



Is there a place for canola on irrigation?

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IN A NUTSHELL

- ▶ Canola is a viable winter rotation crop option under irrigation but yield and profitability must improve for it to have a regular place in the rotation
- ▶ Consistent high canola yields depend on a package approach to the agronomy of the crop – the key agronomy steps must be 'done right'
- ▶ Paddock selection, nutrition management and water management are the most important management factors to get right

It is fair to say that irrigators do not value canola as a rotation crop as much as dryland farmers do, and the reasons are obvious – irrigators have more rotation break crop options including a variety of summer crops such as rice, maize and soybeans.

Currently there are about 8000 ha of irrigated canola in southern NSW, yet there is potential to increase this area to between 16 000 and 20 000 ha, if the crop can be grown profitably and can demonstrate a clear benefit to following wheat crops.

Benefits of canola in irrigated rotations

An analysis of all dryland research trials in southern NSW shows an average benefit of 20% higher yield in the following wheat crop, and in some cases, a 12% higher yield in the 2nd year of wheat. This benefit was mainly due to canola providing a break crop, reducing the incidence of cereal root diseases such as take-all, crown rot and root rot.

Similar wheat yield increases, whilst not measured in research plots, have been recorded by experienced irrigated canola growers. In addition, canola makes the soil "softer" and easier to cultivate or direct sow a subsequent wheat crop, and improves soil structure when grown as the first crop after landforming, more so on the better structured self-mulching soils. Be aware that disappointing results may occur on poorly structured red soils after landforming, especially without deep tillage, and the use of additives such as poultry manure, and gypsum where soils are sodic.

There may be other situations where canola could be the best winter crop option, depending on the weed spectrum and possible herbicide residue issues, eg high rates of atrazine used in maize. Weeds such as wild radish (spreading on irrigation), Paterson's curse and shepherds curse can be controlled by selecting a triazine tolerant (TT)

canola variety and applying the appropriate herbicide. The use of Primextra® Gold (active ingredients atrazine and S-metolachlor) in maize allows wheat to be double-cropped, but in some weed circumstances high rates of atrazine may be needed, restricting the following double crop to TT canola.

2005 season in review

Last season was good for canola, with mild spring temperatures during flowering and pod-fill enhancing yield potential and oil contents. Timely rain also reduced irrigation requirements, and any potential waterlogging on flood irrigated layouts that cannot be drained in less than 12 hours.

A Coleambally crop grown on a border check layout achieved a yield of 3.5 t/ha in 2005, whilst a Carrathool crop yielded 3.9 t/ha on raised beds, using the agronomic recipe for high yields, outlined at the Griffith GRDC Update in July 2004. This proves again that canola can achieve high yields under irrigated conditions if the correct agronomy is applied to the crop. In saying this, canola is helped to big yields when spring temperatures are below average and there are no high temperature spikes during flowering to early pod-fill. Canola is not as tough as wheat under hot spring temperatures.

Bottom line

Despite claiming a net financial benefit to a following wheat crop in the order of 20% higher yield or 1.2 t/ha for a 6 t/ha wheat crop, or in dollar terms \$180/ha (wheat valued at \$150/t), can canola be profitable in its own right? Figure 1 uses canola yields from the mid 1990s Murrumbidgee Valley *Canolacheck* data, but puts into the gross margin calculation the 2005 season growing costs of \$600/ha and price of canola of \$320/t on farm. The 1994 data set was selected as being representative of a period when high yields were



consistently achieved over a three year period, 1994–96.

For a yield of 3.5 t/ha, the gross margin last year was about \$500/ha (based on \$320/t) and still profitable. In 1994 the gross margin for a 3.5 t/ha crop was \$700–850/ha. The average price of canola in 1994 was \$355/t on-farm, with growing costs of \$433/ha. Add \$180/ha to the \$500/ha for the additional wheat yield due to a preceding canola crop, and the figures make canola even more important to the farm rotation gross margin.

