OPTIMISING SEEDING DEPTH

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Key takeaways

- **Fertiliser placement needs care when dry sowing. Separation is important in light soils or when applying higher rates.**
- **Long coleoptile wheat and large, high-quality seed are better suited to deep sowing.**
- **Understanding your soil types and their water holding capacity will help guide sowing depth decisions.**
- **There is little benefit to deeper sowing if there's no soil moisture at depth.**

Sowing depth must balance access to moisture with emergence ability, particularly when soils are dry, herbicide residues are present, or rainfall is uncertain.

Whether deeper sowing is beneficial depends on the soil moisture profile, soil type, crop variety, herbicide program, and machinery capability. While it can help access stored moisture, deep sowing comes with trade-offs: if rain falls soon after sowing, shallow-sown crops may emerge faster. It also places greater demands on machinery, with higher fuel use and increased wear.

Soil moisture

Check how deep the moisture starts and how much of the profile is wet. Peter Baird, Mallee agronomist says, 'What matters is not just whether you can get the crop out of the ground, but whether there's enough subsoil moisture to keep it growing. A narrow band of moisture (e.g. 5–20 cm) isn't enough. In 2024, most crop growth came from stored subsoil moisture, not in-crop rainfall.'

Sowing depth

Place seeds well into the soil moisture, not at the top of it. Sowing too shallow into marginal moisture can lead to poor emergence if conditions remain dry after sowing, especially in soils with a higher clay content. Misjudging moisture depth or availability can result in establishment failures as the profile dries down in the weeks after sowing.

Without access to moisture, deeper sowing can delay emergence or reduce plant numbers. A 2021 Victorian Mallee trial found little difference in emergence between sowing canola at 10 mm and 20 mm. Sowing at 35 mm delayed emergence by about 30 days and required around 10 mm of rain, while shallower sowing allowed emergence to occur earlier and with less rainfall (McDonald, 2024).

Early sown (left) vs later sown lentils (right). Photo: Murray Plains Farmers.

Monitor seed depth

Don't assume the machine is sowing at the set depth. Check regularly throughout the day, especially when changing paddocks, soil types, or conditions. Even small variations in soil hardness or stubble load can affect depth.

Machinery Setup

Seeder type, opener design, travel speed, and press wheel pressure influence sowing depth. Knife-point and press wheel systems suit deep sowing if correctly set-up. Sowing too fast or with uneven pressure reduces seed-to-soil contact, consistency and can compact furrows. Disc seeders tend to disturb the soil less but may struggle to reach depth in dry or hard-setting conditions. The seeding systems case study has more information.

Soil texture and drying behaviour

Sandy soils wet up and dry out quickly. Seeds placed too shallow in sandy soils risk drying out before emergence if follow-up rain is limited. Heavier clay soils absorb water more slowly and unevenly, creating patchy wetting patterns that make it harder to target sowing depth accurately.

Crop Choice

Some crop types tolerate deeper sowing better than others. Long coleoptile wheat varieties (see long loleoptile wheat case study) can be sown up to 100 mm deep and still emerge successfully. Canola can be penalised when deep sowing, especially in dry conditions.

Seed size and quality

Large, high quality seeds produce thicker, stronger coleoptiles, which improves emergence. They also offer greater early vigour, with larger leaves and more extensive seminal root systems to support establishment. For deep sowing, use seed over 2.5 mm, protein >11 %, germination >90 %. Avoid damaged or weather-affected seed.

Herbicide Interactions

Shallow sowing in combination with certain herbicides increases the risk of crop damage due to concentration of herbicide near the seed zone. However, sowing too deep may delay emergence or reduce vigour, especially in dry conditions (see pre-emergent herbicide case study).

Northern Sustainable Soils

Key messages

- **Placing high salt index fertilisers with the seed can reduce establishment, growth and yield, even at relatively low rates.**
- **Seed and fertiliser separation is important when applying higher phosphorus rates in alkaline soils.**

Jordan Green farms 2100 ha near Bute, SA, with his father Milton. Their program includes cereals, pulses and export hay. Average annual rainfall is 370 mm. With dry starts increasingly common, Jordan has focused on getting seed and fertiliser placement right, both to protect crop safety and to make better use of available moisture.

