PULSE AUSTRALIA
Australian Pulse BULLETIN
PA 2012 #06

Field pea Disease Management Strategy

Southern & Western Region

Wayne Hawthorne, Pulse Australia; Jenny Davidson and Larn McMurray, SARDI;
Eric Armstrong, DPI NSW; Bill MacLeod, DAFWA, Helen Richardson, DPI Vic.

Disease management in field pea relies heavily on an integrated management package involving crop management and hygiene. Control of black spot is the first priority in peas, and sets the basis for controlling the other diseases. Fungicide use is minor in the overall integrated program.

Summary of recommended strategies to minimise disease in Field Pea

- **Paddock isolation:** (>500m) from pea stubble is the highest priority.
- **Paddock history:** Aim for a minimum 4 year break between pea crops because soil borne inoculum is significant.
- **Seed source:** Use seed with minimal disease transmission. Test seed for disease and virus status.
- **Fungicide seed dressing:** can be effective in high disease risk situations.
- **Sowing and rainfall:** Use 'Blackspot manager' computer model to assist with sowing date decisions. Do not sow within two weeks of the first rains of the season unless in low rainfall/short season areas and black spot risk is low.
- **Sowing date:** Sow within the optimum 'sowing window' for your district, using "Blackspot manager" to assist.
- **Sowing rate:** Sow at the recommended plant population for the district, sowing time, and variety.
- **Variety selection:** No variety is resistant to blackspot. Know other disease susceptibilities of the variety sown.
- **Hygiene:** Take all precautions to avoid disease spread. Spray or remove self sown pea seedlings and ideally destroy pea stubbles before the new crop emerges.
- **Foliar fungicide application:** Foliar fungicide can effectively control powdery mildew. A fungicide program for controlling blackspot and septoria in peas is possible, but may not necessarily be economic.
- **Mechanical damage:** Traffic, wind erosion, frost, hail or herbicide damage can spread bacterial blight.
- **Harvest management:** Early harvest helps to minimise disease infection of seed and benefits grain quality.

Despite regional differences, predicting the disease risk is possible based on proximity to pea stubbles, paddock history, soil test, rainfall information (timing and amount), stubble management and planned sowing date.

Decision making tools to use are the "Blackspot manager" computer model (SA, WA & Vic) and Predicta^{TM}B soil test (not WA) along with proximity of nearest pea stubble (all areas).

Photos 1 & 2: Black spot (left) and downy mildew (right) - SARDI.

Management of disease in field pea should concentrate on controlling blackspot (also known as ascochyta blight), the greatest threat to the pea industry in southern Australia. Blackspot is a disease complex and comprises up to 4 fungi:
mycosphaerella *(Mycosphaerella pinodes),* two phomas *(Phoma medicaginis var pinodella* and *Phoma koolunga,* ascochyta *(Ascochyta pisi)* and macrophomina *(Macrophomina phaseolina).* The mycosphaerella component is by far the most predominate and most damaging disease in most areas. Decision support tools are now available to assist in management of blackspot.

Plan to manage blackspot in peas first, followed by the other fungal diseases of local importance. Downy mildew *(Peronospora viciae)* and powdery mildew *(Erisyphe polygoni/Erisyphe pisi)* need to be controlled in eastern Australia.

