

SECTION 3

Planting

3.1 Seed treatments

3.1.1 Insecticide treatments

Imidacloprid products, such as Gaucho® 600 or Picus, are registered for use on canola seed, for seedling protection against low pressure redlegged earth mite, blue oat mite and aphids.

These chemicals work through repellency and anti-feeding action, rather than by directly killing earth mites or aphids. They will protect emerging seedlings for 3–4 weeks after sowing. As well as the direct effects of controlling aphids, the use of imidacloprid may also reduce the incidence and spread of aphid-transmitted virus diseases during this period. This product can be applied only by registered operators. All seed companies can supply seed pre-treated with imidacloprid. Fipronil (e.g. Cosmos®) is registered for control of redlegged earth mite in canola. It should be used as part of an integrated pest management approach to redlegged earth mite. Newer insecticide seed treatments include Poncho® Plus and Cruiser® Opti but growers should consult the APVMA at www.apvma.gov.au for up to date information.

Fipronil can be applied either on-farm or off-farm by a contractor or seed company.¹

3.1.2 Fungicide treatments

Fluquinconazole products (e.g. Jockey®) can be used in high-risk situations as a seed dressing to help minimise the effects of blackleg disease. These products may shorten the hypocotyl length of canola. To avoid the possibility of reduced emergence, do not sow treated seed deeper than 20 mm or in soils prone to crusting. Ensure that treated seed is sown in the season of treatment.

Fludioxonil + metalaxyl-M (Maxim® XL) is a fungicidal seed dressing that provides seedling suppression of blackleg as well as protection against seedling diseases caused by *Pythium* spp. and *Rhizoctonia solani*. It will not cause shortening of the hypocotyl or affect seed viability.

Flutriafol products (Impact®) are in-furrow fungicide treatments that are mixed and sown with the granular or liquid fertiliser to assist in minimising the effects of blackleg

¹ L Jenkins (2009) Crop establishment. Ch. 5 In Canola best practice management guide for south-eastern Australia. (Eds D McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf

More information

[Oilseeds WA: Assessment of fungicide efficacy against blackleg disease](#)

[DAFWA research paper: Evaluation of fungicides for the control of downy mildew](#)

[Bayer CropScience product details](#)

disease. In situations of high blackleg pressure, research has shown flutriafol products to be superior to other fungicides for controlling blackleg disease.²

3.2 Time of sowing

The optimum sowing time for spring varieties is a compromise between sowing too early, which may increase the risk of frost damage, early droughting if follow up rains do not occur until late May and lodging, and sowing too late, which increases the risk of the crop undergoing seed development in increasingly hot and dry conditions, reducing the yield potential and oil content of the grain.

The optimum sowing window using early mid to mid/late maturing spring varieties normally falls in the window from April 10th to May 5th. For short season varieties, this window normally falls in the period from April 20th to May 15th.

New research is happening in the south coast and great southern canola growing areas, looking at whether winter canola varieties can also be used. Winter varieties have a vernalisation requirement (a period of exposure to cold temperatures) before they will change from vegetative to reproductive growth ie they won't flower until they have received this period of cold.. Therefore it is envisaged that they could be sown even earlier than April, maybe as early as February (or even the previous spring). This may result in two added benefits; 1- stock feed over summer and autumn, as well as water use over these periods, thereby decreasing the winter waterlogging risk in prone areas.

In general, sowing at the earliest time within the optimum window pays off in several ways. Earlier sown crops:

- generally have higher seed and oil yields because the crop finishes under cooler, moister, conditions (a premium is paid for oil content >42%);
- allow for better coordination of sowing and harvesting, because these operations for canola are well ahead of wheat;
- grow faster initially and so compete better with weeds; and
- may have fewer problems with seedling insect pests.

² L Jenkins (2009) Crop establishment. Ch. 5 In Canola best practice management guide for south-eastern Australia. (Eds D McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf



Figure 1: Canola seed in bunker stockpile. (Photo: AM Photography)

