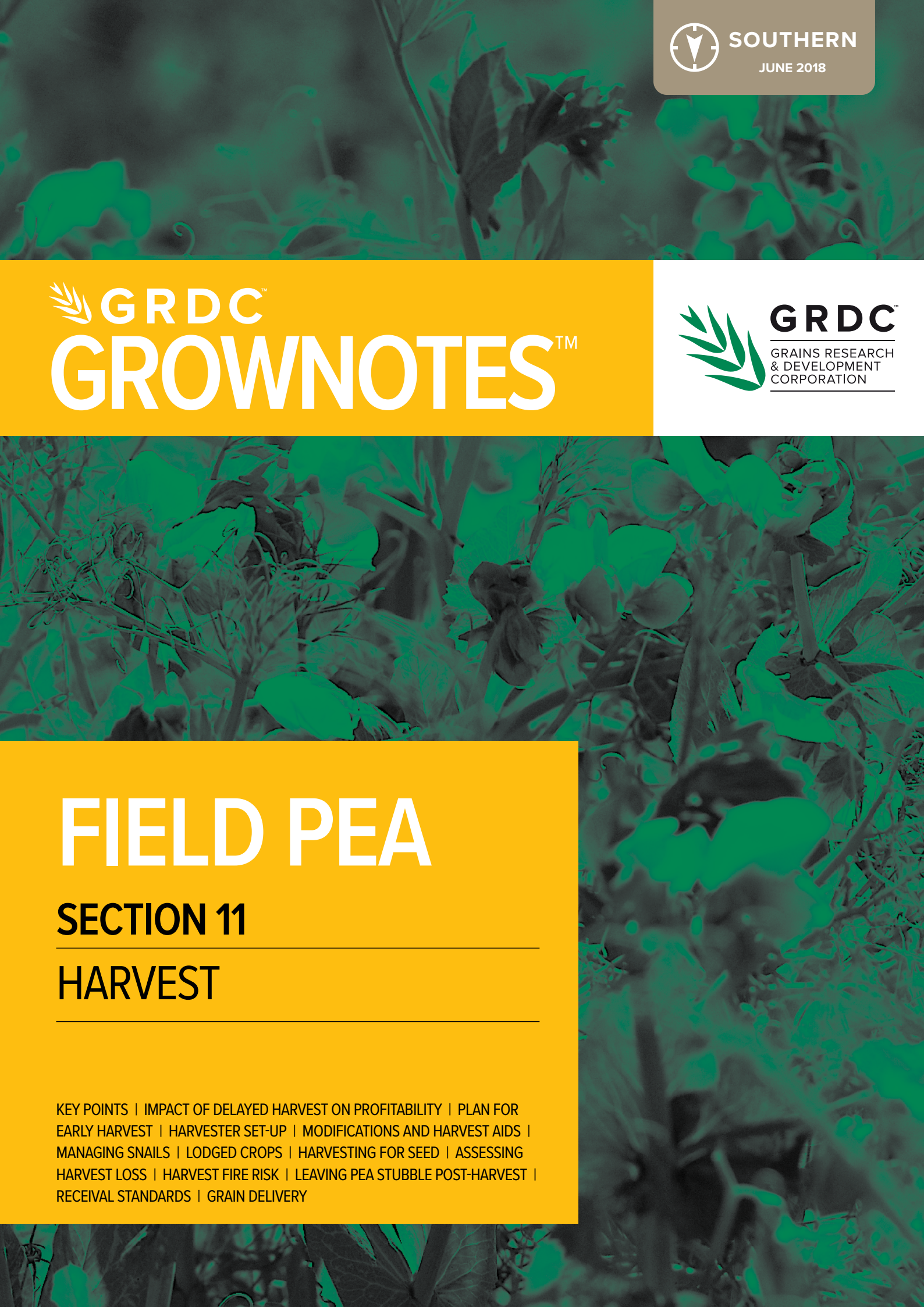

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FIELD PEA

SECTION 11

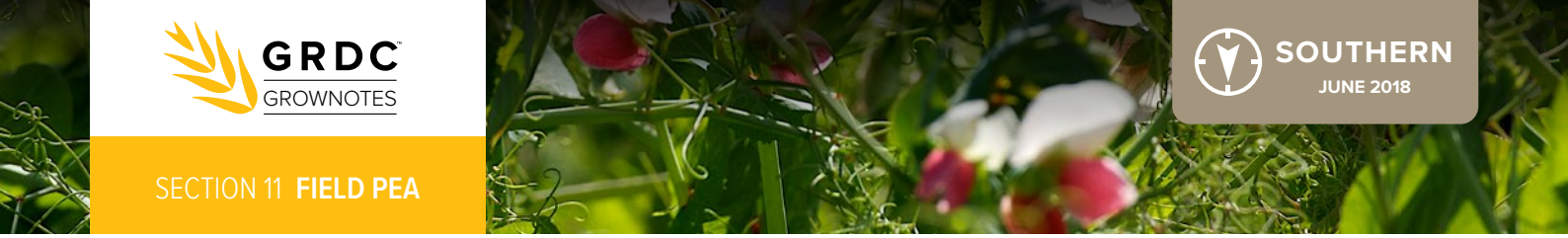
HARVEST

KEY POINTS | IMPACT OF DELAYED HARVEST ON PROFITABILITY | PLAN FOR EARLY HARVEST | HARVESTER SET-UP | MODIFICATIONS AND HARVEST AIDS | MANAGING SNAILS | LODGED CROPS | HARVESTING FOR SEED | ASSESSING HARVEST LOSS | HARVEST FIRE RISK | LEAVING PEA STUBBLE POST-HARVEST | RECEIVAL STANDARDS | GRAIN DELIVERY