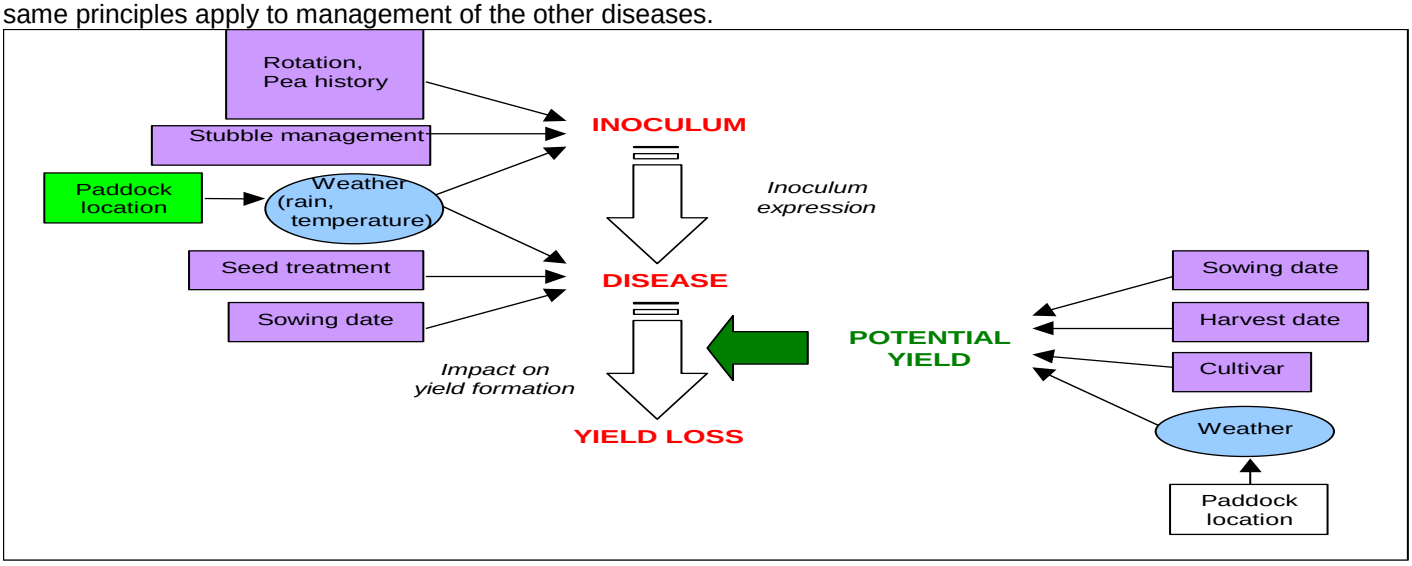
Septoria blight (*Septoria pisi*) can cause problems in parts of New South Wales. Bacterial blight (*Pseudomonas syringae pv. pisi; Pseudomonas syringae pv. syringae)* is a bacterial disease which is seed borne, and can be a major problem depending on location and season. It has been severe in parts of south eastern Australia, but is rarely a problem in WA.

Seasonal conditions and the timing of rainfall events play a significant role in disease outbreaks, even if commencing from a low level of disease inoculum. Growers need to implement an integrated approach to disease management every year to produce a profitable crop. The disease risk can often be predicted, therefore it is possible to minimise the damage through paddock selection and crop management.

1. Knowing the diseases

Blackspot is the number one disease risk in most southern environments and influences crop management decisions. Severity of blackspot depends on the level of inoculum (from stubble, soil and seed) and the duration of prolonged wet, cool conditions particularly before flowering. Rainfall or heavy dews on pea stubble releases spore 'showers' provided the temperature is not too high (average daily temperatures over 15^0C). These spore 'showers' generally last 3-4 weeks after the opening rains, but in WA may continue well into the growing season, and infect emerged plants. This is particularly in seasons or locations where minimal rainfall has fallen prior to seeding. Blackspot is most damaging when it girdles the stem, and in some locations pod and seed infection causes downgrading of pea seed quality.

Figure 1. Key driving factors in blackspot, and the basis for managing the risk and maintaining yield potential. The same principles apply to management of the other diseases.



Downy mildew develops quickly in colder (5 - 15°C), humid (over 90%), dewy conditions lasting for 4 – 5 days, particularly during early vegetative stages. Duration of its survival in the soil is longer than for blackspot. Heavy dews promote sporulation but rainfall will wash spores off of the plants. The infection distorts growing points. Systemic infection can lead to the appearance of the disease late in the season if conditions are conducive, but yield losses due to downy mildew arise from the stunting of plants early in their growth, or from complete loss of seedlings. In WA and NSW, downy mildew can be evident in mid winter, but the plants grow away from the disease without significant yield loss.

Bacterial blight is prevalent in some eastern state areas, but is not considered a major problem in WA. It can be minimised by sowing pathogen-free seed. *Pseudomonas syringae* pv. *pisi* is largely restricted to field pea. *Pseudomonas syringae* pv. *syringae* however has a wide host range including clover, common bean, faba bean, lentil, chickpea and vetch. It appears to be the more prevalent of the two pathovars in field infections. The bacteria spread in wet conditions, particularly after a frost which provides conditions for the bacteria to enter the plant. Hail or heavy rain, sandblasting or herbicide damage also physically damage the plant and provide entry points for this disease).

Powdery mildew is common in many eastern state areas, but not in WA. It is more likely to occur when the season is protracted, sowing is late, or later maturing varieties are grown. Powdery mildew develops quickly in warm (15 - 25°C), humid conditions (over 70%) for 4 – 5 days, particularly at flowering and after canopy closure. As with downy mildew, rainfall will wash spores off of the plants. Free moisture on plants will also restrict germination of the spores and does not promote the epidemic. If infection occurs earlier than four weeks from maturity, yield losses due to powdery mildew arise from the infection covering stems, leaves and pods, which will lead to shrivelled seeds.


Photos 3 & 4: Powdery mildew (left) and septoria (right) - SARDI.

Septoria (*Septoria pisi*) has been particularly noted in NSW but occurs sporadically in the pea production regions in SA and Vic. It only rarely results in significant yield losses. The disease is characterised by yellow blotches on plant tissue, which become necrotic and covered in numerous brown spots. Its occurrence, conditions favouring its development and control principals are very similar to those for blackspot.

