GROWING LUPINS WITH WIDE ROW SPACING IN THE NORTHERN AGRICULTURAL ZONE

A REGIONAL CROPPING SOLUTIONS NETWORK INITIATIVE
Growing lupins with wide row spacing in the northern agricultural zone

A Regional Cropping Solutions Network Initiative

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GRDC invested in the Regional Cropping Solutions Networks (RCSNs) in 2011 with the primary aim to identify local research, development and extension priorities. There are five RCSNs across the western region, which are based on port zones:

- Albany port zone RCSN
- Esperance port zone RCSN
- Kwinana West port zone RCSN
- Kwinana East port zone RCSN, and
- Geraldton port zone RCSN.

The RCSNs comprise a mix of 60 growers and industry professionals who meet formally twice a year to discuss research, development and extension priorities that will improve profitability for grain growers in Western Australia. At their August 2017 meeting, Geraldton port zone RCSN members noted that most growers were struggling to grow profitable lupins. However, there were some growers in the zone who had created a successful system for growing this valuable commodity.

In 2016, the Grains Industry Association of Western Australia (GIWA) estimated that 357,000 hectares of lupins were sown in WA, with 185,000ha being sown in the Geraldton port zone (51.8 per cent of WA total). In this zone, the largest area is sown to wheat, followed by lupins and then canola. Discovering systems to improve the yield of lupins is financially vital to the zone (and WA), as areas sown to lupins have rapidly declined since the late 1990s. Part of the reason for the decline is that canola varieties are now available that are well adapted to northern lupin production areas.

To understand some of the reasons why growers were struggling with lupins, the Geraldton RCSN port zone members wanted to identify successful lupin growers in their port zone and then ask them what they were doing differently. As a result of these interviews, a collection of case studies of growers in the western region documenting real data and experiences has been developed.

Case studies of 10 growers who have adopted lupins into their farming system in the Geraldton port zone are included in this booklet, together with relevant on-farm work and recent research that has been conducted on lupins. The agronomy packages that these growers have adopted will be of great interest to lupin growers. As noted by the Geraldton port zone RCSN members, “We need to find out why some farmers are really doing well out of lupins.”

We would like to acknowledge the support of these 10 growers in sharing this knowledge, as grower-to-grower knowledge transfer is invaluable and is often the best way for other growers to adopt new practices. Further acknowledgement is made of the support and information supplied by grower groups in the Geraldton port zone including the Northern Agri Group and Mingenew Irwin Group, all of which have conducted valuable research for their local growers.

We hope that this booklet can provide growers in the western region with the knowledge to assess the risk and rewards and have the confidence to once again successfully establish lupins on their own properties.

THANK YOU!

Thank you to each of the 10 growers who shared what they do and why they do it for the broader benefit of the grain growers of the Geraldton port zone.

Julianne Hill, Western Region RCSN Coordinator
How to successfully grow lupins in the northern wheatbelt

Narrow leaf lupins, or white lupins, are the most commonly grown lupins in WA and, according to Grains Industry Association of Western Australia (GIWA), in most seasons more than 50 per cent of the state’s production comes from the Geraldton port zone. While albus lupins are also grown in this region, they make up a significantly smaller area and so this booklet focuses on the production tips to successfully grow white lupins.

Lupins are well suited to the sandplain soils of the north and provide a valuable nitrogen source and disease break for subsequent crops. For those who have livestock in their farming systems, the grain and stubble provide valuable feed.

While lupins have been traditionally grown on narrow rows (15 to 18 centimetres) or 7 - 10 inches), research on improving the drought tolerance of lupins by growing them on wider rows (50cm) has seen the adoption of wide row lupins, particularly in the drier areas of the WA northern wheatbelt.

Lupins grown on wide rows grow slower than narrow row lupins, as they intercept less sunlight and use less water, leaving more soil moisture in the inter-row to access later in the season for grain fill.

In warm environments, wide row lupin are unlikely to yield less than those grown on traditional row spacings (Harries and French, 2007).

Wide row lupins are also commonly seen to be growing about five centimetres taller than narrow row lupins (White et al., 2008), which can make harvest easier. In general terms, the agronomy of growing wide row and narrow row lupins is similar.

