

June 2024

Building drought resilience of vulnerable soils in low rainfall cropping and grazing systems

CASE STUDY

Early sowing pays dividend in the northern Mallee





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Farmer Name:	Anthony Rowe
Location:	Merrinee, VIC
Property size:	8500 ha
Rainfall:	250mm
Enterprises:	1600 Merino ewes crossed to White Suffolk rams, cropping (wheat, barley, vetch, field peas) on 4,500 ha
Demo Focus:	Benefits and yield impacts of early sowing of wheat

With increasing adoption of no-till, farmers in the Millewa have moved to a system where crops are sown by the calendar rather than waiting for the break of the season. However, it is not always clear what the benefits of early

sowing are, and how early sowing affects yield, ground cover and drought resilience. To explore this topic, a demonstration was set up to examine the effects of sowing time on wheat crop performance.

Key Learnings

- Many growers in the Millewa find that sowing a proportion of their crop early, often before the break of the season, is a useful strategy to maximise biomass production, yields and ground cover and drought resilience. On farms with a large cropping program, it allows more of the crop to be sown in the optimal germination window.
- In this demonstration, the yield advantage from sowing in early rather than late May was 0.1 t/ha, but would probably have been greater if not for a late rain.
- Early or dry sowing is something that can only be done in paddocks with low weed pressures, and usually requires farms to have a farm plan spanning multiple years.

Demonstration Details

- The demonstration site was set up in a relatively uniform sandy loam paddock with low weed pressures which had been sown to vetch the previous year.
- Sceptre wheat was sown at 40kg/ha, and base fertiliser was 70kg/ha of a 50:50 Granulock SS/urea blend. Aside from sowing time, all other aspects of agronomy were according to district 'best practice' (summer weed control, no-till sowing, soil testing and tailoring inputs based on soil tests).
- Two seeder widths were sown on May 1 into marginal moisture conditions (15 mm had fallen on April 20), with the remainder of the paddock sown May 24. Approx. 20 mm of rain was received on May 27.

Results

- Despite marginal moisture at the early sowing time, the early sown crop emerged well before the later sown crop, and had better early vigour and ground cover.
- By September, the early sown crop had visibly more biomass and was mid-way through flowering, whereas the later crop was only just starting to flower (Fig. 1).
- The season was characterised by a wet June, average July and dry August-September, but then 35 mm fell in early October, helping the later sown crop to mature and fill grain.
- Some frosting did occur during September, which probably impacted yield in the early sown crop, but this was followed by several days over 30 degrees C in late September, which would have caused heat stress to the later sown crop – emphasising the fact that optimal sowing time is a compromise between frost risks at early flowering, and heat and drought risk at grain fill.
- Harvest data showed that the early sown crop yielded 2.3 t/ha and the late sown crop 2.2 t/ha; this level of yield advantage for early sown crops is slightly lower than what has been seen in other trials across the Vic Mallee in other years.

What does the farmer say?

According to Anthony Rowe:

- We've only been sowing early for a few years now - it was good to see the early sown crop establish well even though moisture at time of sowing was marginal.
- We know that early sowing is generally better, but it was good to get some data to back that up - to get 0.1 t/ha higher yield from the early sown crop in a year that had a late rain was interesting. The difference probably would have been higher if we hadn't had the late rain.
- The only reason we are able to sow earlier now compared to 10 years ago is because we have shifted to no-till seeding systems and changed our rotations to allow better weed control as well as conserve moisture through summer weed control.

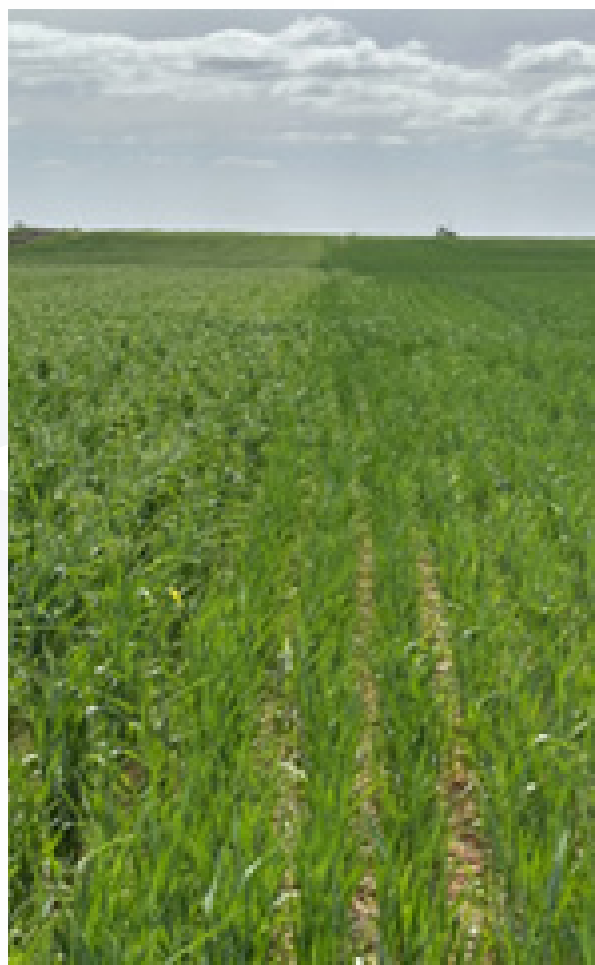


Figure 1. Sceptre wheat seeded May 1st (left side of picture) was more advanced and showed greater biomass compared to the crop seeded May 24th (right); photo taken Sept 5th, 2023.