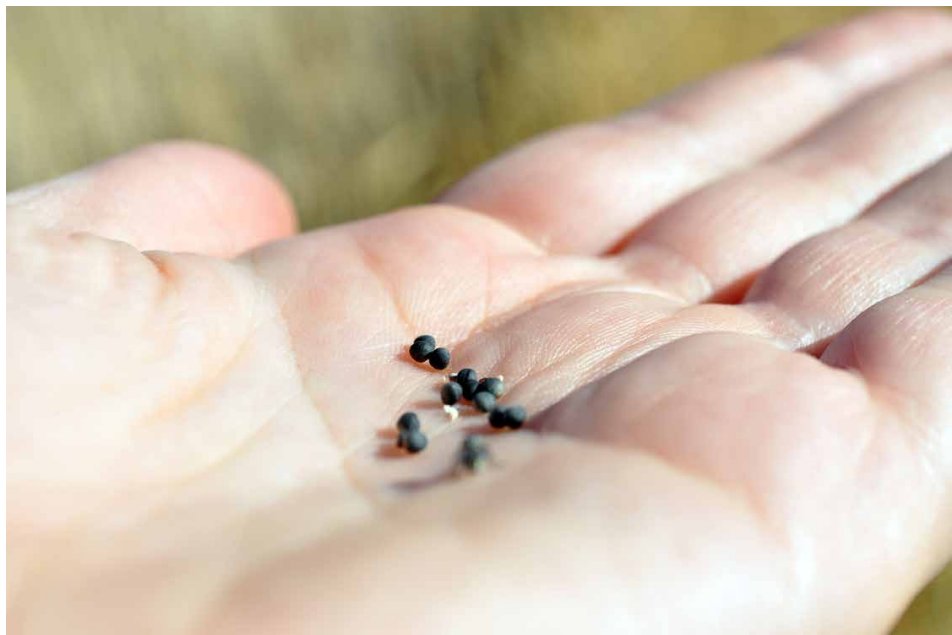


Figure 2: Canola takes longer to establish than cereals due to its small seed size. (Photo: Rebecca Jennings)

Because canola seed is very small (Figures 1 and 2), it takes longer to establish than cereals. Late sowing into cold soils further reduces plant growth, making canola seedlings more vulnerable to disease, insects, slugs and other constraints.

Late sowing also results in canola maturing when the weather is typically warmer and drier. Hot weather during the flowering–podset stages may cause pod abortion, fewer seeds per pod, and reduced oil content.

In general, sowing later to avoid frost is not a good strategy; canola flowers for 4–6 weeks and can usually compensate for aborted flowers if frosts occur at early–mid

flowering. Canola is most susceptible to frost during late flowering–early podfill, when a heavy frost can destroy immature seeds. Canola usually tolerates frosts better than cereals do.

Late-sown paddocks must be carefully selected and prepared for canola; in higher rainfall areas, poorly drained paddocks may be at greater risk from waterlogging with later sowings.

The optimum time to sow may depend on a range of factors, but the relative maturity of a variety is important. Mid- and mid-late-maturing varieties should be sown early in the recommended sowing window for a particular region, and early-maturing varieties sown later.

Early sowings maximise yield potential and oil content, but sowing too early increases the risk of frost damage during the late flowering and pod-filling stages. Sow midseason varieties from early May and early-maturing varieties from mid-May.

In paddocks known to have high frost risk, sowing should be delayed further.

Canola usually flowers for 4-6 weeks, and frost damage is greatest if it occurs towards the end of flowering and through pod filling. Early-maturing varieties sown at the beginning of May would be subject to frosts in the late flowering and pod-filling stages, whereas midseason varieties sown at this time will flower and fill pods later, reducing the risk of frost damage.

The small seeds of canola need to be sown ideally no more than 5 cm deep in self-mulching clays (2–3 cm in red soils) into well-prepared, moist seedbeds.

Good seed–soil contact, to help ensure uniform establishment, is aided by the use of rollers, cultipackers and press-wheels. The crop is suited to conventional and no-till systems.

Heavy stubble loads may reduce emergence, and should not be left over the sowing row. Triazine-tolerant (TT) varieties are less vigorous; therefore, planting methods are more critical for even establishment.³

3.2.1 DAFWA/UWA trials

The Department of Agriculture and Food Western Australia (DAFWA) and the University of Western Australia (UWA) evaluated three times of sowing (starting from the break of the season with two subsequent sowings at 2-week intervals) and various fungicide treatments for the management of blackleg in canola. The trials were conducted at four different locations: East Chapman, Merredin, Wongan Hills and Mt. Barker.⁴

³ L Serafin, J Holland, R Bambach, D McCaffery (2005) Canola: northern NSW planting guide. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0016/148300/canola-northern-NSW-planting-guide.pdf

⁴ R Khangura, M Barbetti. Management of blackleg of canola by manipulating time of sowing in combination with fungicides. Australian Oilseeds Federation, http://www.australianoilseeds.com/_data/assets/pdf_file/0015/4506/Manipulating_blackleg_time_of_sowing_fungicides_WA.pdf

More information

[DAFWA paper: Modelling sowing time response of canola in the northern wheatbelt of Western Australia](#)