Harvest

Key points

- Harvest early to minimise yield loss and also to avoid physical and weathering damage, which impacts on grain quality. Early harvest planning starts with sowing on time, pre-harvest treatments and being organised at harvest.
- Harvest at moisture levels up to 12–14% to avoid damage to grain.
- There are several modifications and harvest aids to assist harvesting of field pea. Modifications differ for conventional and semi-leafless varieties.
- Snails can be a problem for harvest of field pea in SA and Victoria. An integrated approach is required throughout the season with some post-harvest grain cleaning as a salvage option.
- Harvesting field pea can be hazardous for starting paddock and harvester fires.
- Spread pea stubble at harvest to minimise erosion risks



FEEDBACK

MORE INFORMATION

GroundCover™ article: 'Profitable pulses – it's all about the harvest window', https://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-118-Sep-Oct-2015/Profitable-pulses-its-all-about-the-harvest-window

11.1 Impact of delayed harvest on profitability

The key to maximising profit from pulses is grain quality. Human food markets demand a quality sample without cracking, staining, de-hulled seeds or insect damage. Visual appearance is everything. Buyers do not want immature grains (shrivelled or green kernel), bleached (if green peas), chipped, cracked or de-hulled seeds.[1]

Therefore, early harvest of field pea is critical. Delays can result in significant yield loss and quality downgrading due to lodging, shattering, pod loss and diseases. Harvesting pea early improves both quality and harvest efficiency.

If managed correctly, pulses can be more profitable than cereals. Sow and harvest on time to maximise returns.

Some reason why growers may delay harvest of pulses include:

- When there is a clash with cereal harvest, field pea is often considered a 'secondary' crop compared with cereals.
- Perceived better chance of achieving premiums for high quality wheat or malting barley. In reality the premiums for harvesting pulses at the optimum time are often greater.
- The false perception that field pea tolerates weathering.
- Uneven ripening if not desiccated or windrowed, especially when grown on heavy clay or variable soil types.[2]
- Field pea can be slower or more difficult to harvest and there is a higher risk of harvester fires. Harvesting needs extra care, more frequent stopping to blow down residues from around hot spots on the header.

Despite these beliefs, delaying field pea harvest is not recommended. The impact of delays include:

- Greater harvesting difficulties due to:
  - » increased lodging;
  - » slower harvesting;
  - » growth of late weeds; and
  - » more dirt picked up by the header.
- Increased wear and tear on headers due to increased soil contamination.
- Harvest clashes with other crops is more likely.
- Yield is reduced due to pod shattering, seed drop and seed shrinkage.
- Seed quality is reduced due to:
  - » weather damage leading to seed blemishes and increased seed cracking and splitting, especially when handling is excessive;
  - » seed coat discolouration due to prolonged light exposure;
  - » bleaching in blue seed types;
  - » increased field mould infection;
  - » reduced seed viability; and
  - » more soil contamination of seed.
- Greater dust and health problems associated with post-harvest handling.
- Pea weevil escape into the paddock before silo fumigation.
- Greater risk of hail damage.
- More disease carryover on seed kept for sowing.[3]

1 GRDC (2009) Field Peas: The Ute Guide, Southern region. GRDC, https://grdc.com.au/resources-and-publications/all-publications/publications/2009/04/field-peas-the-ute-guide

2 T Weaver (2015) Profitable pulses – it's all about the harvest window. GRDC GroundCover™, Issue 118, September–October 2015 https://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-118-Sep-Oct-2015/Profitable-pulses-its-all-about-the-harvest-window

3 E Armstrong, D Carpenter (1999) Desiccation & harvest of field peas. Pulse Point 5, Second Edition, NSW Agriculture, http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/157099/pulse-point-05.pdf

FEEDBACK

11.1.1 Yield losses

Yield losses increase significantly the longer harvest is delayed.

Some field pea varieties are very prone to pod splitting and pod drop with harvest delays, especially after weather events once the plant has dried down. Weathering of the grain can also occur in split pods. Kaspa-type varieties have a sugar pod, so do not shatter readily. However, the pod wall does deteriorate over time, leaving the grain more exposed to sun damage (Photo 1).

Photo 1: *Kaspa(1) field pea grain that has been sun and heat burnt through the sugar-pod wall. Normal (top) and different severities of burn (below).*

Photo: W. Hawthorne, formerly Pulse Australia

It is estimated that grain losses due to a 1–3-week delay in harvest range from $150–$250/ha, depending on seasonal conditions. Most of the losses are due to pod loss and shattering before harvest, as well as pod loss at the header front.

Yield losses of up to 50% have been recorded in the field after rains or strong winds.

11.1.2 Deterioration in grain quality

Grain quality deteriorates the longer the mature field pea is left exposed to weathering in the field.