In the northern agricultural region, wide row lupins (50cm or 20 inches) are unlikely to yield less than narrow row lupins (15 to 18 cm) and they can be about five centimetres taller.
Crop establishment

Paddock selection
Sandy soils with a pH between 4.5 and 7 (CaCl₂) and a relatively low weed burden are ideal to grow lupins (Pritchard, 2018). Blue lupins are very competitive and so paddocks with a high blue lupin loading should ideally be avoided, or a germination and subsequent knockdown should occur before seeding. Choosing paddocks with more than 20 per cent retained cereal stubble is advantageous to reduce the risk of brown spot disease and, in wide row lupins in particular, to minimise the potential of wind erosion (White et al., 2008).

Variety choice
The choice of white lupin varieties is not a factor between wide and narrow row lupins, with commonly grown varieties suited to both systems. Popular varieties in the Geraldton port zone include the newest release PBA Jurien®; as well as PBA Barlock® and Coromup and Mandelup. These varieties all have metribuzin tolerance and anthracnose resistance. Characteristics of these varieties are noted below.

PBA JURIEN® (2015)
- Consistently high, if not the highest yielding variety in GRDC National Variety Trials (NVT) and Department of Primary Industry and Regional Development (DPIRD) trials in the Geraldton port zone
- Early flowering and early maturing
- Phomopsis and grey spot resistant
- Moderately susceptible to brown spot
- Moderately resistant to cucumber mosaic virus (CMV)

PBA BARLOCK® (2013)
- Good lodging resistance
- Shorter than Mandelup and slightly later flowering and maturity
- Moderate phomopsis resistance
- Improved resistance to pod shattering over Mandelup

COROMUP (2006)
- Similar disease tolerance to Mandelup
- Higher protein than Mandelup
- Early maturing
- Larger seed size than Mandelup

MANDELUP (2004)
- Earliest flowering and maturing variety
- Large seed size
- Prone to frost damage if sown very early
- Prone to pod shattering if harvest is delayed

S inoculant is also compatible (White et al., 2008). Paddocks with acid soils only need be inoculated once, unless more than five years has passed between lupin crops. Therefore, with a strong lupin history, many paddocks in the Geraldton port zone have likely already been inoculated.

Time of sowing
Lupins in the Geraldton port zone are often sown at the beginning of the seeding program as they are best planted early. Ideally lupins should be sown so they are germinating in late April or May when soil temperatures are still warm. Sowing into warm soils allows for rapid germination, emergence and growth so the crop can grow away from diseases such as brown spot. It is not recommended for lupins to be sown in June in the northern wheatbelt. However, stored summer soil moisture, higher-than-average rainfall in August combined with mild spring temperatures can increase the productivity of late-sown lupin crops (Harries and Shea, 2018).

With bigger seeding programs and the fact lupins yield the best when sown early, the majority of lupins in the northern wheatbelt are sown dry. Sowing paddocks with a high weed burden, particularly blue lupins, should be delayed until there is a germination and subsequent application of a knockdown herbicide as there are no in-crop herbicide options. Lupins sown into moisture will also germinate more evenly.

The benefits of sowing dry are to allow the crop to establish in warm soil and maximise the growing season length and thus yield potential, and also logistically it works well. On the other hand, germination can be variable on marginal moisture and with an application of simazine applied pre-seeding, growers are locked into lupins or pulses. Weed control can also be poor as the simazine incorporation may be uneven and weeds are difficult to control in-crop.

Sowing rate
In both wide row and narrow row lupin crops, the recommended plant density is 40 to 45 plants/m² (White et al., 2008), so the seeding rate remains the same irrespective of row spacing.

There is generally no yield penalty if the plant density increases up to 70 plants/m², however if there are less than 40 plants/m², yield losses can be significant (White et al., 2008). High seeding rates provide a buffer for poor establishment caused by sandblasting, non-wetting soils and root diseases. Most of the growers featured in the case studies in this booklet targeted 40 to 45 plants/m² by sowing lupins at 100kg/ha.

Seeding depth
The recommended sowing depth for lupins is 30 to 50mm, which is a compromise between the recommended depths to manage pleiochaeta rot and hypocotyl rot (White et al., 2008). Most of the case study growers featured in this booklet generally sowed lupins 30mm deep or less, but many were prepared to sow down to between 50 to 75mm to chase moisture or to place seed below a non-wetting band of soil.

Inoculation
If lupins are sown into paddocks for the first time, they ideally should ideally be inoculated with a group G inoculant, the group S inoculant is also compatible (White et al., 2008). Paddocks with acid soils only need be inoculated once, unless more than five years has passed between lupin crops. Therefore, with a strong lupin history, many paddocks in the Geraldton port zone have likely already been inoculated.
Plant nutrition

A sample depth of 0 to 10cm is most commonly used to make soil nutrient recommendations, particularly for phosphorus and potassium requirements. However, growers are encouraged to take deeper samples to better understand subsoil reserves of these nutrients. In addition, subsoil samples are also useful to determine soil pH at depth and associated aluminium levels.