Botrytis grey mould *(Botrytis cinerea)* is a minor issue in field pea, and usually poses no major threat, unlike in lentil, faba bean and chickpea. It is most likely to occur at flowering in very dense pea crops. Peas are not at risk if sown adjacent to lentil, faba bean, vetch, chickpea or lathyrus stubble.

Sclerotinia *(Sclerotinia sclerotiorum and S. minor)* may become a problem in wet seasons where pea crops are sown into paddocks previously cropped to canola, sunflower or chickpea.

Pratylenchus: Field peas are resistant to both of the major species of root lesion nematode (*Pratylenchus neglectus* and *P. thorneii)* and are useful to include in rotations to reduce RLN in subsequent cereal crops.

Virus: Pea seed-borne mosaic virus (PSBMV) is the major virus that affects field pea, and is seed transmitted.

2. Disease carry-over and on–farm hygiene (post harvest-pre sowing)

Blackspot carries from one season to the next on infected pea stubble, but can also carry over on infected seed, volunteer plants or directly in the soil. Downy mildew is similarly carried over on stubble or directly in the soil where it persists longer than blackspot. Whilst downy mildew can be found on seed, it does not seem to be transmitted to seedlings. One of the species that causes bacterial blight (*P.s pv syringae)* is carried over on alternative hosts of seed and stubble, but not in soil.

Seed retained on-farm should come from the 'cleanest' paddocks, where least disease was detected, preferably where no disease was detected.

Seed needs to be tested free of bacterial blight and PSbMV if in a prone area or introducing new seed.

Control volunteer peas early to limit the build-up of disease inoculum.

Undertake a program of pea stubble reduction in areas where this will not create an erosion risk, eg chop, bury, destroy, graze or burn pea crop residue.

While burying pea stubble can significantly reduce its decomposition time, chopping and spreading it can be a safer means to avoid erosion whilst achieving a speedy stubble breakdown. However the base of the plants remaining in the ground will still act as a source of blackspot spores.

Pea stubble breakdown may be slower in lower rainfall areas, but can be sped up if buried. Blackspot incidence is therefore not necessarily less in lower rainfall areas.

Baling pea stubble or grazing it over summer helps reduce stubble, however, be wary of erosion. Infected stubble can be carried between paddocks by stock and wind. Be aware of grazing restrictions (withholding periods, export slaughter intervals) on stubble treated with foliar fungicide.

Infected stubble may also be carried by wind, water and machinery at harvest. Clean all machinery, transport equipment and storage vessels with compressed air before moving to the next paddock.

Stubble from peas harvested early at high moistures is not pulverised as would happen when harvested dry. Crop desiccation greatly increases pulverisation of the pea stubble during harvest.

3. Paddock selection

Close proximity to pea stubble and volunteer field pea plants should be avoided, particularly where the new pea crop would be sown on the down-wind side of pea stubble paddocks. Computer based models now estimate the risk of sowing crops in various paddocks across the farm, taking proximity to neighbouring pea crops, rainfall timing and amounts, the cropping history of paddocks and planned sowing date into account to determine risk levels.


Photos 5 & 6: Bacterial blight (left) and Pea Seed Borne Mosaic Virus (right) – Pulse Australia.

In WA, whole farm rotation planning over several years will be possible, and paddock selection and sowing date can be manipulated to minimise the disease problem with peas in the field.

In the eastern states, the soil borne disease risk for blackspot (mycosphaerella and phoma) can be assessed through Predicta^{TM}B soil testing (SARDI Root Disease Testing Service, Adelaide). The test helps identify paddocks with a high level of blackspot in the soil, even after a break from peas. This can occur if the previous pea crop suffered a severe epidemic of blackspot and the normal 5-year break is not sufficient time for the inoculum levels to decline to safer levels. In WA the soil test is less useful because soil borne inoculum is masked by phoma from legume pastures, and is minor compared with the spore 'showers" from nearby pea stubble.

In eastern Australia, if high inoculum levels are detected in the soil, it is advisable to avoid sowing peas in that paddock. If medium levels are detected, then a seed dressing such as P-Pickel T® should be considered to minimise seedling infection, along with crop management practices to avoid the high level of airborne blackspot spores from neighbouring pea stubble.

Use the following guidelines for selecting the paddock to grow peas:

Do not sow adjacent to pea stubble, particularly downwind. Separate this year's pea crop from last year's pea stubble by a distance of at least 500m.

Be aware that self-sown peas or an early sown pea crop may be a source of blackspot spread into adjacent, later sown pea crops.