The seed coat of field pea is very prone to wrinkling if it has been exposed to wetting and drying events due to rain or heavy dew during the summer harvest months. Expansion of the seed as it absorbs moisture, and then contraction as it dries, weakens the seed coat. This renders it much more susceptible to mechanical damage during harvest and handling operations.

Levels of cracked and damaged grain can be as high as 50% in extreme cases of field weathering and prolonged rainfall.

Field pea that do not meet the Number 1 Receival Standard of 3% maximum defective peas will need to be graded. This incurs a cost to the grower of:

- $15–$25/t grading costs; and
- downgrading of the seconds into the stockfeed market at a value of $120–$140/t.

FEEDBACK

MORE INFORMATION

For the current Australian Pulse Standards for field pea go to: http://www.pulseaus.com.au/marketing/receival-trading-standards

Early harvested field pea seed is much more resilient against breakage during harvesting and subsequent handling, even at low moisture contents.

Most field pea are ultimately processed into a protein form, either a dahl or flour, by removing the seed coat (hull) and splitting the cotyledons. However, the visual appearance is still critical for marketing. Older seed, darkened with age splits more readily than new season grain. The milling process uses abrasive-type mills to gradually abrade the seed coat from the cotyledons, and is reliant on the seed coat being firmly attached to the cotyledons.

Cracking and weakening of the seed coat prior to processing substantially reduces the recovery percentage of splits, as well as reducing the quality of the final product.

Field-weathered field pea after rain are also more difficult to thresh out at harvest, and often contain much higher levels of unthreshed pods and pod material.[4]

11.1.3 Missed marketing opportunities

An early harvest provides some degree of control over field pea grain quality, as well as how and when the crop is marketed. Late-harvested field pea can often result in a grower becoming a price-taker in a falling market or encountering delays in delivery.

Delayed harvest can often mean missing out on premiums paid for early harvested crops of good quality. This is often the case, except for seasons where major production problems have been encountered resulting in a shortfall of grain in the market.

4 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

FEEDBACK

11.2 Plan for early harvest

There are a range of management components that contribute to an early matured crop. It requires careful planning from the beginning of the season. There are three broad areas that contribute to a successful early harvest: sowing, in-crop management and harvest management.

Sowing

- Sow at the earliest opportunity but within the preferred planting window for your area. This may involve dry sowing by a particular calendar date.
- Moisture-seeking equipment and/or press-wheels can significantly enhance seeding opportunities under marginal soil moisture conditions.
- Use adapted varieties that meet your target for early harvesting.
- Using precision planters or machines with automatic depth control will often achieve more uniform plant establishment and crop development, and consequently more even crop maturity. This is particularly so when sowing into marginal soil moisture and drying conditions.

Photo 2: *Field pea sown early (left) mature before those sown later (right).*

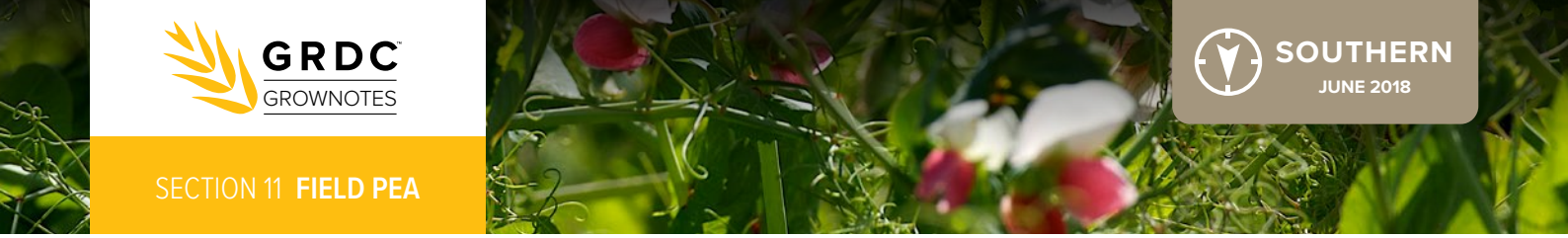
Photo: W. Hawthorne, formerly Pulse Australia

In-crop management

- Control of diseases, if possible, before and during flowering.
- Control of native budworm during flowering to maximise early pod-set.
- Avoid using herbicides that delay crop maturity such as flumetsulam (e.g. Broadstrike®).

Harvest management

- Consider weed wiping (where able to) to kill tall, late weeds (in a short crop) that might otherwise delay harvest
- Consider using a desiccant (crop-topping or desiccation) to dry late plants and any weeds.
- Windrowing is an option to enable earlier maturity and harvest date
- If using glyphosate (or equivalent registered product) to terminate crop growth at the 80–90% black-brown pod stage, be aware of potential impacts on seed quality.



FEEDBACK

- Set up the header to operate efficiently at 14–15% grain moisture content.
- Blend, aerate and/or dry the sample to the required receival standard of 14% moisture.[5]
- More frequent blow-down of harvesters is needed to avoid fire risk. Fine residues accumulating around the engine bay and exhaust can cause increased risk of fires.

For more information on desiccation, crop-topping and windrowing see Section 10 Pre-harvest treatments.

11.3 Harvester set-up

Field pea is easily threshed, so concave clearances should be opened and the drum speed reduced.

Field pea is prone to cracking, so gentle harvesting will give the best seed quality. Rotary harvesters are gentler on the crop and will generally cause less grain damage than conventional harvesters.

