10  Harvesting, transport and storage

10.1  Swathing

For most of the low and medium rainfall districts, large crop areas with high yields (>1 t/ha) are better managed by swathing before harvest. The crop will dry more evenly allowing earlier harvesting, and reduce harvest losses from shattering. Insects such as DBM, budworm and aphids need to have been controlled well ahead of swathing in order to not breach withholding periods, which vary according to the chemicals used.

When canola has reached physiological maturity, it is ready to swath. That is when either the seed moisture content is between 30–35% or the seed colour change has reached 60–70%. Swathing at too high a moisture content, when the seed is immature, will adversely affect grain size, oil content and yield. For the eastern grainbelt in most seasons the crop will be ready to swath within 14 to 21 days from the end of flowering.

For grasses surviving a grass selective herbicide application, the use of a spray boom on the swather is proving a very effective means of crop topping ryegrass in canola. At present this operation is not registered and may need to be registered to satisfy QA requirements.

Also be aware that some commonly used grass selective herbicides have long withholding periods in canola.
10.2 Direct harvesting

Direct harvesting canola is an option for growers with suitable varieties, belt fronts, those who only have a small area of canola (<200ha) or for crops close to break even returns to reduce further expenditure. Direct harvesting is very variety dependant due to large differences in pod shatter between varieties.

Throughout the low rainfall districts where the crop may dry out unevenly, the denser area on the valley floors could be swathed while the remainder of the crop on the hilltops could be direct headed. Direct heading is an option for salvaging small uneven areas or where not enough plants exist to retain the swathes off the ground.

The crop will be ready when the majority of pods are dry and rattle when shaken. Always test a small amount and have the moisture measured. The header must be ready for harvest once the crop has reached 8.5% moisture in the seed.

10.3 Crop topping or desiccation

This method of harvest preparation is not generally favoured due to knockdown herbicides needing to be sprayed by air.

Farmer experience has shown Reglone™ will kill all green material within two to three days; however the seed will not dry out well in the pods, resulting in high moisture content grain if attempts to harvest are too early.

When Glyphosate is applied plants die slower, however this may result in more damage if strong winds occur after desiccation. Plants are prone to damage from strong hot winds in October and November and considerable loss of grain can occur even though the crop has been desiccated.

As a general rule of thumb for most canola crops growing in the eastern grainbelt, desiccation is not justified unless it is for the control of a serious herbicide resistant weed population, although swathing can achieve a result without the risk of seed loss through shattering.
10.4 **Timing of harvest**

Harvest can begin when seed moisture content is below 8.5% (Ensure moisture meter is calibrated). Moisture levels in canola are lower after mid-morning and remain so well into the evening.

Harvest usually commences approximately 10 to 20 days after swathing. Direct harvesting canola without swathing usually occurs up to 30 days from the time the crop would have been ready to swath. For a crop swathed 20 days after flowering, harvest is possible approximately 5–10 days after swathing. Swathing advances harvest by about 5 days relative to direct harvest.

Seed can be graded to remove weed seed such as ryegrass and radish in the harvest sample.

Oil “Bonification” bonus or discount payments vary from acquirer to acquirer. Most cash payment terms have a cap on oil premiums. Growers should check bonification terms and conditions with each company at time of sale or delivery.

The Grain Pool Pty Ltd pays a premium or deducts a discount for each 1% oil in seed, (measured on a clean seed basis), above (bonus) or below (discount) 42% oil content in canola seed delivered into their pool. Canola with oil content below 30% is currently classed as undergrade. There is no limit to Grain Pool Pty Ltd premiums. Special segregations are required for canola below 38% oil content, which is subject to seasonal conditions and regional seed averages.

Please check with CBH before delivering grain to your local receival point.

Admixture penalties are applied for 0.0% to 3.0% at 1% pro rata basis, plus $2 per tonne for each 0.1% admixture above 2% and up to 3% (2.5% = $10.00/tonne, 3.0% = $20.00). Canola with over 2.0% admixture may be received as CS2, and any canola > 3.0% admixture is considered undergrade.

Bonification bonuses or discount rates and admixture penalty rates should be checked each season.

10.5 **Harvest losses**

Harvest losses can be significant in canola if harvesting is not carefully monitored. Patience is important to minimise losses as small seed losses are easily overlooked. Previous surveys have shown harvest losses to be anywhere between 40kg to 150kg/ha. A loss of 20 to 30kg/ha is considered acceptable.

Losses can be minimised by:

- Correctly setting up sieves.
- Slowing harvesting speed.
- Harvesting early in the morning and at night, especially when direct harvesting.

The easiest method of assessing the losses in canola is to use 2 litre ice cream containers. Put eight containers in the uncut crop in front of the harvester, four either side of where the harvester will go to measure the front losses, and four in the middle of the machine to measure the front plus machine losses. Then harvest the crop over the top of where the containers are placed and count the number of seeds in each container. For swathed crops just put 8 containers either side of the swathed row. Sixty (60) seeds in the area of a 2 litre ice cream container (0.022 m²) is equivalent to a loss of 100 kg/ha.