In the eastern states, a break of at least 5 years between pea crops is usually required to minimise soil inoculum. Downy mildew persists in soil longer than blackspot. In WA, a break of at least 3 years between pea crops is required to minimise carryover of stubble borne inoculum on the soil surface and along fence-lines.

Paddocks with low soil fertility or nutrient status can lead to stress, predisposing the peas to disease

Observe the maximum plant-back period for sulphonylurea herbicides (eg Glean®, Logran®), Lontrel® and triazines. Herbicide residues may increase susceptibility to disease.

Beware of post-emergent herbicide mixes (eg grass selective with additives), as spray damage can lead to sites for infection of blackspot, downy mildew and bacterial blight.

In paddocks that grew faba bean, chickpea, vetch, lathyrus, medic or clover pastures two years previously, there is a slight risk of phoma *(Phoma medicaginis var pinodella)* attacking peas, especially in waterlogged soils.

4. Varieties

Under high disease pressure, some varieties could require fungicide protection to control epidemics.

Use a variety that best with-stands the main disease risk for your region, or one in which the disease can be controlled e.g Yarrum for powdery mildew resistance, PBA Percy for least bacterial blight risk. Yield and marketability also need to be considered in variety choice.

No variety has resistance to blackspot. Compared to Kaspa, PBA Gunyah and to a lesser extent PBA Twilight have shown less blackspot symptoms early in the season and a better yield response when either foliar fungicide is applied or sowing is delayed. The better response is associated with the earlier and longer flowering regime of PBA Gunyah and PBA Twilight rather than less disease.

Consider spreading risk by sowing more than one variety, e.g. don't sow both Parafield and Kaspa in a powdery mildew prone region since both are susceptible.

Varieties resistant to powdery mildew (e.g. Yarrum, Maki), are virtually immune to that disease, but for the other diseases, all varieties can suffer significant

Table 1. Disease ratings [A] of current varieties.

Disease rating	Black spot	Downy mildew 'Parafield strain'	Downy mildew 'Kaspa strain'	Powdery mildew	Bacterial blight[B] *(pv syringae)*[B]	Septoria	PSbMV
R (Resistant)	-	PBA Gunyah, PBA Twilight, Bundi,	-	Yarrum, Maki	PBA Percy,	-	Yarrum, Maki
MR (Moderately Resistant)	-	PBA Oura, Kaspa, Morgan, Excell,	-		PBA Oura, Parafield		
MR-MS	-	-	-	-	Yarrum	-	-
MS (Mod. Susceptible)	PBA Oura, PBA Percy, PBA Gunyah, PBA Twilight, Kaspa , Parafield, Sturt Morgan, SW Celine, Yarrum, Excell, Bundi, Dunwa, Helena	Sturt	PBA Oura, Bundi	Bundi,	Morgan, Yarrum, Sturt, Dunwa, Helena	-	-
S (Susceptible)	Maki	PBA Percy, SW Celine, Maki, Parafield, Yarrum, Dunwa, Helena	PBA Percy, PBA Gunyah, PBA Twilight, Kaspa Parafield, SW Celine, Yarrum, Morgan, Sturt, Excell,	PBA Oura, PBA Percy, PBA Gunyah, PBA Twilight, Kaspa, Parafield, Morgan, Sturt, SW Celine, Dunwa, Excell, Helena,	PBA Gunyah, PBA Twilight, Kaspa, Bundi, SW Celine, Maki, Excell	PBA Gunyah, PBA Twilight, Kaspa, Parafield, Morgan, Sturt, Dunwa, Excell, Helena.	PBA Gunyah, PBA Twilight, Kaspa, Morgan, Parafield, Sturt. Dunwa, Excell, Helena.

[A] Pea variety disease reaction as supplied by Pulse Breeding Australia (PBA) 2012 except Septoria supplied by SARDI.
[B] ALL varieties are susceptible to bacterial blight *pv pisi* (race 6), which is specific to field pea; *pv syringae* has many hosts.

production losses under high disease pressure, irrespective of their disease rating.

Only Yarrum and Maki are resistant to Pea Seed-borne Mosaic virus. All other varieties are susceptible, so test seed to ensure freedom from PSbMV. Maki is also resistant to bean leaf roll virus (BLRV) which is not seed-borne.

5. Seed

Select seed of the highest possible purity, germination and pathogen free status. Seed retained should be from the 'cleanest' paddock or section of it. Select the seed source area before harvest, and harvest it before any other peas to prevent contamination from other diseased pea crops.

Do not introduce a new disease on seed. Seed testing services are available in most states.

