Early sowing adds yield to slow-maturing wheats

By Deanna Lush

**AT A GLANCE...**
- Slow-maturing varieties must be considered in the change to early sowing.
- Date of sowing and variety maturity can add an extra 0.8 tonnes per hectare to yields.
- Early sown crops yield more because they have deeper roots with more water and nutrient access.
- Other yield determinants include faster canopy development and longer stem elongation phase.

If rain in summer and early autumn provide good subsoil moisture, how early is too early to start sowing wheat?

CSIRO research is helping to answer this question for grain growers so they can get crops in, up and well established to take advantage of stored moisture and help adaptation to increased climate variability.

CSIRO’s James Hunt says the key to successful early sowing is for growers to understand their region’s optimal flowering window and how to achieve it with different varieties and sowing dates.

The CSIRO has partnered with FarmLink, Southern Farming Systems and NSW Department of Primary Industries, with funding from the GRDC, to test how slow-maturing, milling quality spring wheats sown early into stored soil water, yield in comparison to mid-fast varieties sown in the usual sowing window.

Data was collected from a range of maturing wheats – very slow, slow, mid, fast and very fast – at three locations – in the high rainfall zone at Lake Bolac and Westmere, Victoria; in the medium rainfall zone at Temora and Junee, NSW, and in the low rainfall zone at Condobolin, NSW.

Overall, the trial found that very slow or slow maturing wheat varieties sown in mid to late April averaged an extra 0.8 tonnes per hectare more than mid to fast varieties sown in mid-May (see Table 1).

There are two key risk factors in sowing crops early – the amount of rain that will be received in late autumn after the crop is sown and the chance that the crop will be flowering in the high-risk window for frost.

**TABLE 1: Early sowing trial summary**

<table>
<thead>
<tr>
<th>High rainfall zone</th>
<th>Medium rainfall zone</th>
<th>Low rainfall zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Bolac &amp; Westmere (Vic)</td>
<td>Temora &amp; Junee (NSW)</td>
<td>Condobolin (NSW)</td>
</tr>
<tr>
<td>High density plantings of late April-sown Bolac at Lake Bolac yielded 7.0 t/ha, compared with a mid-maturing variety sown in early May at 6.6 t/ha and fast-maturing variety sown in late May at 6.0 t/ha. Bolac and mid-maturing variety Derrimut also performed well at Westmere when planted in early May.</td>
<td>EGA Eaglehawk sown in mid-April yielded more than mid-fast variety Lincoln sown in mid-May by 0.8 t/ha at Temora in 2011 and 2.1 t/ha at Junee in 2012.</td>
<td>All varieties sown at their optimal time from mid-April to mid-May had similar yields because of a dry spell in late winter. Eaglehawk and Bolac yields were helped by low density plantings but fast-maturing wheats sown later were lower yielding. Eaglehawk sown in mid-April at 30 plants per square metre yielded more than Lincoln sown in mid-May at 90 plants/m² by 0.4 t/ha in 2011 and 0.6 t/ha in 2012.</td>
</tr>
</tbody>
</table>

**SOWING RATE, VARIETY KEY TO LOW RAINFALL ZONE SUCCESS**

THE saying ‘sow early, sow light’ applies when it comes to early-sown wheat in the low rainfall zone.

University of New England’s Neil Fettell coordinated the Condobolin trial site in which data was generated for the CSIRO project.

Neil, a GRDC Southern Panel member, said the trial demonstrated that sowing in late April gave at least the equivalent and sometimes higher yields than main season sowing in mid-May.

“If sowing earlier in April, it’s important to keep seeding rates low at 30–40 plants per square metre to keep the harvest index high,” he said.

But the key problem is the lack of variety options at present for early-sowing in the low rainfall zone. EGA Eaglehawk and EGA Wedgetail are most often used in southern NSW and in parts of Victoria but they can be too slow whereas Bolac must be sown early to avoid high screenings.

“Breeding companies are working on plugging that gap, particularly for southern Australia,” he said.

Neil said it was important to use the appropriate variety for each sowing time and that longer season varieties had to be sown early.

“We are not pushing people into sowing quick varieties early and getting frosted,” he said. “Realistically, early sown crops will be a portion of your area. It’s about spreading risk and workload by spreading sowing times and taking advantage of opportunities.

“We are much better at weed control now, we don’t have to work it up and back, so modern farming systems give more opportunities for early sowing because of the machinery and weed control advances.”
Unlock your Phosphorus with FertiCoat- the ultimate solution for Phosphorus availability. Call today to find out how.