10.6 **Storage**

Quality canola stores well if its moisture and temperature are properly maintained. Storage of canola on-farm below 8% moisture content should only be for a maximum period of up to two months without aeration before being marketed. Storage of retained seed is preferable in bags where plenty of air can circulate around the bags or in a small silo fitted with aeration.

Canola grain that is not stored in cool dry conditions can suffer increased fatty acid content, oil colour change, insect damage, surface crusting, mould and in extreme cases smoulder or catch fire.
10.7 Aeration and drying

Aeration in its simplest form is the forcing of ambient air through a stack of grain. Grain can be cooled and stored at a higher than normal moisture content; moisture migration is prevented by equalising the temperature throughout the stack. Cool grain also keeps insect numbers low; temperatures of 12 to 14°C will stop them breeding.

During the storage period some drying will occur if the ingoing air has a low relative humidity (rh). Introducing air into the stack with a rh below that of the air surrounding the grain, will absorb the extra moisture and carry it out of the silo through the exhaust vents. The reverse is also true. Hence it is important that the operator makes judgements that introduce only air that best suits the storage strategy.

Grain aeration can be described as three processes: drying, cooling and maintenance. The amount of air passed through the grain is measured in litres per second per tonne and varies depending on the particular aeration strategy.

Grain under aeration will dry as air passes through the stack until equilibrium is reached. This is known as the equilibrium relative humidity, when the incoming air has the same rh as the air surrounding the grain. The volume of air passing through the grain and the rh will determine the speed of drying.

Aeration drying

An aeration drying system requires an air flow of more than 20 litres per second per tonne of grain. To achieve this volume of air you will need a very large blower or a medium sized blower and a small stack of grain. The grain will dry more efficiently in a shallow bed depth of up to three metres. This allows the faster passage of drying fronts.

Grain at 12% moisture content and a temperature of 22°C has an equilibrium relative humidity of 55%. Selecting incoming air well below 55% will dry the grain. The speed of drying will increase if the relative humidity is considerably lower. Grain could be dried in several weeks in a standard silo with a high air flow and very low incoming relative humidity air.
Aeration cooling

Aeration cooling performs two tasks, cooling the grain and equalizing the moisture in the stack by transferring it from moist grain to dry grain.

Airflows of 2 to 4 litres per second per tonne are normal for this process. The aim is to remove heat accumulated during harvest and cool the grain quickly. This assists to protect the grain from mould development and self heating. Canola can be stored safely below 20°C with up to 9% moisture content. Higher moisture canola should be stored below 18ºC. When harvesting moist grain, aerate continuously as it is loaded for at least 48 hours to stabilise the internal temperature. Then only switch on the fan during the coolest part of the day until the target temperature is reached. In a deep bed silo (>6 metres) this process may take several weeks if ambient conditions are unfavourable.

Aeration maintenance

When stored grain has been cooled, fans are used intermittently to maintain the required temperature. The number of fan-hours per month will depend on ambient temperature and humidity. To remove the guesswork from cooling and maintenance phases it is recommended the aeration fan be connected to a controller. The standard lower cost unit operates by selecting the coolest part of the day. The more expensive units have a selection function that allows grain conditioning to a desired outcome.

Harvest benefit from aeration

Aeration is a valuable tool that can extend the harvesting window in the southern cropping areas. It will enable harvesting of crops before they become weather damaged (i.e. when they are at optimum quality but still too moist for delivery). The problem will always be the logistics of handling large amounts of seed as it is harvested.

Large aerated silos or sheds can keep the grain cool and safe but drying will be limited unless there is a very high airflow. A grain drier will bring the grain to delivery standard in a known time but the removal of moisture in an ambient air drier will be subject to the rh and temperature of the day.

Drying with heat

Drying canola with a heated air grain dryer is not without risk. Overheating of the grain will cause the destruction of the seed germ and the release of free fatty acids. Seed dried to below 6% moisture content (mc) is more vulnerable to cracking.

Generally, wetter seed (>12% mc) requires a longer drying time using a lower air temperature.

Selection of dryer type is a consideration in selecting the plenum air temperature. Seed in a batch dryer that is next to the plenum chamber will reach a temperature approaching the heat of the incoming air. For this reason the air temperature in a batch dryer, for up to 10% mc canola, should be a maximum of 40°C for seed and 65°C for crushing grain.

Continuous flow dryers can be a cross flow design, where the air from a central plenum blows directly through the grain column, or a mixed flow type where the air is blown in and exits through ducts in the grain bulk.

Cross flow dryers also have potential to overheat the seed, depending on the speed of flow through the machine. Care should be taken to ensure the temperature does not exceed 45°C for seed and 70°C for processing canola.

Mixed flow dryers are less likely to cause damage due to the mixing of the grain and shorter resident time close to the heated air ducts as it progresses though the machine. Plenum air temperatures can be slightly higher at 49°C for seed and 82°C for processing grain.

Most grain dryers are set up for handling cereal grains and contain perforated mesh. It is important to check there is no canola loss through the mesh or that the seeds are lodging in perforations. Mixed flow dryers do not have perforated ducts and are able to accommodate all seed sizes.