- Avoid using seed with greater than 5% blackspot infection, preferably use seed with nil infection. Infected seed will often fail to emerge. Seed infected with blackspot can act as a source of disease for new districts, but does not necessarily increase the disease risk in areas with a history of pea production.
- Do not sow seed with bacterial blight infection (seed test is available).
- Botrytis grey mould can occur on seed, but is not the source of inoculum for most outbreaks.
- Downy mildew can also occur on seed, but does not transmit through to seedlings.
- Test to ensure that seed sown is free of Pea Seed Borne Mosaic Virus (PSbMV) infection.
- If seed is more than one year old, frosted, weather damaged or diseased, its germination and vigour may have deteriorated. This may increase its susceptibility to disease attack.
- Re-test seed for germination percentage before sowing if retained in silos for more than one year.

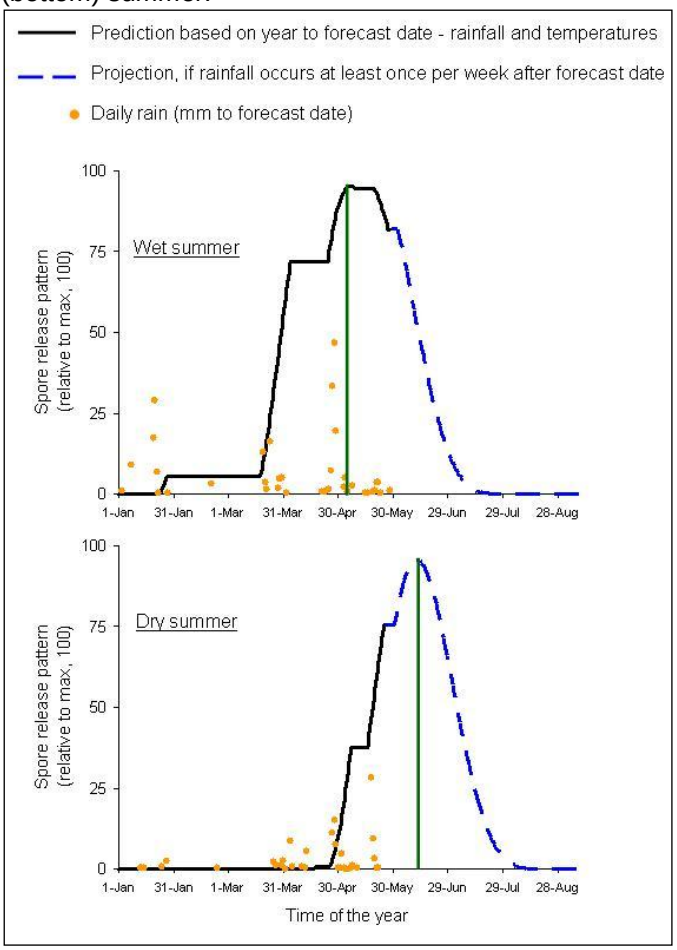
6. Seed dressing

No pea variety is resistant to seed infection by blackspot. Use of a fungicide seed dressing is dependent on region and the disease risk (see table 2 and the fungicide section). They are not widely recommended in WA and NSW as yield increases, if any, are not economic. Seed dressings may have a deleterious effect upon rhizobia, particularly under acid soil conditions, so their contact time must be minimised. Read the inoculum label for compatabilities. It is wise to apply seed dressing first, then apply inoculum immediately before sowing.

7. Sowing date

Sow within the optimum time for the region (see Table 2). The 'blackspot manager' computer model can assist in the time of sowing decision in WA, SA and Vic (Figure 2). See:
http://www.agric.wa.gov.au/PC_92989.html

Figure 2. Graphs from 'Blackspot manager' showing timing of spore release after either a wet (top) or dry (bottom) summer.



Sowing Management:
Ideal sowing dates vary with locations and disease risk (Table 2, Figure 1). Reference to early, ideal or late sowing is therefore a relative statement for the situation Delayed sowing is the most important strategy for blackspot management available, particularly in situations of high disease risk. This minimises exposure of young pea seedlings to 'showers' of blackspot spores which are predominantly released from pea stubble early after summer rains or the break. Figure 1 illustrates how timing of spore showers is influenced by rainfall. Delayed sowing may not help if self-sown peas are nearby.

Early sowing (eg within 2 weeks of opening season rains) increases exposure of pea seedlings to a greater number of blackspot spores in the earlier growth stage, and then over a longer period.

Early sowing should be avoided in high-risk situations, particularly in areas with a high intensity of pea stubbles and where sowing would be soon after the opening rain. Early sowing results in more vegetative growth and increased lodging, which will increase the risk of disease infection.

If the opening rain is the first rain to release blackspot spores from stubble, delay sowing so that emergence is 4 weeks after the first rain. Use "Blackspot Manager" to determine the risk of blackspot associated with particular sowing dates.