Perfect for granular coating, mixing with UAN for stability and liquid soil injection.
Managing frosts and other risks

In the past 17 years, rain in April and May has declined because of a southerly shift in the position of high pressure systems from central Australia, called the sub-tropical ridge. In recent years, this weather phenomenon has pushed the traditional Anzac Day autumn break back into May or June.

But in many areas, there is rain falling earlier in the summer fallow period, such as February and March. This means by conserving moisture from these falls, growers can use it to establish crops instead of waiting for the traditional autumn break.

The sub-tropical ridge change has caused an increase in the number of spring frosts in southern Australia in recent years and has changed the period of frost risk.

While the window of frost risk has widened over southern New South Wales, Victoria and eastern South Australia, it has become later over Western Australia and western parts of South Australia.

THE GROWER...
Charles Kingston, The Rock, NSW

Charles Kingston

There are two ‘must-haves’ when early sowing wheat – clean paddocks and enough moisture to ensure the crop will germinate and emerge straight after it is sown.

That’s the experience of Charles Kingston, who farms with wife Emma, parents John and Sue and brother David and his wife Rebecca.

The Kingstons planted long-season variety Bolac, a cultivar suited to southern NSW’s medium and high rainfall zones, on April 23 last year. It was seven to 15 days before seeding would have traditionally started in the first week of May and was harvested in late November, when all wheat sown was ripe.

“It smashed everything else,” Charles said. “The early-sown Bolac averaged 4.0 tonnes per hectare while the wheat in total averaged 3.2 tonnes per hectare, including the Bolac.”

Bolac sown later in the program on May 2 did not finish properly and had high screenings.

There was no disease or frost in the early-sown Bolac and only a few broadleaf weeds which were easily controlled.

The trade-off

One of the challenges for the Kingstons in making the change was the trade-off between sowing times and different crops. While they were out sowing Bolac, it was traditionally their window of time for sowing canola, a crop they knew they were good at growing and would be profitable.

“We are still feeling our way with it. I don’t think we’d have the whole farm sown to Bolac that early but it’s definitely an option for a portion. A tight finish that was warm and dry would be an issue for the crop.

“Clean paddocks are needed because the effectiveness of your knockdown spray will be marginal. The key is to ensure it comes up in April when it is sown, because if it doesn’t come up you’re in a lot of trouble.”

In 2013, the Kingstons have sown 2075 hectares mostly to wheat, canola and brown manure crops but also grazing wheat and lucerne and clover pastures undersown to barley and wheat. They also run 2700 merino breeding ewes, one-third mated back to merinos and two-thirds to Poll Dorsets.

While they were sowing into lots of moisture in 2012, they did not early sow Bolac this year because it started to get very dry and their cleanest paddocks were canola stubbles which lacked cover. Other paddocks were not as clean as they would have liked.

Charles says, in hindsight, this year they should have been aiming to early-sow Bolac into wheat stubbles rather than canola. And with good rain since the break to the season, some paddocks now have plenty of moisture.

Instead, canola was sown in April last year in moisture under wheat stubbles and on April 27, Charles started to sow Gregory wheat into marginal moisture.

The Kingstons put in 120 hectares of dual-purpose milling wheat EGA Wedgetail on April 1. Grazing started on June 5, with one 45 hectare paddock carrying 450 pregnant ewes, a carrying capacity of 20–25 DSE per hectare.

Other paddocks were not as clean as they would have liked.

James says planting currently grown varieties in early autumn increases frost risk because of the earlier flowering time.

He says for growers to make the change to early sowing, they will need to consider slow-maturing varieties such as winter wheats, with their stronger vernalisation, or slow-maturing spring wheats.

“Such varieties do exist but they are currently undervalued and rarely used because they are sown too late for their yield and quality potential to be fully expressed,” he said.

Despite these risks, James says yield penalties for sowing too late are generally higher than for sowing too early, even at sites where frosts are common.

Early sowing benefits

James says while growers may cringe at the prospect of keeping seed of multiple varieties on hand to sow an unknown area of crop each year, the yield benefits of early sowing are substantial.