Gross margins need to be developed for each specific paddock as costs will vary. In 1994 the growing costs ranged from \$278–580/ha.

When developing individual paddock gross margins a realistic yield target should be set – no higher than 10% above the average yield of the last three canola crops or 50% of achievable wheat yield for the paddock.

Management for consistent high yields

To achieve consistent high canola yields, agronomy has to be implemented as a package. Following is a discussion of some of the key agronomy issues that must be "got right" to make canola profitable.

Paddock selection

This is one of the most crucial of all decisions to get right. Select your best wheat paddock for canola. As a guide canola should yield 50–55% of wheat, ie paddocks yielding 7 t/ha of wheat should be able to grow a 3.5 t/ha crop of canola. If this cannot be achieved, investigations need to find out why.

Ensure that soil structure is good – self-mulching soils perform best. Eliminate any subsoil constraints such as plough pans with deep tillage. Soil pH preferably should be above 5.0 (CaCl₂) and any liming carried out the season before the crop is grown.

Crop nutrition

Canola has a higher nitrogen (N), phosphorus (P) and sulphur (S) requirement compared with wheat. Canola needs 40–50 kg N, 10 kg P and 10 kg S to produce each tonne of grain the crop produces. It is important to note that these are the nutrient requirements of the crop, not the amount of nutrient removed in the grain. Table 1 shows the nutrient demand for different yield targets. Only apply micronutrients if soil tests are backed up by field experimentation.

Nutritional requirements are met by a combination of applied fertiliser and supply from the soil itself. Murrumbidgee Valley Canolacheck data 1994–1996, showed the highest yielding crops (3.5–4.2 t/ha) received

about 140–160 kg N/ha, 35–50 kg P/ha, and 40–50 kg S/ha.

Nitrogen timing is always a subject of debate and needs to allow for the characteristics of the variety (crop height and lodging propensity), sowing time and the underlying fertility of the paddock. A Deep Soil Nitrogen Test is a useful tool in determining background nitrogen fertility. It is more accurate than paddock history 'guesstimates' but is probably best used in conjunction with paddock history to determine nitrogen rates and timing strategies.

Banding all the nitrogen requirements as anhydrous ammonia has been used successfully in the past as nitrogen is released slower than it is from solid fertilisers such as urea, which theoretically produces less cabbage growth by budding. Topdressing is still very economic in most situations. To balance risk, a general rule of thumb is to apply about 60% of total nitrogen requirements before or at sowing. This will ensure adequate cabbage growth by budding, when the yield potential can be better assessed and the remainder of the nitrogen can be topdressed at an appropriate rate.

Nitrogen test strips applied at or before sowing can assist topdressing decisions as well help refine future timing strategies.

Irrigation layout and management

Farmer results show that canola grown on beds will yield on average about **20% better** than on border check and terraced contour layouts. Top irrigators who are in tune with crop requirements have been able to reduce this difference to about 10–15% (Figure 2). Overhead sprinkler irrigation offers a number of advantages over flood systems including timely sowing because 25 mm can be applied to the seedbed and the crop sown within a few days. As water is applied like a normal rain event, there is no deep drainage loss (below the root zone) as there is when flood irrigating.

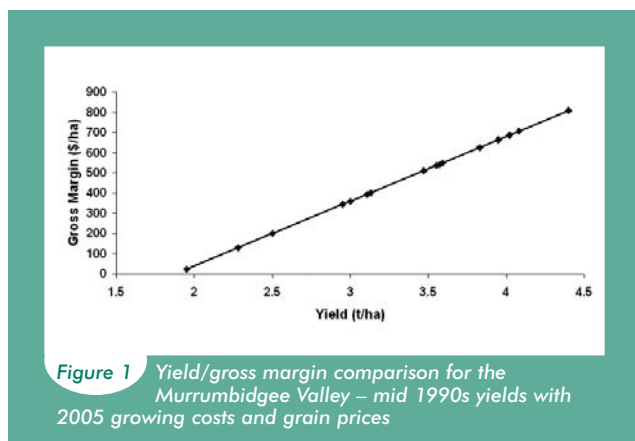


Figure 1 Yield/gross margin comparison for the Murrumbidgee Valley – mid 1990s yields with 2005 growing costs and grain prices