Earlier sowing may be possible in some seasons or cooler districts where significant rains have fallen prior to the chosen seeding date (use the 'Blackspot manager' model). In warmer areas like the central, eastern and northern wheat-belt of WA, summer rains may not give the spore release seen in the cooler southern areas of WA and the eastern states.

Later sowings can result in lower yields due to increased risk of a dry finish, of high temperatures at flowering-pod fill, and increased harvest difficulties due to very short crops, particularly in low rainfall or short season districts. In these areas earlier sowing is preferable if other disease risks are low.

The new earlier flowering varieties (PBA Gunyah, PBA Twilight, PBA Oura and PBA Percy) provide growers with increased flexibility to either sow earlier using current disease management strategies or to sow later if the predicted disease risk is high. Hence they can help to reduce yield loss risks from black spot.

In a disease prone area or higher risk situation, sow at the later end of the recommended optimum for the district.

8. Sowing rate

Higher seeding rates lead to greater canopy vigour, increased lodging and higher humidity, and under ideal growing conditions can increase disease risk. Avoid double sowing headlands, as the denser crop can be more prone to disease and lodging.

Seeding rates below the minimum recommended plant populations will reduce potential yield and increase harvest losses.

See local regional production guidelines for seeding rate recommendations.

9. Row spacing

Wider row spacing does not reduce disease incidence in peas.

10. Virus incidence and control

Many field pea crops surveyed in Australia had pea seed-borne mosaic virus (PSbMV) present, which is a seed transmitted virus that can occasionally express as a major problem. Other viruses like bean leaf roll virus (BLRV) and beet western yellows virus (BWYV) have also been detected, but are not seed transmitted. In unique cases where field pea crops have experienced heavy losses from viral infection, it has been in association with prolonged, high levels of aphids that arrived early.

Table 2: Generalised sowing dates[A] for black spot management in southern Australia (*see 'blackspot manager' computer outputs for more detailed sowing date information for specific locations in each new season*).

Region (annual rainfall)	Month	May				June				July			
	Week	1	2	3	4	1	2	3	4	1	2	3	4
Less than 350 mm – northern agricultural region WA													
Less than 350 mm – central and southern agricultural areas WA													
Greater than 350 mm – WA													
Less than 400 mm – SA/Vic[B]													
400-450 mm – SA/Vic													
450-500 mm – SA/Vic													
500–600 mm[C] – SA/Vic													
Less than 450 mm – southern NSW													
450-500 mm – southern NSW													
500–600 mm* - southern NSW													

Key: Marginal rainfall or low disease risk areas; Preferred sowing window; For high disease risk areas. NB:Heat & drought stress risk

[A] Sowing date may need be later in the sowing window with earlier maturing varietie sin some areas. [B]sow within 3 weeks of the opening rains
[C]preferred sowing time for spring-sown peas in south-eastern Australia is August-September

The most important factors that predispose pulse crops to severe virus infection are:

- Infected seed or close proximity to a substantial virus reservoir (eg lucerne, summer weeds).
- High summer-autumn rainfall and the subsequent uncontrolled multiplication of aphids on host plants. Early aphid flights to newly emerged crops cause early infection and economic loss as infected plants act as a reservoir for further spread of infection within the crop.

Virus control

Virus risks can be managed by combining a number of different control measures:

- Suppress the virus source within the crop. Sow seed with less than 0.1% seed infection.
- Control volunteer weeds during summer and autumn in and where peas are to be sown.
- Use Gaucho 350SD (imidacloprid) seed treatment for early aphid protection. It potentially could reduce virus spread and aphid numbers.
- Ensure field pea plants are less attractive to aphids by minimising seedling disease, herbicide damage or poor nutrition.
- Decrease aphid landing rates through having stubble cover and/or a dense early canopy.
- Note that high seeding rates and narrow row spacing to provide early canopy closure assists in aphid control, but conflicts with other fungal disease management.

Growers should only consider applying insecticide for virus control if they consider their peas to be at high risk. See virus and aphid management guides for pulses, eg at www.pulseaus.com.au. Insecticides aimed at controlling damage from aphid feeding are normally applied too late to control virus spread and damage.

11. Disease monitoring and control periods

Disease has least impact when a fully integrated disease management program is initiated before seeding and maintained through the growing season. A crop is considered to be at high risk if susceptible varieties are grown, crop rotation is tight, sowing is adjacent to pea stubble, sowing is early or where all integrated management strategies cannot be followed. Potentially critical periods for disease development in peas are in the early vegetative stages, flowering and during seed fill. Fungicide spraying for control is not necessarily economic. Monitoring should start at 6-8 weeks after emergence if foliar fungicide is a possible option. In WA and many eastern state locations, post-seeding management does not include foliar fungicides.