Phosphorus (P)

Like other plants, lupins require adequate phosphorus early to maximise growth and development. Compared with cereals, lupins have a higher phosphorus requirement for grain production (White et al., 2008), so growers should use soil tests and paddock history to determine phosphorus and potassium requirements. Critical values of Colwell P vary with soil type due to differences in P sorption. For soil types with a phosphorus retention index (PRI) of less than or equal to one, the critical value is 25mg/kg (Chen et al., 2011).

It is recommended the same rate of fertiliser be applied between wide and narrow rows. Particular care should be taken on wide rows as there is double the fertiliser with the seed compared with narrow rows (Harries and French, 2007).

Potassium (K)

Potassium is required for many plant processes and plants that are deficient in potassium will be less efficient users of water and nutrients than plants with adequate potassium. As with phosphorus, soil tests are recommended to determine potassium requirements. The critical value for the Colwell soil K test is 31mg/kg (Chen et al., 2011).

Manganese (Mn)

While the role of manganese in lupins is not fully understood, the consequences of manganese deficiency are well known. Split seed disorder is a symptom of manganese deficiency, which is more commonly associated with coarser, deeper and more leached sands. Manganese deficiency is corrected by applying a manganese fertiliser either to the soil or as foliar spray when the pods on the main stem are 2 to 3cm long and the secondary stems have nearly finished flowering (White et al., 2008). Growers can have lupin stems and seed tested for manganese levels.

Some growers and advisers in the WA Northern Ag Region (NAR) have observed that PBA Jurien® lupins appear to have a higher requirement for manganese than other varieties. It is recommended to deep band manganese if possible, so the element is in moist soil and available to the plant during grain fill.

Fertiliser placement

It is recommended that fertiliser should be banded about 8cm from the seed to avoid fertiliser toxicity issues (White et al., 2008). Lupins are more sensitive to fertiliser toxicity than cereals as the germinating radicle can be destroyed by the salting effect of the fertiliser and there are no other roots to compensate.

Research by CSBP in 2017, in the WA NAR, examined the effects of fertiliser type and placement on the germination and subsequent growth of lupins. At the Binnu site, the top-dressed plots had the better plant establishment, which translated into the highest yielding plots. Adding MOP to plots that were drilled or banded with Double Phos exacerbated the toxicity and it was worse again if K-Till Extra Plus was banded below the seed. Many of the case study growers in this booklet referenced this research as a reason why they top-dress at least some of their fertiliser.

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<th>TABLE 1: The effects of fertiliser type and placement on germination and subsequent growth of lupins at Binnu.</th>
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Plant density and yield was optimised when fertiliser was top-dressed, rather than banded or sown with the seed. The addition of potassium and nitrogen further increased the fertiliser toxicity.

SOURCE: CSBP, 2017
Weed control

There are fewer herbicide control options for weeds in lupins compared with cereals, so careful consideration should be given to the weed burden of the paddock prior to sowing lupins. Target small, actively growing weeds using the recommended label rate for the situation. There are no post emergent herbicide options available for blue lupin control.

If sowing wide row lupins, tynes not needed for sowing should be lifted or removed to not only reduce weed germinations but to save fuel, allow for faster seeding and to sow into thick stubble more easily.

Pre-emergent weed control

Simazine is commonly applied either on its own or with trifluralin, Boxer Gold® or Sakura® for improved grass control prior to seeding. Simazine gives best weed control when incorporated into moist soil.

Simazine is registered at 550g to 1.1kg/ha (900g/kg a.i) on light soils and 1.1 to 1.6kg/ha on gravelly loam soils. Simazine is very mobile in moist, sandy soils so growers should be particularly wary of large rainfall events on sandy soils causing herbicide damage. The following guidelines (White et al., 2008) are given to minimise the risk of herbicide damage:
- deep white, grey and gritty sands – 0.53kg/ha simazine can damage lupins;
- yellow sandplain soils – 0.83kg/ha simazine may cause crop damage; and
- gravelly loams and sand over clay – 1 to 1.3kg/ha simazine is generally safe.

Post-emergent weed control

Many growers in the case studies used a post emergent three-way mix of simazine, metribuzin and diflufenican.