[WANTFA Time of sowing trial](#)

More information

[DAFWA paper: Agronomic performance of new open-pollinated and hybrid canola cultivars to time of sowing in Western Australia](#)

[DAFWA/UWA paper: Environmental impact on canola yield and oil](#)

[GRDC: Over the bar with better canola agronomy](#)

[DAFWA presentation: Modelling sowing time response of canola in the northern wheatbelt of Western Australia](#)

[DAFWA research: Scoping early sown canola in Western Australia](#)

i More information

[BCG trial details.](#)
[Timing is everything: barley and canola time of sowing](#)

[Hart Field-Site Group: Canola growth and development—impact of ToS and seasonal conditions](#)

[GRDC Media: Scope to reap rewards from early sowing](#)

i More information

[GRDC Fact Sheet: Growing hybrid canola](#)

[GrowNotes Canola West Section 2. Pre-planting](#)

[DAFWA: Estimating the size of retained canola seed](#)

[DAFWA: Retained canola seed options at Grass Patch, 2013](#)

[Hart Field-Site Group: Retaining hybrid canola seed 2013](#)

[GRDC Update-Papers: Turning sowing times on their head with winter habit canola and wheat](#)

[GRDC Update Papers: Canola growth and development—impact of time of sowing and seasonal conditions](#)

Blackleg severity was significantly reduced when the sowing was delayed until the first or second week of July; however, there were yield penalties due to the shortened growing season. All of the fungicide treatments substantially reduced blackleg at all locations and yields were improved with most of the fungicide treatments at all locations except East Chapman.

3.3 Retained seed

There has been some grower interest in retaining hybrids from one season to the next, as they have traditionally done with open-pollinated (OP) varieties. Retaining hybrids to the second generation (F2) will produce seed of inconsistent traits and quality. Depending on how different the parental lines were from each other in certain traits, the F2 generation may vary greatly from the original seed. Such differences may occur in herbicide tolerance, blackleg resistance and maturity (see GRDC Fact Sheet: [Growing hybrid canola](#)). Those differences may greatly affect the overall yield and financial returns to growers to the point that the initial savings from retaining the seed are outweighed.

3.4 Targeted plant population

Carry out crop establishment counts within 4 weeks of emergence to review the success of the sowing operation and to help decide whether the seed rate or equipment needs to be adjusted for next year's crop. The impact of establishment pests (such as earth mites, aphids, slugs or soil-dwelling pests) can also be assessed at this time.

For narrow row spacing (up to 30 cm), use a square quadrat (0.25 m²). For a wider row spacing, a 1-m ruler placed along the row is more convenient. Count as many sites as possible (minimum of 20) across an area widely representative of the whole crop.

Plant population, which is determined by sowing rate, germination percentage and establishment percentage, is an important determinant of biomass at flowering and therefore of yield (Figure 3).

More information

[DAFWA: 2015 WA agribusiness crop updates: sowing canola in wide rows could save growers money](#)

[DAFWA: Canola response to plant density at Mingenew, 2014](#)

[WAFarmers: Canola variety guide available for 2015 cropping season—DAFWA](#)

[SEPWA: All trials in the Esperance Port zone](#)

[Mingenew–Irwin Group: Spring field day booklet 2014](#)

[DAFWA: Canola response to plant density at Mullewa, 2013](#)

[DAFWA: Canola plant density trials list](#)

[DAFWA: Canola response plant density Chapman Valley, 2013](#)

[DAFWA: Other canola agronomy trials list](#)



Figure 3: Canola stand well established near Geraldton. (Photo: Cox Inall Communications)

Crops with low plant densities tend to yield poorly. Low-density crops can compensate with increased pod and seed production per plant; however, they are more vulnerable to disease, pests, weed competition and environmental stress.⁵

Evenness of plant population, both within the row and across the paddock, is more important than having an ideal population. Where plant populations are low, plants compensate by producing extra branches. For most canola-growing regions, the recommended seeding rate for *Brassica napus* canola is 3–4 kg/ha.

Many growers have reduced this rate to 2 kg/ha but only after they have gained considerable experience in the skills and machinery refinements required to produce consistent establishment of the crop under a range of seasonal conditions. The trend towards hybrids with superior seedling vigour over OP varieties is allowing experienced growers to reduce seeding rates to as low as 1.5–2.0 kg/ha. Excessively high seeding rates (e.g. 6–8 kg/ha) cause crops to grow too tall with weak spindly stems, making them susceptible to lodging in the spring as flowering and pod development occur.