Field pea can be harvested with minor adjustments and modifications. Flexi-fronts are best because they can harvest close to the ground and flex with ground contours. Open-front or pick-up fronts are also suitable.

Field pea, like all pulse crops, should be harvested as soon as it matures as pods will fall if harvest is delayed, especially after rain.

A field pea crop varies in height from 30 to 110 cm, with pods held up in the canopy so direct heading without crop lifters is possible with open front machines. Field peas thresh easily but are prone to cracking, so adjust thresher speed (400–600 rpm) and concave (10–30 mm) to suit (Table 1).

Be aware of thresher impact speeds that vary with the drum diameter and adjust drum speed to suit 12 m/second impact speed required.

Harvesting grain at high moisture levels up to 14% should help minimise cracking.

Desiccating the crop will kill summer weeds and ensure even crop ripening. Desiccate or harvest early before green weeds become a problem. This will help to reduce clogging, staining and sample contamination with green vegetative material.

If there are summer weeds present, the drum speed may need to be increased to ensure that weeds do not block the machine. Alternate wires and blanking-off plates may have to be removed. Maximum wind settings and barley sieve settings should ensure a good sample. If there are summer weeds, the rake at the back of the sieves should be blanked-off to stop them entering the returns. Summer weeds may cause walkers and sieves to block completely, causing high grain losses.[6]

5 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

6 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

FEEDBACK

Table 1: Harvester settings for pulses.

	Chickpea	Faba bean	Green lentil	Red lentil	Lupin	Field pea	Vetch
Reel speed	medium	slow	slow	slow	slow	medium	slow
Spiral clearance	high	high	low	low	high	standard	low
Thresher speed	400–600	400–600	350–450	350–450	400–600	400–600	400–600
Concave clearance	10–30 mm	15–35 mm	20–30 mm	10–20 mm	10–30 mm	10–30 mm	10–30 mm
Fan speed	high	high	high	high	high	high	medium
Top sieve	32	32–38 mm	32 mm	16 mm	32 mm	25 mm	25 mm
Bottom sieve	16 mm	16–19 mm	8–16 mm	3–10 mm	16 mm	16 mm	10–16 mm
Rotor speed*	700–900	700–900	350–450	350–450	700–900	700–900	slow

* Rotary machines only.
Source: Grain Legume Handbook (2008) Grain Legume Handbook for the Pulse Industry. Grain Legume Hand Book Committee, https://grdc.com.au/grainlegumehandbook

VIDEO

Watch video:
Harvest 2010 Kaspa(b) pea
https://youtu.be/b8QDjg5FkBM

Photo 3: *Harvesting field pea.*

Photo: T. Bray, formerly Pulse Australia

MORE INFORMATION

Modify harvesters for semi-leafless field pea crops, https://www.agric.wa.gov.au/field-peas/modifying-harvesters-semi-leafless-field-peas-crops

GRDC App Field Peas: The Ute Guide for android and iOS found at App Store

11.4 Modifications and harvest aids

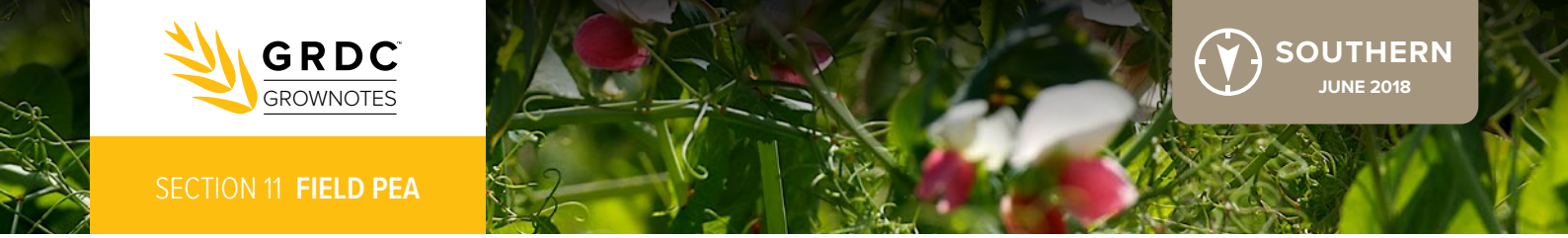
Modifications to harvesters can be made that improve the ease and efficiency of harvesting field pea. Modifications to machinery may void warranty or insurance; please check before proceeding.[7]

Harvester modifications need to be carefully assessed as the benefits may not justify the costs.

Some modifications that may be useful for pulse harvest include:

- Flexible cutter-bar fronts (flexi-fronts) are hinged in short sections allowing harvest close to the ground.
- Aussie-air directs a blast of air through the reel fingers for both light and heavy crops.
- Harvestaire replaces the reel with a manifold to direct a blast of air into the front and is more effective in light crops.