12. Disease Pressure

High risk blackspot situations are when infected seed is sown, there is a close field pea rotation, pea stubble is nearby, sowing is too early and cold wet conditions prevail. Use Predicta^{TM}B soil testing and 'Blackspot manager' to assist in determining the initial risk where relevant.

High risk downy mildew situations are when there is a close field pea rotation, sowing is late, and cold wet conditions prevail.

Powdery mildew is most severe in seasons when rainfall occurs in late spring and warm, humid conditions prevail.

Fungicides for blackspot

Fungicide application for blackspot control has generally proven to be uneconomic for field pea that yield less than 2 t/ha. Some control of blackspot and septoria in field pea can be obtained with foliar applied fungicides, but fortnightly applications are required from the early seedling stage through till the mid pod-filling stage (approximately 8 sprays) for complete control and this is uneconomic.

13. Fungicides

Table 3a: Pea seed treatment fungicides and the diseases controlled.

	1.P-Pickel T® 2.Fairgro® 3.Reaper® TT	**1.ApronXL®**	**1. Mantle 2.Mantle flowable 3.Rampart®**
Company	1.CropCare 2.Farmoz 3.Ospray	1.Syngenta	1,2.Chemtura 3.United Phos.
Active ingredient (and fungicide group)	Thiram 360 g/L + TBZ 200 g/L **(M3** & 1)	Metalaxyl-M 350 g/L **(4)**	Metalaxyl 1,3. 350 g/kg 2. 322g/L **(4)**
Rate (per 100kg seed)	200 ml	75 ml	1,2,3. 150 g
Av. cost to treat 100kg seed ($)[1]	8.50-10	18.40-21.50	21-30
Ascochyta blight	√	-	-
Downy mildew		√	√
Seedling root rot	√	√	√

® = registered trademark. **NAP** = not all products registered for this disease, **S** = suppression, 1 =prices are GST inclusive and based on retail price at end of 2010

In some situations, applying fewer fungicides for blackspot control at more strategic timings (9 nodes and again at early flowering prior to significant rain fronts) in combination with a seed dressing (eg P-Pickel T®) can lead to economic disease control in high yielding pea crops. Other disease management strategies like delayed sowing must still occur.

Fungicides for downy mildew

Seed treatment of metalaxyl (Apron®, Rampart®, Axiom®, Mantle®) is highly effective on downy mildew, and is the first priority control option to choose where the risk is high. It does not control blackspot. A foliar application of chlorothalonil may be effective in suppressing the downy mildew in a salvage operation if detected in the seedling stage, but this is less effective than a seed dressing because the damage has been done earlier. The foliar fungicides of phosphorous acid or metalaxyl are not registered in peas.

Fungicides for powdery mildew

Seed treatment is not effective against powdery mildew. A foliar application of tebuconazole (eg Folicur®, various Tebuconazole's) can be effective in suppressing powdery mildew if applied as soon as it is first detected. Triadimefon products (eg Accord®, Triad®, various Triadimefon's) can be effective in suppressing the powdery mildew, but a repeat application may be needed. Carbendazim and Sulphur products are not registered in peas.

Bactericide for bacterial blight

Seed treatment is not effective against bacterial blight. A foliar application of a copper product occasionally provides temporary suppression of bacterial blight, but results are variable. In addition regular weekly sprays would be required for control, and this would be uneconomic.

Fungicide Application Guide: SA and Vic .

Consider the potential crop yields, rainfall zone and disease risk when deciding on fungicide use in SA and Victoria.

If the crop is at high risk of blackspot (ie adjacent pea stubbles, medium-high soil test, early sown, close rotations), treat seed with thiabendazole plus thiram (eg P-Pickel-T®) for blackspot protection, irrespective of variety.

If yield potential is greater than 2t/ha then apply a foliar fungicide spray (mancozeb) at 9 nodes prior to a significant rain front. If blackspot disease is present then follow up again at early flowering, again prior to a significant rain front. Fungicide can be applied when disease lesions are expanding on lower leaves before canopy closure, but can be earlier if the disease appears early.

In paddocks with a history of downy mildew, consider treating seed with metalaxyl unless a downy mildew resistant variety is being sown. There are now two strains of downy mildew and varieties resistant to the 'Parafield strain' (eg PBA Gunyah, PBA Twilight, Kaspa or Morgan) are susceptible to the 'Kaspa strain'. Seed treatment may be necessary unless the risk is low due to the absence of downy mildew in the paddock history. Note that downy mildew spores may last for up to ten years in the soil and seed treatment is the only fully effective control.

Only consider applying a foliar fungicide for downy mildew suppression if the disease is likely and metalaxyl seed treatment has not been used. Waiting until the disease is present is too late.