It is advisable to sow at a rate 1.0–1.5 kg/ha higher than normal when seedbed conditions are not ideal, such as when sowing late into cold, wet soils or no-till sowing into dense stubbles. Within the recommended plant-population range, it is better to have too many canola plants than too few, although high plant densities have been linked to an increased incidence of the disease *Sclerotinia* stem rot.

Typically, about 40–60% of sown seeds establish as plants. However, if conditions are very favourable, establishment can be as high as 80%. Check the seed size every year; it can vary depending on how well the seed crop finished in the previous

⁵ P Matthews, D McCaffery, L Jenkins (2015) Winter crop variety sowing guide 2015. NSW DPI Management Guide. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0011/272945/winter-crop-variety-sowing-guide-2015.pdf

spring. For *B. napus* varieties, the range is 250,000–350,000 seeds/kg for OP varieties and 150,000–200,000 for hybrids. Table 1 shows the large difference in plant establishment rates for a given seeding rate between OP varieties and hybrids.⁶

Table 1: Number of plants established per m² from different sowing rates and establishment percentages of open-pollinated canola varieties based on 290,000 seeds/kg, and hybrid canola based on 175,000 seeds/kg

Sowing rate (kg/ha)	Establishment percentage					
	40%	50%	60%	70%	80%	90%
<i>Open-pollinated canola</i>						
2.0	23	29	35	41	46	52
3.0	35	44	52	61	70	78
4.0	46	58	70	81	93	104
5.0	58	73	87	102	116	131
<i>Hybrid canola</i>						
2.0	14	18	21	25	28	32
3.0	21	26	32	37	42	47
4.0	28	35	42	49	56	63
5.0	35	44	53	61	70	79

Increasing the sowing rate increases competition between plants, creating thinner main stems and fewer, less productive branches.

Reducing the sowing rate creates plants with thicker main stems and more branches, delays leaf-area development, reduces biomass at flowering, and ultimately reduces yield.⁷

3.4.1 Determining target density

To work out the seeding rate, consider the desired result. What is the target plant density, or how thick should the canola crop be? Rainfall is a guide to target density. Table 2 presents the suggested target crop densities for Western Australia.

Cost of seed is another important consideration, the lower density targets of hybrid canola are primarily due to the higher seed cost compared with OP canola. The target density should not be <20 plants/m².⁸

More information

[GRDC: Over the bar with better canola agronomy](#)

[NSW I&I/Delta Agribusiness/Rural Management research: Canola variety x row spacing x plan population trial](#)

[GRDC Update Papers: Wide row canola why bother](#)

⁶ L Jenkins (2009) Crop establishment. Ch. 5 In Canola best practice management guide for south-eastern Australia. (Eds D McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf

⁷ L Jenkins (2009) Crop establishment. Ch. 5 In Canola best practice management guide for south-eastern Australia. (Eds D McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf

⁸ J Bucat, M Seymour (2015) Information for the canola seeding rate calculator. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/information-canola-seeding-rate-calculator?page=0%2C0>

Table 2: Suggested target crop density (plants/m²) for canola varieties—use the higher target density to combat weeds

Rainfall zone	Hybrid	Open-pollinated
Low (250–325 mm)	20–25	30–40
Medium (325–450 mm)	25–40	35–50
High (450–550 mm)	30–40	40–60

Beware of reducing the seeding rate too much with expensive hybrid seed. It is good to have a safety margin in case of mites, depth variation, fertiliser toxicity or other unforeseen establishment problems.

3.4.2 Use a higher plant density to combat weeds

It may pay to increase the target density to ensure good crop competition with weeds. Make the most of canola and use it as a true break crop by using all of the integrated weed management (IWM) strategies. A high plant density is one such tool. Weed seedset accelerates where canola densities are <20 plants/m². Where there is a high weed burden, target high crop densities to boost crop competition with weeds and help to combat weed seedset.

Although there is no economic yield advantage in having a crop that is too thick, there are generally no yield penalties, especially for growers in the medium- and high-rainfall zones. Results from 18 DAFWA density trials over 3 years and all rainfall zones showed only one trial where yields were severely reduced as density increased. This was in 2013 at Mullewa, where dry conditions and continual aphid attack droughted out canola at crop densities >20 plants/m². In the other experiments, canola densities >60 plants/m² and up to 110 plants/m² produced yields similar to lower densities. However, high-density crops may be more prone to disease or lodging.

3.4.3 Field establishment

Establishment of canola is highly variable. Field establishment (or paddock establishment) is the proportion of viable seeds that emerge and grow (Figure 4) compared with the number sown. Commonly, only half of the canola seeds sown emerge and contribute to the final crop yield.