7 I Pritchard, M Seymour (2015) Modifying harvesters for semi-leafless field pea. Department of Agriculture, Western Australia, https://www.agric.wa.gov.au/field-peas/modifying-harvesters-semi-leafless-field-peas-crops



FEEDBACK

- Vibra-mat vibrates with the knife to prevent bunching on open front headers. It is cheap and most effective for light crops, but speed needs to be carefully managed.
- Crop lifters are a knife attachment designed to lift lodged crops. Height control is important as they can bring in more sticks and soil.
- Extension fingers are plastic fingers approximately 30 cm long that are fitted over existing fingers to prevent pods from falling in front of the knife.
- Extended fronts extend the distance between the knife and the auger to a maximum of 760 mm to minimise losses from bunching at the auger.
- Platform sweeps are used with extended fronts and are fingers that rake material towards the auger to minimise bunching. They can be used with conventional fronts.
- Draper fronts (e.g. MacDon and Honey Bee) have large clearances behind the knife and carry the crop to the elevator.[8]
- Fire Knock Out will drench the engine bay in fire retardant using a self-actuating switch.
- Fire Prevention Shield reduces the temperature of the components in the engine bay by drawing air from the cooling fan through a heat exchanger, charging it to higher pressure to clean residues from around the muffler. This effectively reduces residues and temperature to lower the risk of fire.

11.4.1 Modifications for conventional and semi-leafless peas

The harvesting of semi-leafless, erect peas may need header adjustments to be made compared with conventional pea types (Table 2).

Table 2: Suggested harvest settings or modifications for conventional and semi-leafless peas.

Factor	Trailing varieties (e.g. Parafield)	Semi-leafless (e.g. Kaspa(Φ))
Harvest timing	Cool conditions	Warm conditions
Crop lifters	Essential	Not needed in an upright crop
Finger tyne adjustment	Tilt back slightly – assists lifting	Set in vertical position to force material down and into draper fronts
Reel speed	1.1 times ground speed	1.0 – 1.3 times ground speed
Raised cross auger	Usually not required	Improves speed of harvest of pluckers
Raised cross auger with paddles on middle section	Usually not required	Essential for draper fronts
Lupin breakers	Usually not required	On cross auger for draper fronts and table auger for conventional fronts. Essential for table auger of plucker fronts if raised cross auger not fitted
Position of broad elevator feeder house auger	Set back	Moving the feeder house auger forward may reduce blockages
Stripper plate	–	To stop material building up behind cross augers
Wire fence across back of fronts	Useful addition	Assists in light crops – raised cross auger + paddles more reliable
Concave	Easy to thresh 10–25mm	Ensure wire gaps at least 7 mm and not blocked
Straw chopper	Useful addition	Essential due to ropey vine

Source: GRDC (2009) Field Peas: The Ute Guide, Southern region. GRDC https://grdc.com.au/resources-and-publications/all-publications/publications/2009/04/field-peas-the-ute-guide

8 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

FEEDBACK

For taller, semi-leafless types like Kaspa$^{\Phi}$ or Moonlight, plucker and draper fronts will require modifications to create downward pressure onto the harvested pea material or to force it into the broad elevator. There are generally fewer problems with conventional and flex fronts. Also a slower harvesting speed will reduce intake problems. Newer semi-leafless varieties like PBA Wharton$^{\Phi}$ and PBA Twilight$^{\Phi}$ are not as tall as Kaspa$^{\Phi}$, but can still cause harvest issues of poor feeding into the front elevator.

For semi-leafless, non-shattering pea types, harvest under warmer conditions than conventional peas. The concave setting may need to be closer than normal and threshing time longer. A straw chopper may be essential to chop up the more ropey pea vine produced. It may be possible to remove the crop lifters if the crop is upright.

Set the finger tyne reel to force the pea material down onto the front. Moving the broad elevator auger forward can improve the feeding of light pea material. Fitting a raised cross auger, ideally with paddles on the middle section, is essential on draper fronts. A backing plate or cross wires at the back of the table may help all set-ups. Lupin breakers are a useful addition to cross or table augers to increase their aggressiveness on all set-ups, but particularly on plucker fronts. Flexible fingers above the plucker are a useful addition. Crop dividing coulters will assist all set-ups.[9]

Photo 4: *Light crop lifter used in field pea.*

Photo: G Reithmuller, DPIRD, Pulse Australia (2016). Southern/western field pea best management practices training course, module 8-2016. Pulse Australia Limited

Photo 5: *Plastic extension fitted to a draper front.*

Photo: Gordon Cumming, formerly Pulse Australia (2016). Southern/western field pea best management practices training course, module 8-2016. Pulse Australia Limited

Photo 6: *Harvestaire front combined with extension fingers and a blue Vibra-mate.*

Photo: G Cummings, formerly Pulse Australia (2016). Southern/western field pea best management practices training course, module 8-2016. Pulse Australia Limited

9 J Lamb, A Podder (2008) Grain Legume Handbook (u. Update 8 March 2008). Grain Legume Handbook Committee, GRDC https://grdc.com.au/grainlegumehandbook

FEEDBACK

MORE INFORMATION

GRDC Fact Sheet: Snail management
https://grdc.com.au/GRDC-FS-SnailManagement

GRDC Booklet: *Bash 'Em Burn 'Em Bai 'Em*
https://grdc.com.au/GRDC-Snails-BashBurnBait

11.5 Managing snails

Snails can build up more rapidly in field pea, faba bean and canola compared with other crops (Photo 7). They need to be managed throughout the season using integrated management (see Section 8.7 Snails).

