rust epidemics. Rust spores from stubble and volunteers are blown onto new crops by the wind and infect plants. New spores form in rust pustules on infected plants. Secondary spread of the disease occurs when these spores become air-borne and then spread to other plants, (Figure 1).

Rust commonly occurs late in the growing season during podding, resulting in premature leaf drop which can reduce seed weight and size. Humid and warm conditions (more than 20°C) promote its spread.<sup>12</sup>



**Figure 1:** Disease cycle of rust on legumes.

Illustration by Kylie Fowler

### 9.4.5 Management of disease

Because the spores of the fungus can travel long distances to infect a new crop, disease prevention is difficult but awareness is key.

#### Paddock Selection

A break of at least three years between vetch crops is recommended. Aim for a separation of 250m from the previous year's vetch paddock. Do not sow adjacent to last year's vetch stubble.

#### Variety Selection

A number of vetch varieties are currently available with improved resistance to rust (see Table 1).

<sup>12</sup> CropPro (2014) Rust of Faba Beans. [http://www.croppro.com.au/crop\\_disease\\_manual/ch06s06.php](http://www.croppro.com.au/crop_disease_manual/ch06s06.php)



 MORE INFORMATION

[PulseAustralia - Managing viruses](#)

## Fungicide control and timing

While it is usually not economically viable to use fungicides for rust on vetch, it may be necessary where rust susceptible varieties are to be used as feed.

Foliar fungicides can be used to control the disease and prevent a rust epidemic developing. Crops should be monitored closely if warm (around 20°C) temperatures and very high humidity occur.

Successful fungicide application relies on crop monitoring and timeliness of application with the right product effective against rust. Several products are registered for use against rust.<sup>13</sup>

### For fungicides registered for control of rust in vetch, see Table 2.

Check the [APVMA website](#) for up to date chemical registrations and labels.

## 9.5 Viruses

Vetch can be a host to a number of aphid species, most commonly the cowpea and pea aphid. These aphids can spread viruses between and within different pulse crops. Viruses can be a problem in vetch, especially in years that favour aphid movement. All viruses that affect pulse crops in the Northern region have been found to affect common vetch varieties as well. Though there have not been trials dedicated to vetch varietal resistance and tolerance to viruses, there have been observation in the severity and incidence of viruses.<sup>14</sup>

### 9.5.1 Symptoms

Viruses differ from most fungal diseases in that they infect plants systematically and no curative treatment is available. Virus infections are spasmodic and levels depend heavily on seasonal conditions and differ greatly between years and locations. Early infection can lead to stunting, reduced tillering and plant death and losses can be high. Late infections have less impact, but can still affect seed quality.

Pulse viruses are transmitted either in a persistent or non-persistent manner by insects (mostly aphids). The mode of transmission has implications for the way a virus develops in the field and its management.

Plants grown from infected seed are stunted with pale, bunched, down-curved, faintly mottled leaves. Plants infected by aphids during the season exhibit similar symptoms on plant parts that emerge following infection, older leaves present before infection remain healthy. Pod set and seed size are both reduced in infected plants.<sup>15</sup>

### 9.5.2 Conditions favouring development

Rainfall in summer and autumn has a major effect on virus infections in crops. High rainfall during this period leads to a build up of weed hosts for viruses and the growth of self sown pulses. Aphids are also favoured by a wet summer and autumn. Aphid population development is strongly influenced by local conditions. Early breaks and summer rainfall favour early increases in aphids and volunteers that host viruses, resulting in a higher level of virus risk. These conditions can lead to an early infection which can then have a major impact on growth and yield.<sup>16</sup>

13 CropPro (2014) Rust of Faba Beans. [http://www.croppro.com.au/crop\\_disease\\_manual/ch06s06.php](http://www.croppro.com.au/crop_disease_manual/ch06s06.php)

14 Joop van Leur (2017) NSW DPI. Personal Communication.

15 G Thomas, B Coutts (2016) Lupin foliar disease: diagnosis and management. DAFWA. <https://www.agric.wa.gov.au/lupins/lupin-foliar-diseases-diagnosis-and-management>

16 GRDC (2010) Aphids and viruses in pulse crops – Fact sheet. [https://grdc.com.au/\\_data/assets/pdf\\_file/0019/205642/aphidvirusesfactsheets.pdf.pdf](https://grdc.com.au/_data/assets/pdf_file/0019/205642/aphidvirusesfactsheets.pdf.pdf)

 MORE INFORMATION

[Aphids and viruses in pulse crops.](#)

[Managing viruses in pulse crops](#)

[Managing Viruses in Pulses](#)

### 9.5.3 Management of viruses

Sow early at high seeding rates using narrow row spacing to promote early crop canopy coverage into standing stubble. This deters aphids from landing and shades over the seed-infected and early infected plants, denying aphids access to them.

Direct drill into retained stubble. Ground cover reduces aphid landing rates before a crop canopy develops, especially with wide row spacing.

Minimise the pool of potentially virus-infected plant material near crops by controlling the green bridge of weeds, pastures and volunteer pulses that can harbour viruses and aphids over summer or between crops. This includes weeds around dams, tracks and the margins of crops. Isolate from neighbouring crops that could be a source of infection.

Some species of aphids are attracted to areas of bare earth. Use minimal tillage and sow into retained stubble, ideally inter-row to discourage aphid landings.

#### Controlling aphids

Monitor crops and neighbouring areas regularly. Identify the species of aphid present and their numbers.

Beneficial insects – including hover flies, lacewings, ladybirds and parasitic wasps – will attack aphids and assist in preventing aphid levels from increasing. Beneficial insects can help reduce virus spread and spring feeding damage, but some virus spread will have occurred before aphid numbers subside. The risk of non-persistently transmitted viruses can be reduced by an integrated disease management approach applied prior to seeding that includes a range of crop hygiene and management measures.

Insecticide applied as seed dressings will help control aphid attack and the spread of viruses. Foliar insecticides applied soon after crop emergence can help control persistently transmitted viruses, but are of little benefit against non-persistently transmitted viruses. Preferably use a 'soft' insecticide, that targets the aphids and leaves beneficial insects unharmed.<sup>17</sup>

<sup>17</sup> GRDC (2010) Aphids and viruses in pulse crops – Fact sheet. [https://grdc.com.au/\\_data/assets/pdf\\_file/0019/205642/aphidsvirusesfactsheets.pdf](https://grdc.com.au/_data/assets/pdf_file/0019/205642/aphidsvirusesfactsheets.pdf)