Seeding conditions are the major factor affecting field establishment. Establishment is best in warm, wet conditions. In cold conditions, emergence is slower and establishment is reduced. Establishment is also reduced in dry conditions. If sowing into marginal moisture, increase the seeding rate to compensate for the seeds that will not emerge.

Accounting for differences in field establishment can be the most important factor in calculating seeding rate. The seeding rate of medium-sized hybrid seed is 1.9 kg/ha under excellent conditions but 2.6 kg/ha when seeding dry and >5 kg/ha if the dry seeding is followed by a tough start to the season.

The precision of the seeder affects establishment if some seeds are sown too deep. Establishment can be reduced further by fertiliser toxicity, high stubble loads, insect

attack or diseases such as Pythium or Fusarium root rot. Hybrid varieties tend to have better establishment than OP varieties.

A guide to the expected field establishment is provided in Table 3.⁹



Figure 4: Canola cotyledon. (Photo: J. Bucat, DAFWA)

Table 3: Expected field establishment (%) for canola varieties

Seeding conditions	Open-pollinated	Hybrid
Excellent; warm and wet	65	80
Reasonable; just enough moisture	50	65
Dry-sown; good opening rains within 10 days	45	60
Dry-sown; tough start (non-wetting or hard-crusting soil, marginal break)	10–35	20–45

3.4.4 Seed size or number of seeds per kilo

The bigger the seed, the fewer seeds per kg and the higher the seeding rate required. A change in seed size can cause a marked change in seeding rate. The seeding rate changes from 1.7 to 2.9 kg/ha where seed is changed from a small hybrid seed (285,000 seeds/kg) to large hybrid seed (170,000 seeds/kg), assuming 65% field establishment (as would be expected under reasonable seeding conditions) and a target of population of 30 plants/m².

Although you receive more seeds per dollar with small seed, large seed is more robust for good crop establishment. Refer to Table 4 for a guide to the common range of seed size of commercial hybrid and OP seed in Western Australia.¹⁰

⁹ J Bucat, M Seymour (2015) Information for the canola seeding rate calculator. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/information-canola-seeding-rate-calculator?page=0%2C0>

¹⁰ J Bucat, M Seymour (2015) Information for the canola seeding rate calculator. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/information-canola-seeding-rate-calculator?page=0%2C0>

Table 4: Common seed size range for hybrid and commercial open-pollinated seed

	Small	Medium	Large
<i>Hybrid</i>			
Seed size (mg)	3.51	4.88	5.88
No. of seeds per kg	285,000	205,000	170,000
<i>Open-pollinated</i>			
Seed size (mg)	2.86	3.22	4.00
No. of seeds per kg	350,000	310,000	250,000

Variation between and within varieties is a normal part of our canola industry. The seed size of canola is determined by genetics and the environment. Hybrids generally have bigger seeds. However, the environment can have an overriding effect on seed size.

Different seed lots of any variety may have quite different seed sizes if they are produced from different source crops. It is important to find out the size of the seed being planted this year. The number of seeds per kg for your seed lot will be provided on the seed bag, and/or available from the seed supplier.¹¹

3.4.5 Germination

The germination percentage is the proportion of viable seed in the seed lot. Each seed lot sold has a germination test. This information is available from the seed supplier. Commercially available seed generally has a high germination, >90%.

Retained seed should be germination-tested by a laboratory, such as [AGWEST Plant Laboratories](#) (+61(0)8 9368 3721). Otherwise, do a germination test at home.¹²

3.4.6 Calculating seed requirements

To calculate seeding rate, decide on the number of plants per m² (the target density), estimate the field establishment, and determine the seed size (or no. of seeds/kg) and germination percentage.

Use the DAFWA online [Canola seeding rate calculator](#) or a hand-held calculator to obtain the seeding rate.¹³

The formula is as follows:

$$\text{Seeding rate} = \frac{(\text{target density (plants/m}^2\text{)} \times 10,000)}{(\text{field establishment\%} \times \text{seeds per kg} \times \text{germination\%})}$$

Inputs are: 30 plants/m² target density; 205,000 seeds/kg; expected field establishment 65% (use decimal format, 0.65) (sowing hybrid into reasonable seeding

¹¹ J Bucat, M Seymour (2015) Information for the canola seeding rate calculator. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/information-canola-seeding-rate-calculator?page=0%2C0>

¹² J Bucat (2015) Canola germination test. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/canola-germination-test>

¹³ J Bucat (2015) Canola seeding rate calculator. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/canola-seeding-rate-calculator-0>

conditions); germination test result 95% (use decimal format, 0.95); 10 000 m² in 1 ha.