Photo 7: *Snail damage to a near-mature pea pod.*

Photo: Mary Raynes, formerly Pulse Australia (2016). Southern/western field pea best management practices training course, module 8-2016. Pulse Australia Limited

A rule of thumb is that snail numbers above 5/m^2 in pulses will contaminate grain at harvest.[10]

Pulse grain receival standards for pea is no dead or alive snails for export and no more than one (whole or more than half) dead or alive snails per 200 g for 'farmer dressed'.

Snails can be a major problem at harvest. They can clog up and damage harvesting machinery causing delays while snail pulp is removed from sieves and other parts of the machinery. If allowed to dry crushed snail guts and dust can set like concrete.

Both white and conical snails can cause problems by climbing plants and entering headers with the grain.

There is no quick and easy way to control snails, but a combination of a number of strategies and modifications to harvesting equipment can help.

Before harvest:

- Baiting snails – complete all baiting by the end of August to avoid the risk of bait entering grain samples at harvest, particularly with peas.
- Harvest crops early – the later they are left, the more difficult they will be to harvest.
- Leave badly infected areas until cool or damp weather when snails are more likely to be down off the plants.

At harvest:

- Minimise the entry of dirt into the header by using a grate in the bottom of the front elevator.
- Use a smaller top sieve, or 10 mm punch hole or octagonal top sieve.
- Weld a lip onto the front of the top sieve to stop snails falling off.
- Add removable panels to the header to allow easy cleaning.
- Add a steel slat in the elevator to keep the elevator clean.
- Slow down the speed of the grain elevators.
- Harvest with the repeat door open, but monitor losses.[11]

10 GRDC (2012) Snail management Fact Sheet. GRDC, Southern and Western Regions, September 2012, https://grdc.com.au/GRDC-FS-SnailManagement

11 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

FEEDBACK

VIDEO

Burning Snails and Weed Seeds
https://youtu.be/zqQKFFqndKQ

Dislodger bars can remove snails but will result in some yield loss. Research has shown that a rigid bar fitted with dangling V-belts at 100 mm spacing can dislodge 60% of round snails in pulse crops with up to 5% in crop losses.[12]

After harvest:

- Burning stubbles in autumn is effective if a complete burn of the paddock is achieved.
- Control grass along fence lines where snails can remain undisturbed.
- Roll, slash, cable or trash harrow stubbles so snails cannot get above 5 cm off the ground. Beware of erosion.[13]

11.5.1 Post-harvest grain cleaning

Samples with high numbers of snails will require cleaning to enable delivery to national receival standards. These steps can remove high numbers of snails with very little grain loss:

- Scalping.
- Use a soft, snail-crushing roller on field pea of 14–15% moisture content and with a roller clearance of 1–2.5 mm.
- Screening with 5.15-mm-diameter round screen.

Gravity separation may be effective for grain coming out of storage as dead snails are lighter in weight.[14]

11.6 Lodged crops

Conventional, trailing pea varieties lodge before harvest. Semi-leafless types may also lodgge to some degree if tall enough or subjected to weather events of wind or rain. Where the crop has lodged, it is usually best to harvest into the opposite direction, or at right angles to the direction the crop has fallen. Crop lifters can definitely help.

If sown on wider rows, use crop lifters and harvest up and back in the rows. The crop usually feeds in better over the knife section, and also provides the header operator with a better view of any rocks or sticks in the paddock.[15]

11.7 Harvesting for seed

Field pea seed kept for seeding in the following season should be harvested from an area that is as free as possible from diseases, pests and weeds.

Germination rates are best maintained if the grain is harvested at 12–14% moisture and then stored in aerated silos or immediately graded and bagged. Crop-topping with herbicides prior to crop maturity may reduce grain quality and seed viability. Retaining seed from a crop that has had glyphosate applied is not recommended; likewise if crop-topping was too early.

Ensure headers, bins, augers and other equipment are free of cereal contamination as these contaminant grains are hard to remove during cleaning.

Sprouting of unharvested grain after rain downgrades quality and germination.[16]

12 GRDC (2012) Snail management Fact Sheet. GRDC, Southern and Western Regions, September 2012, https://grdc.com.au/GRDC-FS-SnailManagement

13 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

14 GRDC (2012) Snail management Fact Sheet. GRDC, Southern and Western Regions, September 2012, https://grdc.com.au/GRDC-FS-SnailManagement

15 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

16 GRDC (2009) Field Peas: The Ute Guide, Southern region. GRDC Ground Cover Direct https://grdc.com.au/resources-and-publications/all-publications/publications/2009/04/field-peas-the-ute-guide

FEEDBACK

11.8 Assessing harvest loss

Grain can be lost at a number of places during harvest and each loss needs to be assessed so that corrective action can be taken. Figure 3 shows the three places where grain can be lost:

- before harvest due to pod shedding;
- at the harvester front due to the type of harvester front or set-up; and
- in the threshing system of the harvester, due to drum, concave and sieve settings.