In 2023, Jordan upgraded to a second-hand DBS bar with twin chutes. He chose the DBS for its ability to sow deep, its minor delving action that helps bring moist soil closer to the surface, and its strength in heavier country. Jordan says, 'It's tough on diesel, but it can handle the heavy country. I wanted a system that would work 95% of the time, across all our soils, and give us confidence that both seed and fertiliser are where they need to be.'

Seeding depth is typically set at 25 mm, while fertiliser is spread throughout the dig zone, which extends down to 100–120 mm. About one-quarter of the fertiliser is applied with the seed, and the remaining three-quarters are scattered through the soil profile below the seed. This separation has become critical as they increase phosphorus rates to overcome tie-up in alkaline soils.

In recent years when moisture has been marginal, he's placed little to no fertiliser with the seed.

The DBS also gives Jordan the flexibility to chase moisture. With long knife points, the bar can place seed down to 100 mm.

Jordan says seeing the Northern Sustainable Soils trial site at Barunga Gap (which compared different placement strategies and fertiliser types) reassured him they were on the right track with their seed and fertiliser placement. 'It backed up what we were already trying to achieve,' he says. 'It's a good reminder that if you're running high P rates or chasing moisture, knowing where your seed and fertiliser are going really matters.'

Control summer weeds

Deep-rooted weeds can deplete reserves needed for early sowing. In mixed farming systems, some growers rely on summer weeds for grazing, but using weeds for feed may reduce your ability to sow early and deep later. Peter Baird notes, 'If you're relying on those weeds for a month, you need a better plan. Identify cropping paddocks early and manage them with a focus on moisture conservation.'

Fertiliser placement

Dry sowing increases fertiliser toxicity risk if seed and fertiliser are close, especially in light soils or with high fertiliser rates. To reduce risk:

- Keep seed and fertiliser bands separate. Use a double-shoot system if possible.
- Use narrow row spacing and wider seed spread (higher seedbed utilisation)
- Avoid placing high rates of nitrogen or phosphorus directly with the seed, especially ammonium-based products.

Some deep-banding systems place seed through the fertiliser tube in reverse configuration (fertiliser above the seed). While this reduces toxicity risk, it may delay early nutrient uptake—particularly under marginal moisture conditions—leading to reduced seedling vigour.

Early sowing for stockfeed

Early deep sowing into stored moisture can establish valuable feed without follow-up rain—but only if summer moisture was conserved. While self-sown cereals or summer weeds may provide short-term grazing, relying on them too long depletes the moisture needed to make early sowing successful.

Timing, rates and nutrition

Early sowing works better with warm soils. Crops sown into cold soils in late May or June will establish poorly and grow slowly.

Expect some losses when sowing deep. Increasing seeding rates can help maintain target plant populations.

Good crop nutrition supports emergence from depth.

References

McDonald, G., 2024. A summary of recent experiments on soil moisture, germination and crop establishment. Hart Field Trial Results 2024. Pp 122-128. Available at: https://www.hartfieldsite.org.au/media/2024%20Trial%20Results/Hart_Trial_Results_2024_web.pdf

Adjusting the seeder. Photo: Jordan Green

Photo: Matt Dunn

Ag Innovation & Research Eyre Peninsula

Key messages

- **Switching to a disc seeder has made it easier to manage rocky paddocks, improving trafficability and seed placement.**
- **Shallow sowing has proven more reliable in dry years, making the most of small rainfall events.**

Matt Dunn farms 3,800 ha near Rudall on the central Eyre Peninsula, where annual rainfall averages 330 mm. The farm sits on a typical dune–swale landscape with calcareous sandy loam soils and limestone rock close to the surface. Rocks are scattered across most paddocks, to the extent that it's not practical to treat stony areas separately.