Therefore:

$$\begin{aligned} \text{Seeding rate} &= \frac{(30 \times 10,000)}{(0.65 \times 205,000 \times 0.95)} \\ &= 2.4 \text{ kg/ha} \end{aligned}$$

Be prepared to change the seeding rate at seeding time if conditions are better or worse than the field establishment you have used in your seeding rate calculation.

Seeding rate example tables

Table 5 provides examples of seeding rates for hybrid and OP canola varieties at various rates of seed establishment and with different seed sizes.

Table 5: Seeding rate (kg/ha) for hybrid canola varieties with 30 plants/m² target and 95% germination, and open-pollinated varieties with 40 plants/m² target and 95% germination

	Small	Medium	Large
<i>Hybrid seed</i>			
Seed size (mg)	3.51	4.88	5.88
No. of seeds/kg	285,000	205,000	170,000
80% Field establishment (excellent condition)	1.4	1.9	2.3
65% Field establishment (reasonable conditions)	1.7	2.4	2.9
60% Field establishment (dry seeding)	1.8	2.6	3.1
30% Field establishment (dry seeding, tough start)	3.7	5.1	6.2
<i>Open pollinated seed</i>			
Seed size (mg)	2.86	3.22	4.00
No. of seeds/kg	350,000	310,000	250,000
65% Field establishment (excellent condition)	1.9	2.1	2.6
50% Field establishment (reasonable conditions)	2.4	2.7	3.4
45% Field establishment (dry seeding)	2.7	3.0	3.7
20% Field establishment (dry seeding, tough start)	6.0	6.8	8.4

3.4.7 Make a better decision next year

Assess the success rate this year so that you can make a better decision next year. It is good to know the actual plant density. If the target density was higher than expected, then the field establishment was better than estimated. The seed rate may be reduced, under similar seeding conditions.

Conversely, if the target density was lower than expected, the field establishment must have been lower than estimated. Was there a clear reason for this? Or was it just what can be expected of the machinery type? Consider increasing the seeding rate for the following season. Monitor the establishment in different paddocks in each season.

To assess crop density, count the average number of plants per 1-m row and the row spacing;

$$\text{Crop density (plants/m}^2\text{)} = \frac{\text{average number of plants per 1-m row} \times 100}{\text{row spacing (cm)}}$$

i More information

[DAFWA: Canola seeding rate calculator](#)

[Pacific Seeds: Canola seed planting rate calculators](#)

[Pioneer: Canola seed rate calculator](#)

For example, plant density is 24 plants/m² where there is an average of 6 plants per 1-m row and 25-cm row spacing.

Calculate field establishment by rearranging the seeding rate calculation;

$$\text{Field establishment} = \frac{(\text{crop density (plants/m}^2\text{)} \times 10,000)}{(\text{seeding rate (kg/ha)} \times \text{seeds per kg} \times \text{germination}\%)}^{14}$$

3.5 Row spacing

Canola was traditionally sown on 15-cm row spacing, but the adoption of stubble retention and no-till farming systems has resulted in a trend to wider row spacing and the possibility of inter-row sowing using GPS guidance systems.

Experiments in southern New South Wales have shown that widening row spacing in canola does appear to reduce yield when the row space is increased to 35 cm.¹⁵ Plant densities as low as 15 plants/m², if consistent across a paddock, can still result in profitable crops when sown early and plants have time to compensate. Seed size varies between and within varieties and hybrids. Check seed size to calculate the correct number of seeds to be sown per m².

Establishment can be significantly reduced by sowing too deep, sowing late into cold, wet soils, and no-till-sowing into dense stubble. Use the higher seed rate, consider sowing the seed at a shallower depth, or select a variety or hybrid with high vigour in these situations. Hybrids are generally more vigorous than OP varieties, primarily because of larger seed size. Where seed is retained on-farm, grade the seed and keep the largest seed for sowing.

High plant densities, combined with suitable environmental conditions, can increase the risk of Sclerotinia stem rot during flowering. High plant densities can also increase the risk of moisture deficit during grainfill in dry spring conditions, potentially reducing yields.¹⁶

3.5.1 DAFWA trials at Binu – wide rows

In GRDC-funded DAFWA trials, canola grown in wide rows (44–60 cm) in the northern region yielded well enough compared with narrow rows (22–30 cm) to consider this sowing option. This means that agronomic packages can be refined for wide rows. Results indicate that wide rows are better suited to warmer climates and shallower soil types where drought during grainfill is more severe.