Early sown crops are higher yielding because, when the soil

Charles Kingston
Powerful savings on 4WD tractors
Everything you need to go all out

Get a great deal now on John Deere 9R/9RT Series Tractors. Choose between models with 265 to 412 kW* of engine power, plus the spacious and comfortable CommandView™ II Cab. Act now and save thousands. The earlier you order, the bigger the savings. See your local John Deere Dealer today. Nothing Runs Like A Deere.™

* Rated engine hp (ISO) per 97/68/EC. Offer ends 31 Aug 2013. See your dealer for full details.
Optimal flowering

James says CSIRO research has shown there are three basic strategies for achieving an optimal flowering time:

- **Plant winter wheats from early-March to mid-April;**
- **Plant slow-maturing spring wheats from mid to late April; and,**
- **Plant mid-fast varieties from late April into May.**

The first two strategies require some stored soil water – about 25–30 millimetres of plant available water. Use a shovel to check if soil is wet to at least 30 cm on most soil types,” James said. “These crops must germinate and emerge when they are sown. Winter and slow maturing spring wheats will flower too late if they do not establish before the end of April.

“Choose paddocks that are relatively weed-free and therefore do not require a good knockdown for grass weed control. If sowing early into high soil N, reduce seeding rates.”

He says one of the advantages is that including a slow-maturing wheat variety in a farm program increases the frequency of planting opportunities and allows more crop to be sown and flower on time, increasing average farm yield.

**Full details of the trial are available in the 2013 Temora, NSW, Update proceedings www.grdc.com.au/UpdatesPapers**

More information: Dr James Hunt, 02 6246 5066, james.hunt@csiro.au

Deanna is the GRDC Southern Region science writer.

---

**THE FARM CONSULTANT…**

**Chris Minehan, Rural Management Strategies, Wagga Wagga**

Early sowing a proportion of wheat area to long-season varieties can increase average yields and improve whole farm productivity, says Rural Management Strategies’ Chris Minehan.

He has a number of clients early sowing long-season spring wheat varieties, based on the findings of CSIRO’s time of sowing research.

He says using winter wheats and long-season spring wheats enables more wheat to flower at the ideal time for that area and the average wheat yield across the whole farm is increased.

Starting earlier also spreads the workload and reduces stress, with less pressure to have everything sown by June.

“Some clients finished their sowing program by the third week of May this year, by utilising available moisture when it was there and starting both canola and wheat earlier. Those with brown manure crops found it helped spread the workload,” Chris said. “That means we didn’t have many clients sowing past the end of May this year. This region has had around 100 mm in June, so that’s in-crop rain for most.”

**Frost concern**

One of the barriers to adoption has been concern about frost damage. But Chris says the risk of frost damage needs to be weighed up against the potential damage of heat stress at flowering.

“Frost seems to be more visual than heat stress,” he said. “Yield loss from heat stress at flowering probably occurs every year but because it happens to the whole crop, it is less obvious. About 5–10 per cent frostling can look pretty bad, but may be a better yield outcome than no frosting and more heat stress.”

Chris uses **Yield Prophet** to determine frost and heat risk for varieties when looking at a specific location and date.

“Another concern is that crops will use up the available moisture and will ‘hay off’ at grain fill, which is why stored moisture and canopy management are so important.”

Grain growers need to consider the logistics of storing long-season wheat varieties in areas where an early sowing opportunity may only arise every three or four years.

Chris encourages growers considering the concept to sow one paddock as a test and compare with their normal practice.

In his experience, farmers with livestock are generally comfortable early-sowing winter wheats like EGA Wedgetail or Marombi because they provide a grazing option.

“This season around Wagga and Lockhart there was a planting opportunity in late March and early April, so Wedgetail was sown then. By the end of April surface moisture wasn’t adequate to establish Bolac in many cases. Each year is going to be slightly different.”

Chris says grain growers need to consider how any new technique or technology fits into their individual farming system.

**RULES OF THUMB: EARLY SOWING**

- There must be 30 mm of plant available water (PAW) stored in soil before sowing.
- There must be enough moisture in the top 5–10 cm to germinate wheat. While a paddock may have good moisture at depth, if it is dry at the surface the crop may not establish in the correct window and end up flowering far too late.
- Early-sown paddocks must have a low weed burden. It is especially important to have a low grass weed seed-bank. Canola stubbles are often the best choice after good grass weed control the previous year.
- Match the sowing time with the variety. For example, Bolac has to be sown in April, May is too late. Medium and high rainfall areas have more early-sowing variety options than low rainfall areas.
- Crop canopy must be managed by reducing sowing rate for earlier sown crops and avoiding oversupply of nitrogen in the vegetative phase by using paddock history and deep soil tests.