Research by DPIRD in 2013 examined weed control in wide row Coromup lupins. Treatments included (Riethmuller et al., 2014):
- multiple cultivations between the rows;
- applying herbicides onto the crop row after sowing in conjunction with the cultivation; and
- applying a herbicide over the row in conjunction with an inter-row shielded spray.

In-crop cultivation on its own was not successful as it controlled the weeds in the inter-row, but did not control the weeds in the row. Shielded spraying reduced weed numbers without compromising the yield of the Coromup lupins.

Gramoxone® 250 is registered at 0.4 to 0.8L/ha and Reglone® at 2 to 3L/ha to crop-top lupins.

In addition, harvest weed seed control principles apply to lupins, with narrow windrow burning being the most commonly used tool. In time, as integrated weed seed destructors become less cost prohibitive, it is expected they will have an excellent fit for lupins. Burning practices on light soils often leave an uneven distribution of nutrients, such as potassium, across the paddock.

Blue lupins (in the inter-row) are becoming a larger problem and with no post emergent herbicide options, many growers are delaying their sowing to enable a knockdown prior to sowing. However, this is costly in terms of reduced yield potential.

PHOTO: CUSSONS MEDIA

GROWING LUPINS WITH WIDE ROW SPACING IN THE NORTHERN AGRICULTURAL ZONE
Insect control

As with cereals, there are three critical stages to monitor lupins for insect damage (Pritchard, 2018):

- from emergence to three weeks post emergence, monitor crops for redlegged earth mite, cutworm and lucerne flea;
- at flowering monitor for aphid damage; and
- at pod fill monitor for native budworm.

As wide row lupins remain green for a few weeks longer, native budworm should continue to be monitored until the pods are too hard for the grubs to penetrate. To avoid aphid infestation, wide row lupin growers should sow paddocks with high stubble loading to reduce the attraction of aphids to bare earth.

Disease

While lupins are susceptible to a range of diseases, many case study growers felt disease management was not a significant challenge.

**Brown spot**

Brown spot is the most widespread lupin disease, causing the most damage to yield when it occurs at the seedling stage. The occurrence of brown spot can be reduced by avoiding sowing lupins into bare paddocks with minimum stubble cover, applying an iprodione seed dressing such as Rovral® Liquid, having longer rotations to reduce spore concentration and by practising good agronomy to promote good early seedling vigour. For wide row lupin growers, retaining at least 20 per cent standing stubble will reduce the spread of brown spot (Harries and French, 2007).
Sclerotinia

More canola in the Geraldton port zone has resulted in an increased incidence of sclerotinia in lupins. Sclerotinia is most common in paddocks with lush dense canopies in areas with regular rainfall that have had lupins or canola with a sclerotinia infection previously (Thomas and Coutts, 2018). While there is no fungicide registered for sclerotinia control in lupins, there are minor use permits in place for boscalid (Filan®) and iprodione (Rovral® Aquaflo), but there is little understanding of best practice application.

In 2016, DPIRD explored the use of a fungicide for treating sclerotinia in Mandelup and Amira (albus) lupins in Geraldton (Thomas, 2017). The trial found the following:

- The fungicide was safe to use on lupins with no negative crop impact.
- The fungicide can reduce but not eradicate sclerotinia in lupins, particularly on the pods and flower spike.
- Main stem infections were associated with lesions originating from leaf axis or with leaflets wrapping around the stem.
- Stem base infection and lodging did not respond to fungicide application.
- Sclerotinia on upper stems and pods may be greater in lodged plants and later spray timings may be more effective in these cases.
- While sclerotinia sprays in canola are aimed at the beginning of flowering, in lupins aim for full flowering on the main stem.

DPIRD also invested in sclerotinia trials in 2017 in the Chapman Valley, which investigated row space and disease interactions as well as seed dressing, in-furrow and foliar treatments. However, as there were only trace levels of sclerotinia present, there were no clear recommendations to come from this research.

In 2018 further research is being conducted by DPIRD at Woorree, where similar trials to 2016 are underway. They are comparing several fungicides applied at various timings.

Anthracnose

With anthracnose-resistant lupin varieties available, this disease is not seen as a significant issue in the WA NAR.

Harvest

Lupins should be harvested in humid conditions as soon as the moisture content reaches to 14 per cent to reduce yield loss caused by lodging, pod shattering and pod drop (Pritchard, 2018).