¹⁴ J Bucat, M Seymour (2015) Information for the canola seeding rate calculator. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/information-canola-seeding-rate-calculator?page=0%2C2>

¹⁵ J Edwards, K Hertel (2011) Canola growth and development. PROCROP Series. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/516181/Procrop-canola-growth-and-development.pdf

¹⁶ P Matthews, D McCaffery, L Jenkins (2015) Winter crop variety sowing guide 2015. NSW DPI Management Guide. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0011/272945/winter-crop-variety-sowing-guide-2015.pdf

i More information

[DAFWA: Canola row spacing Binu 2014 trial report](#)

[GRDC Update Papers: Wide row canola why bother](#)

[GRDC Media: Scope to reap rewards from early sowing](#)

[GRDC Media: Assess soil moisture before sowing early canola](#)

i More information

[DAFWA: Canola re-seeding: is it worth it?](#)

[GRDC Update Papers: Canola establishment: does size matter?](#)

Growers involved in these trials consider other aspects as well as yield to be important: reduced fuel costs at seeding (~30%), better stubble handling and improved crop safety of incorporated-before-sowing (IBS) herbicides.

Key findings:

- Canola grown in wide rows (50–60 cm) yielded well enough to consider this row spacing an option.
- Canola plants were able to compensate for being sown in wide rows—biomass similar to narrow rows.
- We may be able to reduce input costs, seed and fertiliser by refining the production package in wide rows.
- Wide rows offer benefits of reduced fuel costs at seeding, easy stubble handling and safety of IBS herbicides.^{17 18}

3.5.2 Managing low plant establishment

Although plant populations as low as 20 plants/m² can still produce good yields, such crops are more susceptible to weed competition. In addition, the variable pod development on these plants makes timing of windrowing difficult to determine, especially if germination has been staggered. At <15 plants/m², the crop is likely to be patchy and lower yielding. Before re-sowing or abandoning a crop, always check with an experienced agronomist or grower, because plants can compensate remarkably well and the yield potential may be equal to or higher than a better established but later sown crop.¹⁹

3.6 Sowing depth

Where conditions allow, aim to drill seed through the main seed box to 1.5–3 cm deep and up to 5 cm in self-mulching clays. Where there is moisture below 1.5–3 cm, a reduced but viable establishment may still be achieved by sowing deeper, provided large seed is sown. This strategy can be used to sow some of the crop on time in seasons of good summer rainfall followed by drying surface seedbeds in autumn. Success with this strategy depends on soil type, soil structure and the amount and timing of follow-up rainfall.²⁰

Sowing depth has a major influence on seedling vigour, which subsequently affects seedling establishment and crop performance. A sowing depth of 1.2–2.5 cm is ideal.

¹⁷ M Harries, M Seymour (2015) Canolarow spacing Binu 2014 trial report. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/canola/canola-row-spacing-binu-2014-trial-report>

¹⁸ M Harries, M Seymour, C Pinkney, K Suckling, B Cripps, R Ford (2015) Wide row canola why bother; a summary of a series of small plot and farmer trials and farmer experiences. GRDC Update Papers, 25 February 2015, <http://www.grdc.com.au/Research-and-Development/GRDC-Update-Papers/2015/02/Wide-row-canola-why-bother>

¹⁹ L Jenkins (2009) Crop establishment. Ch. 5 In Canola best practice management guide for south-eastern Australia. (Eds D McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf

²⁰ P Matthews, D McCaffery, L Jenkins (2015) Winter crop variety sowing guide 2015. NSW DPI Management Guide. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0011/272945/winter-crop-variety-sowing-guide-2015.pdf

Deep seed placement increases the risk of failed emergence. Deeper sowing reduces light availability, and the hypocotyl (the shoot that emerges from the seed) responds to this by elongating, reducing the chance of seedling emergence. Seeds planted >2 cm deep or into >5 t/ha of stubble develop elongated hypocotyls. This elongation depletes the seed reserves more quickly than in seeds with shorter hypocotyls. The longer hypocotyls are also thinner, with decreased tissue density, and are more susceptible to mechanical damage and collapse.

More information

[GRDC: over the bar with better canola agronomy](#)

[DAFWA: Deep seeding canola](#)

Plants with longer hypocotyls have smaller root systems, less leaf area from an early stage, and less leaf and root biomass. Leaves are slower to expand, which reduces dry matter. As a result, plants that allocate more resources to the hypocotyls at the expense of leaves and roots have lower relative growth rates.²¹

This effect can contribute to slower growth of plants in surface-mulch treatments, and the slower growth can be compounded by low temperatures.