With powdery mildew, if not growing a resistant variety (eg Yarrum, Maki), then at least one foliar fungicide for its control may be necessary in areas historically prone to the disease. Apply a fungicide before or as soon as powdery mildew is detected, usually from flowering on until 4 weeks before maturity. Timing is critical, as control can be ineffective if applied once the disease has taken hold.

Fungicide Application Guide: WA

Fungicide seed dressings are not recommended in WA as there is no evidence that adequate yield increases result. Foliar fungicide use in WA has proven uneconomic.

Table 3b: Pea foliar fungicides and the diseases controlled.

Fungicide active ingredient		Rate applied	Downy mildew	Ascochyta (black spot)	Powdery mildew	Harvest whp
Mancozeb	750-800 g/kg or 420-430 g/L	1.0-2.2kg/ha 3.0L/ha	–	√	–	28 days
Chlorothalonil	500g/L, 720 g/L or 900g/kg	1.1-2.3L/ha	**RRS#**	**RRS#**	–	14 days
Copper	375-500g/kg or 93 -190g/L	1.55-2.5 kg/ha 2.5-3.0 L/ha	–	**RRS RRV**	–	1 day
Triadimefon	125g/L	500ml/ha	–	-	**RRS#**	14 days
Tebuconazole	500g/L	145ml/ha	–	-	√	3 days

RRS = Restricted registration (some products not necessarily registered in some states). **RRV** = Restricted registration, Processing peas (not registered in all states).

Fungicide Application Guide: NSW

In areas of southern NSW where acidic soils predominate and seed is routinely inoculated with rhizobia, seed treatment is generally not recommended because of variable results.

If the peas are at high risk of blackspot (ie adjacent pea stubbles, early sown, rotations), consider selecting another paddock, sowing later and treating seed with thiabendazole plus thiram (eg P-Pickel-T®) for blackspot protection, irrespective of variety. Care must be taken to minimise contact between seed dressing and rhizobia.

Downy mildew is rarely a problem in southern NSW, and seed treatment is not generally recommended. If there is a history of downy mildew in the paddock, consider seed treatment with metalaxyl unless a downy mildew resistant variety is being sown.

If not growing Yarrum or Maki, then a foliar fungicide for powdery mildew control may be beneficial in historically prone areas, should the disease be detected at flowering or up to 4 weeks before maturity.

14. Early harvest

Harvest at maturity to minimise blackspot infection on seed. The disease is usually more severe when crops are harvested late. Harvest losses, seed splitting and downgrading in quality can be substantial if pea harvest is delayed until moisture content is below 12%.

Pea crop desiccation assists in early harvest, as does the higher moisture contents now allowable on delivery (14%).

Early harvest will give the best chance of achieving the number 1 grade pea receival standard, in which there is a maximum of 1% poor colour (due to disease, water staining, frost).

Pea stubble may not be broken up as readily by the harvester if reapt at high grain moisture content. Chopping the stubble at harvest or as a post harvest operation may be required to break up the stubble or anchoring it to the soil may be required to prevent erosion.

Acknowledgements

Ian Pritchard, Dept.Agric. and Food WA.
Peter Matthews, formerly I & I NSW.
Di Carpenter, formerly Agric.NSW (past inputs).
Trevor Bretag, formerly DPI Vic (past inputs).
Tony Leonforte, DPI Vic ,
Kurt Lindbeck, Primary Industries NSW.
Moin Salam, Dept.Agric. and Food WA.
SA Grains Industry Trust funded project S0507R with additional funding from GRDC.

References

- "Southern Region Winter Crop Summary" (2012). DPI Victoria.
- "Pea Variety Sowing Guide 2012". Fact Sheet by Michael Lines et al, SARDI.
- "Pulse varieties. Southern & Central NSW" (2012). NSW Pulse Point 15 by Eric Armstrong and Peter Matthews.
- "Producing Pulses in the Northern Agricultural region" (2005). Editors Peter. White *et al* Department of Agriculture and Food WA.
- "Producing Pulses in the Southern Agricultural region" (2005). Editors Peter White *et al* Department of Agriculture and Food WA.
- Grain Legume Handbook (2008). Edited by Grain Legume Handbook Committee.
- Field Peas for SA and Vic (2007). Fact Sheet by Wayne Hawthorne *et al*, Pulse Australia.
- Strategies to minimise bacterial blight in field peas, a growers guide to an integrated approach. (2002) NSW Pulse Point 13 by Eric Armstrong, Trevor Bretag, Kathy Ophel-Keller, Kris Panagiotopoulos.
- Powdery mildew in field peas. Management in southern NSW NSW Pulse Point 14 (2002) by Peter Matthews and Alex Nikandrow

Major projects funded by

GRDC Grains Research & Development Corporation

Pulse Australia gratefully acknowledges the valuable financial support from our industry members.

These are listed on our website under the index heading "Members".