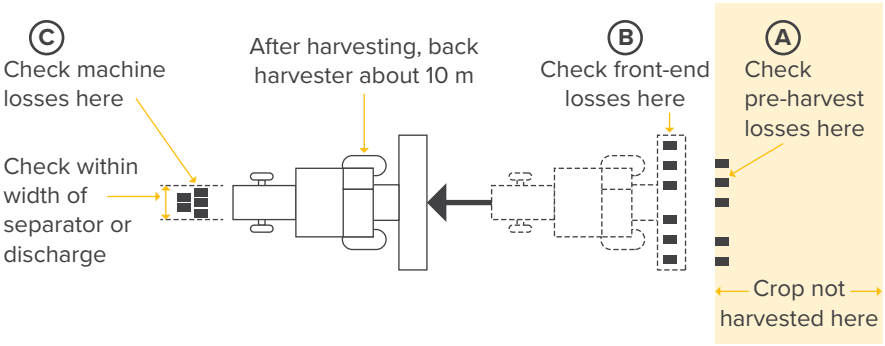


Figure 1: *Sampling places for estimating grain losses at harvest.*

Source: The Chickpea Book via Grain Legume Handbook (2008)

To determine grain losses, the following action should be undertaken:

1. Harvest a typical area without stopping the machine, then stop and allow the machine to clear itself of material.
2. Back the harvester about 10 m and shut down the machine.
3. Sample grain losses in each of the following three areas:
    a. Pre-harvest (that is, in the standing crop in front of the harvester 'A').
    b. Front (in the cut crop in front of the harvester 'B').
    c. Behind (in the cut crop behind the harvester, including trash, 'C').
4. Sampling is best done using a quadrat with an area of 0.1 m^2.
    a. Count the number of seeds on the ground within the 0.1 m^2 quadrat. Ideally take 10 quadrats for each of the three locations (A, B and C).
    b. Average the number of seeds per 0.1 m^2 quadrat for each area. Multiply by 10 to get the number of seeds per square metre.[17]

Grain losses on the ground can then be calculated using the 100 seed weight from the seeding rates in Section 4.3.1 Calculating seed rates (also see Section 3.3 Field pea varieties).

Example: A typical 100 seed weight of Kaspa$^{\phi}$ field pea is 22 g/100 seeds.

If the seed on the ground is 32 m^2

$$\text{Seed loss} = \frac{\text{No. of seed/m}^2 \times \text{100 seed weight}}{10}$$

$$= (32 \times 22)/10$$

$$= 70 \text{ kg/ha}$$

17 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

FEEDBACK

MORE INFORMATION

Ground Cover™ article: 'Careful harvester set-up puts more grain in the bin'
https://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-95-November-December-2011/Careful-harvester-setup-puts-more-grain-in-the-bin

VIDEO

Reducing the risk of harvester fires
https://youtu.be/WqTfR2ifM1I

MORE INFORMATION

Booklet: Reducing harvester fire risk: The Back Pocket Guide
https://grdc.com.au/GRDC-BPG-ReducingHarvesterFireRisk

Pulse Australia: Avoiding harvester fires
http://pulseaus.com.au/blog/post/avoiding-harvester-fires

Ground Cover™ article: A few steps to preventing header fires
https://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-101/A-few-steps-to-preventing-header-fires

Photo 8: *Field pea grain lost at harvest.*

Photo: W. Hawthorne, formerly Pulse Australia

11.9 Harvest fire risk

Harvesting pulse crops can be hazardous for starting paddock or header fires, perhaps more so than in some other crops. With hot, dry conditions in Australia's southern cropping region each summer, harvester fires are an extreme risk to life, crops and property. Farmers and contractors need to make sure that their harvesters are well maintained and cleaned to reduce fire risk, especially when harvesting lentil and chickpea, which have a higher fire risk than other crops. However, field pea, faba bean and lupin also have fine residues that powder easily and create a higher risk of ignition.

Flammable material can collect on the exhaust manifold and turbocharger in a harvester's engine bay, which is the most common cause of harvester fires. When these materials ignite, they can blow around the machine and into nearby crops, where they can cause spot fires.

Keeping your machines clean and well maintained is the best way to prevent harvester fires. Taking steps to prevent harvester fires should be a priority in all crops.

Harvester fires can be prevented by undertaking the following:

- Keep at least two fire extinguishers accessible on each of your harvesting machines.
- Perform regular blow-downs on the harvester. In extreme conditions this might be every half hour or every time after filling the harvester box.
- Keep equipment clean and well maintained.
- Ensure the manifold, turbocharger and exhaust free of flammable material.
- Do not overload electrical circuits.

Postpone paddock works during high fire-risk periods, which typically involve low humidity, high winds and vulnerable crop conditions.[18]

18 Pulse Australia (2016) Southern/western field pea best management practices training course, module 8-2016, Draft. Pulse Australia Limited

FEEDBACK

11.10 Leaving pea stubble post-harvest

Pea stubble can be a severe erosion risk, particularly if the crop was sown into bare cultivated soil. Header trails blow and the ground is often left bare in between header tailings (Photo 8). The newer, semi-leafless varieties (e.g. Kaspa(b)) leave a little more pea stubble rooted, but can still be an erosion risk if the header tailings are left in rows. Spreading pea straw out of the harvester does assist in erosion control (Photo 9). Sowing peas into a cereal stubble and harvesting above ground is clearly the best option to minimise erosion in pea stubbles.

Grazing of pea stubble creates a major erosion risk, especially on sandier soils.