Matt switched to a disc seeder in 2013 to better manage the rocky soils across his farm. With his previous tyne system, rocks were regularly pulled to the surface, making paddocks rough and difficult to manage. He started with a Tobin disc seeder on 300 mm row spacings, and later upgraded to an Alpha disc system with 175 mm spacing to improve seedbed utilisation and achieve more even establishment. Seeding depth is adjusted manually, and

Mallee Sustainable Farming

Key messages

- **Early deep sowing into stored subsoil moisture can establish crops ahead of the break.**
- **When soil moisture is very limited, leaving paddocks fallow to preserve water for the following season can be a lower-risk option than sowing a crop.**

In 2024, summer rainfall left good subsoil moisture across many Mallee paddocks, prompting growers to consider early sowing opportunities. With limited surface moisture and no guarantee of a timely break, the question was whether sowing wheat early and deep could establish a crop on stored moisture—and whether long coleoptile varieties were needed to make it work.

Mallee Sustainable Farming partnered with the Baird family at Anabranch South to establish a demonstration site comparing early deep sowing with more conventional timings. Two wheat varieties were included: Hammer(ϕ), a common Mallee variety with a standard coleoptile (~95 mm), and Calibre(ϕ), a newer variety with a longer coleoptile (~108 mm). Both were sown at approximately 10 cm depth—twice the typical depth—on three dates: 18 April, 1 May, and 16 May.

The earliest sowings (18 April and 1 May) emerged within about ten days, establishing successfully on stored subsoil moisture alone. The 16 May sowing did not emerge until early June, following opening rains.

Through winter, despite decile 1 rainfall, early sown crops maintained stronger growth and earlier development.

Although the early crops got off to a strong start, the season remained dry through September and early October. Frost affected some of the earlier sowings, while late rainfall helped boost later sown wheat. In the end, all treatments yielded between 1.2 and 1.4 t/ha, with few consistent differences between sowing dates or varieties.

Would the Bairds sow wheat early and deep again?

'Definitely', says Nigel Baird. 'It was great to get some in and up early last year, earlier than we'd ever tried before. For most of the year, it was the pick of all our crops, and if it had been a better year, it probably would have outyielded all the later crops. Another thing we learnt was that our regular wheat varieties can establish well from depth, so we won't be worrying too much about coleoptile length in our program in future. It was also good to see too that a commitment to weed control the previous summer can help us bank enough moisture to get a crop up early.'

This season (2025), the Baird's have minimal subsoil moisture. With little early season rainfall and drought conditions escalating, they have decided not to sow any crops. However, the next time there's good subsoil moisture they'll be keen to get sowing in mid-April again.

the process takes around half an hour—there are no on-the-go depth adjustments.

Matt adjusts seeding depth each season based on where the moisture sits in the profile, usually sowing between 10 and 50 mm depth. He generally aims for 30 mm, but goes shallower on sandy rises where the press wheel furrow can collapse and bury the seed. At the moment, he's working through a soil amelioration program, which has left the soil softer in places. To suit these conditions, he's growing longer coleoptile wheat (Calibre$^{\phi}$), which copes better with variable seeding depth and performs more reliably in softer soils.

Matt assumed sowing deeper to chase moisture wouldn't be practical due to the amount of rock. But the 2024 AirEP trial on his property, where the crop germinated well from 90–100 mm depth, has made him reconsider whether deeper sowing might be possible.

Matt has found that in dry seasons, sowing shallow can help de-risk the program by making better use of small, frequent rainfall events. 'If we get 20 mm after sowing, the crop is fine," he says. 'But if it's only 4–6 mm at time, the shallow-sown areas come up better.' In 2025, he trialled a skip-row approach in one paddock—sowing rows alternately at 30 mm and 40 mm depth. The decision to go deeper in the second pass was driven by rough paddocks following grazing, with the aim of improving seed placement and levelling the surface.

With only sporadic 5–6 mm rain events since seeding, and only 50 mm of rain total since sowing (which began at Easter), the seed sown at 30 mm emerged around 10 days earlier than the deeper-sown rows, which Matt puts down to the small amount of rain reaching the shallower sown crop.

Dry sown lentils tapping into moisture at depth - at Cleve 2024.

Photo: Lyndon May, Elders

The project, "*De-risking the seeding program – Adoption of key management practices for the success of dry and early sown crops*" was led by Ag Excellence Alliance. It combined research and on-farm experience to support earlier and more strategic sowing decisions to build drought resilience. The project draws on the expertise and local knowledge of fourteen grower groups across the grain producing regions of South Australia, Victoria, New South Wales and Western Australia. Scan the QR code to find out more.