Table 1
Canola nutrient requirement for four yield targets

Target Yield	2.5 t/ha	3.0 t/ha	3.5 t/ha	4.0 t/ha
Nitrogen kg N/ha	100–125	120–150	140–175	160–200
Phosphorus kg P/ha	25	30	35	40
Sulphur kg S/ha	25	30	35	40



Water can be applied closer to when it is actually needed. This improves water use efficiency by reducing waterlogging potential, and maintaining yield using less water.

Spring irrigation of canola is needed earlier than for wheat, so unless there has been substantial rainfall to fill the root zone, irrigate as soon as water becomes available. The crop uses water at a faster rate than wheat during August because of its more advanced development (ie earlier flowering). Any waterlogging at this time has less effect on yield compared to later during pod-fill, when temperatures are much warmer, increasing the risk of "cooking" the crop.

Be prepared to irrigate to the target yield. This first spring irrigation is the most important as growth achieved at this time has the biggest influence on yield. It is important to get water on and off the bay within 12 hours. On flat layouts, high flow rates (15–20 ML per day) may be required. Crops grown on raised beds will not lose yield potential with slower watering times, with 12–18 hours being acceptable because drainage is better.

For very high yielding crops, spring water use could be as high as 4 ML/ha. An achievable Water Use Efficiency target for canola is 8–10 kg/ha/mm, ie for each mm of growing season water (rain and irrigation). This calculation uses an irrigation efficiency factor of about 80% which is a fair figure for a good flood irrigated layout.

Other key management points to consider

Varieties

The three major issues in selecting a canola variety for irrigation are:

- the planned sowing time
- the maturity of the variety
- the lodging risk during spring irrigation

Mid-maturing or mid- to late-maturing varieties are best

sued to late April sowings. Early- to mid-maturing varieties are best suited to early May sowing. Early-maturing varieties are best suited to sowing from early to mid May. This order of maturities reduces the risk of flowering and pod-fill taking place in high temperatures and also manages the risk of possible frost damage during pod-fill (Figure 3).

There are other factors such as yield, oil content, blackleg resistance and herbicide tolerance that should be considered.

Establishment

Target a plant population of 40–75 plants/m², by sowing 3–4 kg/ha in late April/early May. Higher seeding rates are not needed unless establishment losses are anticipated.

Sow at a shallow depth onto a firm seedbed and water the crop up with high flow rates. If sowing into dry soil, rolling before sowing will firm the seedbed. Do not chase moisture when sowing canola, especially where there is a risk of the soil slaking, dispersing, setting hard or slumping if heavy rain falls within 10–14 days of sowing.

Pest management

Earth mites are the major establishment pest of canola but the risk is often less in the irrigation areas than in dryland areas as most canola does not follow a pasture phase. However, preventative measures are recommended and are cheap insurance. Ensure seed is treated with Gaucho® (active ingredient imidacloprid) to protect the seedling crop from aphids as the warm, dry conditions of the southern irrigation areas is conducive to high aphid pressure. Gaucho is also registered for earth mite control but should not be relied on as the sole control method.

Canola's place in irrigation

Canola is a viable winter rotation crop option under irrigation, but yield and profitability must improve for it to



Figure 2 Canola grown on border check (left) can yield 85–90% of canola grown on raised beds (right) with good irrigation layout and careful management




have a recognised place in farmers' rotation planning. In northern NSW, canola has been described by some as a "fair weather friend". Whilst this may have an element of truth for the irrigation areas, how many irrigators are making money out of irrigated wheat and barley, and especially when springs are tough? 



Figure 3 Early-maturing varieties (left) suit later sowings (early to mid May) and mid-maturing varieties are suited to earlier sowings (late April to early May), to ensure flowering and pod-fill occur at the most suitable times of the season

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Further reading

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