3.7 Seed placement

Sow canola seed into the soil, rather than dropping it on the soil surface and harrowing it in; drilled seed is more accurately placed in contact with moisture and will germinate more uniformly. In marginal rainfall areas, drilling seed to a pre-determined depth is the only sowing method recommended.

On heavy clay soils, growers have had success with moisture-seeking points, press-wheels, rubber-tyred rollers and trailing cultipackers. Deep-furrow planting, which allows sowing into subsurface moisture through the dry surface soil, is a proven technique in these soils, where rainfall is summer dominant and surface seedbeds are often dry at sowing time. When deep-furrow planting, it is critical that moist soil is firmed around the seed but only 2–3 cm of moist soil is covering the seed.

On lighter, sandier, non-wetting soils, the use of moisture-seeking points in conjunction with 'V' shaped press-wheels can give acceptable results. When sowing into wet soils, take care to avoid a smearing action by the moisture-seeking points, which could reduce crop emergence.

Broadcasting seed through the combine small-seed box is unreliable and usually results in staggered germination. Band-seeding is more suited to high-rainfall areas. Thoroughly clean out the seeder after sowing to prevent seed residue from contaminating other crops sown later in the season.²²

²¹ L Jenkins, R Brill (2013) Improving canola profit in central NSW: effect of time of sowing and variety choice. GRDC Update Papers 25 February 2013, <http://www.grdc.com.au/Research-and-Development/GRDC-Update-Papers/2013/02/Improving-canola-profit-in-central-NSW-effect-of-time-of-sowing-and-variety-choice>

²² R Mailer (2009) Grain quality. Ch. 2 In Canola best practice management guide for eastern Australia. (EdsD McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf

3.8 Sowing equipment

Canola can be sown by using no-till techniques or sown into a well-prepared, cultivated seedbed. When sowing into cereal stubble, ensure that straw and header trash is pushed away from the sowing row. Stubble covering the row can reduce canola emergence and early plant growth to reduce yield significantly. Use rollers, cultipackers or press-wheels to improve seed–soil contact where appropriate, ensuring that the pressure applied by these devices is low.²³

Sow seed through the main seed box or small-seed box of standard wheat-sowing equipment. The air-seeder or combine should be in good condition and the level adjusted (from side to side, front to back, and tine to tine) to ensure sowing at a uniform depth. Regulate groundspeed to avoid tine bounce, which will cause an uneven sowing depth. Diffusers are fitted to the sowing tines of air-seeders to stop seed from being blown from the seed row. A maximum sowing speed of 8–10 km/h is suggested for most soils.

Several options are available to level the seedbed and help to compact moist soil around the seed. These include the use of press-wheels or a rubber-tyred roller, coil packers (flexi-coil roller), or trailing light harrows or mesh behind the planter. Knifepoints with press-wheels are the preferred option. Avoid heavy harrows with long tines because they can disturb seed placement.

The seed box on most modern air-seeders and combines can be calibrated for low seeding rates. Check calibrations from year to year, because seed size can change and affect actual sowing rate.

Checklist for sowing equipment:

- Ensure accurate calibration for sowing rate.
- Ensure even wear of points for accurate seed placement.
- Use narrow points to reduce ridging.
- Keep front and rear rows of tines level.
- Sow slower rather than faster, to avoid overly shallow depth, seed bounce, or increased soil throw by tines, which effectively result in front-tine seed being sown too deep.
- Ensure level ridges behind the seeder. If using harrows, heavy harrows may be too severe and finger harrows too light.
- Avoid seed–fertiliser mixes that contain excess rates of nitrogen.²⁴

²³ J Edwards, K Hertel (2011) Canola growth and development. PROCROP Series. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/516181/Procrop-canola-growth-and-development.pdf

²⁴ L Jenkins (2009) Crop establishment. Ch. 5 In Canola best practice management guide for south-eastern Australia. (Eds D McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf

3.8.1 Alternative sowing techniques

The use of wider row spacing to conserve moisture in low-rainfall areas has seen an expansion of the areas in which canola is grown. Other techniques, such as dry sowing, aerial sowing and the use of raised beds, have been further refined, and these can reduce sowing delays caused by unseasonably dry or wet conditions.²⁵

²⁵ L Jenkins (2009) Crop establishment. Ch. 5 In Canola best practice management guide for south-eastern Australia. (Eds D McCaffrey, T Potter, S Marcroft, F Pritchard) GRDC, http://www.grdc.com.au/uploads/documents/GRDC_Canola_Guide_All_1308091.pdf