Photo 9: *Pea stubble can be an erosion risk, particularly if bare ground and left in header trails.*

Photo: W. Hawthorne, formerly Pulse Australia

Photo 10: *Pea stubble can be less of an erosion risk if spread at harvest.*

Photo: W. Hawthorne, formerly Pulse Australia

FEEDBACK

MORE INFORMATION

Field Pea receival standards are detailed at: http://www.pulseaus.com.au/storage/app/media/markets/20160801_Pulse-Standards.pdf

11.11 Receival standards

The national receival standards for field pea are set by the pulse industry via Pulse Australia. They reflect the market requirements for a quality food product. Receival standards are set in order to achieve the export standards used by marketers and buyers internationally.

Pea types (dun, white, blue) are segregated with off-types becoming part of the defective count. The majority of deliveries continue to be into the Australian field pea number 2 grade receival which requires low insect damage and breakages (defectives 7% maximum) and minimal foreign material or impurities (3% maximum). Discolouration or staining of grain is not a specified rejection in number 2 grade. Failure to achieve this receival standard may mean price discounts at the discretion of the buyer or re-cleaning to make grade.

The Australian field pea number 1 grade receival may be applied by a few buyers who supply premium human consumption markets. This tighter receival grade requires minimal insect damage and breakages (defectives 3% maximum) and minimal discolouration or staining of grain (1% maximum). See pulse receival and export standards at http://www.pulseaus.com.au/storage/app/media/markets/20160801_Pulse-Standards.pdf

Table 3: Summary of National Field pea receival standards Maximum moisture content (%)

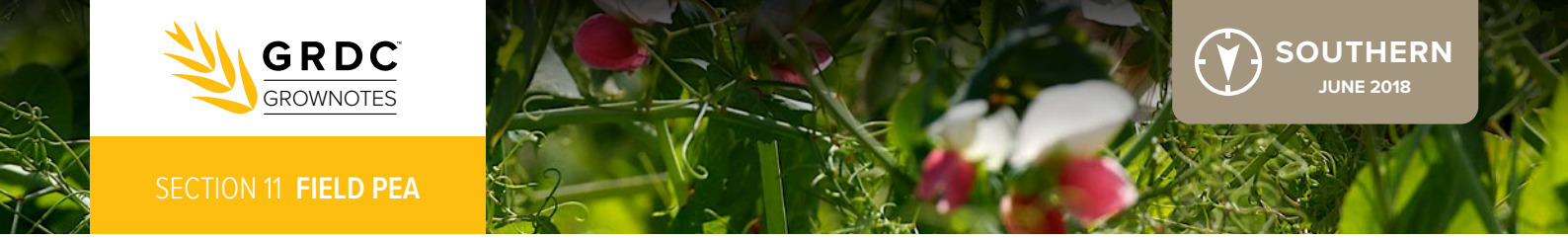
	Maximum moisture content (%)	Minimum Purity (%)	Maximum defective plus poor colour (%)	Screen size for defective (mm)	Poor colour maximum (5)	Foreign material maximum in total (%)
No 1 grade receival standard	14	97	3	3.75 slotted	1	3
No 2 grade receival standard	14	97	7	-	-	3
	Unmillable material maximum (%)	**Snail maximum**	**Insect maximum**	**Nominated weed seed maximums**		
No 1 grade receival standard	0.5 (0.3% soil)	1 per 200g	15 per 200g	See receival standards appendix for amounts allowable		
No 2 grade receival standard	0.5 (0.3% soil)	1 per 200g	15 per 200g	See receival standards appendix for amounts allowable		

11.12 Grain delivery

Cash buying at harvest or warehousing options are not necessarily always available, close or desirable for field pea growers at harvest. Depending on the location, variety/type, market outlet or grower choice, grain may need to be stored on farm. Sales must therefore be made privately to processors, agents or direct to the end-user.

Like with most pulse grains, there are bulk handling storage locations that do handle field pea grain for warehouse storage or storage on behalf of buyers. .There are also an increasing number of processors that receive field peas at harvest or after storage. Bulk storage most likely will not be for all types of field peas or their grades. Receival grades are usually based on the national standards receival grade 2 farmer dressed (CSP-10.2.1). See Section 11.11 Receival standards.

White, green, marrowfat and even number 1 grade dun type field peas will most likely need specific arrangements with buyers or processors because bulk storage facilities for these types are usually unavailable or rare for these niche classes, unless traded as livestock feed. See a pulse trader list at http://www.pulseaus.com.au/marketing/pulse-traders.



FEEDBACK

Each year before harvest, bulk-handling facilities usually publish a list of locations, segregations and grades of products that they will receive. These segregations reflect the national receival standard for field peas as well as anticipated locations and volumes of production.

Glencore/Viterra in South Australia publish segregations they accept for field pea each year pre-harvest (see http://www.viterra.com.au/index.php/classification/). Look for 'grade segregations', which are usually for Dun types only, and based on variety type ('Kaspa$^{\Phi}$' types or other Dun types).

Look also for "receival standards" which are updated annually pre-harvest. See http://www.viterra.com.au/index.php/receival-standards/.

Field pea growers in Victoria and southern NSW likely will need to be in touch with the many private storage facilities and pulse processors direct (see http://www.pulseaus.com.au/marketing/pulse-traders).

Note that field pea grain sold as seed to other growers for grain, hay or green/brown manure uses can only occur if it is a variety not covered by Plant Breeder's Rights (PBR). If the variety is covered by PBR, as most new varieties are now, then arrangements must be made directly with the commercial partner for that particular variety.