- Knowing we have some moisture down the soil profile is another factor giving us confidence to sow early or dry - going into 2023, there was significant soil moisture after the wet spring of 2022, and having sprayed out summer weeds.
- The extra biomass from the early sown crops gives us better ground cover, more sheep feed, and helps us to get through a drought.

What does the agronomist say?

According to local agronomist Peter Baird:

- Many Millewa growers are finding that sowing a proportion of their crop early, often before the break of the season, is a useful strategy to ensure they get all crop sown in the optimal window - if they wait for the break they can end up sowing too late into June, leading to problems filling grain in a dry spring.

- Early sowing maximises the length of the growing season, improves early season vigour, and leads to yield gains of up to 0.5 t/ha.
- Downsides to dry or early sowing include false breaks and frosting of early maturing crops. There is also the major issue of weed control - with early sown crops, weeds do not germinate before seeding. Growers are reliant on pre-emergent herbicides, which never give 100% control.
- These risks can be reduced by sowing later maturing crops and varieties first, and sowing paddocks with low weed pressures first.
- Growers that succeed with dry or early sowing tend to have an overall farm plan and rotations that allow good weed control. A high degree of organisation is required to ensure timeliness of all operations.

01 Have a farm plan

For dry sowing to succeed, you need to have an overall farm plan. Most farmers starting out with dry seeding need help from an agronomist to develop one. The plan takes a 'systems approach', starts before harvest, and covers weed control, rotations, time of sowing for different crops, and nutrition.

02 Low weed pressure

Under dry seeding, weeds do not germinate before seeding, meaning pre-emergent herbicides must be used to manage the first weed flush. Pre-emergent herbicides vary in their effectiveness in dry soils (for more information, see GRDC factsheet Paddock Practices: dry sowing and pre-emergent herbicides), and no pre-emergent herbicide can be expected to achieve 100% control. Thus, dry sowing should only be considered in paddocks with few weeds, or paddocks where light weed pressure can be controlled in crop. Having the right rotation with appropriate weed control options is the key to achieving low weed pressure.

Factors to consider before dry sowing

The advantages of sowing at least some crop dry in the southern cropping zone are well established and are highly relevant in the SA, Vic & NSW Mallee regions.

Advantages include:

- Maximising the length of the growing season and allowing early growth under warm soil conditions once rains do occur.
- Yield gains of up to 0.5 t/ha, particularly after a dry spring
- Improved biomass and ground cover
- For farms with large cropping programs, the ability to get more crop sown in the optimal germination window (before it gets too late).

However, a number of factors need to be considered, and conditions met, before dry sowing is viable:

03 Timelines of operations

For dry seeding to work, everything needs to happen on time, based on the overall farm plan. Seed, fertiliser, herbicides (pre-emergent and in-crop) and seeding and spraying gear all need to be ready by a set date each year. If there are delays in getting the crop in, or in achieving in-crop spraying, the benefits of sowing early may be lost and the approach may not work.

04 Machinery requirements

Sowing into dry soils can make correct seed placement difficult, particularly in heavier soils, and not all seeding set-ups provide the right amounts of soil throw and seed/herbicide separation under dry conditions. Given the need for prompt in-crop control where weed problems do occur, it is also essential that growers have the capacity to spray their crops quickly.

05 Frost risk

The main disadvantage of early sowing is increased frost risk at flowering and early grain fill. This can be partly mitigated by sowing longer season crop types and varieties first. Sowing a number of crop types that have a range of flowering dates and maturities can reduce this risk, along with being ready to cut frosted crops for hay.

Despite these many requirements for dry seeding success, there are plenty of growers in low-rainfall areas using the approach each year. A good starting point for many has been to include browned out vetch crops or more pulses in their rotations, to achieve better grassy weed control and conserve moisture.

Factors that favour the decision to sow dry include:

Lack of capacity to seed intended program within optimal sowing window

Low weed pressures

Late break to the season

Conserved subsoil moisture

Forecast rain

Dry topsoil

Where the conditions apply, farmers are obviously less likely to sow dry. The other condition that often leads to a halt in dry sowing is when soils are partially wetted up by a small rain event, increasing the risk of a staggered germination - in this case farmers may wait a week for the soil to dry out before resuming seeding, particularly if it is early in the season.

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