Avoiding yield losses

Trials by DPIRD at Eradu found delaying harvest by two weeks after maturity reduced yields by six per cent, while delaying by six weeks reduced yields by 15 per cent (Harries et al., 2018). Several growers in the case studies featured in this booklet raised concerns about shedding losses from PBA Jurien®, however this trial found PBA Jurien® did not have higher harvest losses than other varieties. The Mingenew Irwin Group (MIG) has also researched shedding losses in lupin varieties in 2009, 2011 and 2015. Its most recent research had the following findings:

- Delaying harvest significantly reduced the yield of Mandelup.
- Yields of PBA Barlock® and Coromup significantly reduced when harvested in December, rather than October or November.
- PBA Jurien® was the only variety that did not show reduced yield when harvested in December.
- Some MIG members found shattering losses were reduced when using an air reel.

The main causes of high harvest losses are the action of the cutter bar, which shakes the stem and can cause pods to drop, and when the cut material drops from the cutter bar before entering the feeder-house. To reduce these losses, ensure the header knife is sharp, timed correctly and cuts close to the ledger plate beneath the knife (White et al., 2008). MIG researched the harvest losses in a tin versus a belt front in 2011, and, while it was not considered a bad shedding year, there was a trend towards increased yield from the tin front, but the difference was not significant.

Maintaining seed quality

Lupins from crop-topped paddocks should not be kept for seed because the germination and vigour may be reduced. Lupins that are going to be kept for seed should also be harvested as soon as possible to reduce the likelihood of rain on the mature crop causing reduced germination. In both field and laboratory trials, seed exposed to one wetting and drying cycle prior to harvest had a 5 to 10 per cent reduced germination, two cycles by 10 to 20 per cent and three cycles by 35 to 45 per cent (Harries et al., 2018).
Featured case study growers

GROWING LUPINS WITH WIDE ROW SPACING IN THE NORTHERN AGRICULTURAL ZONE
While brome grass is a challenge for the Carson family, particularly on their farm west of Binnu, they have found a solution by introducing barley and lupins into their rotation to better control the weed.

“We have pretty big brome grass issues on that farm because of our non-wetting soils and it could also be a contribution from too many wheat on wheats,” Josh Carson says.

“So we brought barley into our rotation in 2015 to control brome grass, allowing for a double-hit on the brome in the barley and then again in the lupin phase.”

Blue lupins are also a challenge on the western farm, so they ideally wait for a germination before sowing PBA Jurien® lupins. On their other farm, east of Binnu, their biggest weed challenge is radish. The Carsons apply a knockdown where possible with propyzamide and metribuzin and then come back post-emergent with a Brodal® and simazine mix followed by quizalofop to manage radish and brome grass in particular. They are also hoping that spading will be a valuable weed control tool. Once a few more people have tested the Seed Destructor or Terminator and they become less expensive, Josh will more closely consider investing in the harvest weed seed management technology.

WIDE ROWS

Like many others, the attraction of moving to wide row spacing was predominantly driven by improved drought tolerance and the additional height of the wide row lupins compared with the narrow row.

“We’ve got a few rocky paddocks and trying to pick the lupins up off the ground was a pretty big issue and we were losing a lot, especially in 2012, 2013 and 2014 when the lupins were really short,” Josh says.

To tackle the issue, in 2015 the Carsons moved from a 25 centimetre spacing on their DBS bar to a 50cm spacing by pulling back every second tyne. An additional benefit of the move to wider rows has been an improved ability to handle higher stubble loads.

After seeing their PBA Jurien® lupins out-yield their Coromup lupins by about 200kg/ha in a tough year in 2017, in 2018 the Carsons switched to growing 100 per cent PBA Jurien®. Each year the Carsons use fresh seed and the lupins on their eastern farm are sown dry at 80kg/ha at a depth of 8mm, whereas on the western farm they wait for a germination as a management strategy for the blue lupins. The lupins are then placed into the moisture, which in 2018 was at 24 to 32mm deep. While ideally they would like all their lupins to germinate in May, this did not happen in 2017 and 2018.

“I think we finished seeding on the 4th June in 2017 and that was the latest we have finished for a long time. However, with the late rains I think we averaged 1.9t/ha in our lupins in 2017 which was incredible really,” Josh says.

“It was pretty much the same as our wheat average.”

AVOIDING FERTILISER TOXICITY

Trials by CSBP on the Northern Agri Group’s main trial site confirmed the Carsons’ belief that applying phosphorus and potassium by spreading is a good tactic to avoid fertiliser toxicity issues without yield penalties.

“We spread 150kg/ha Super Potash 2:1 pre-seeding, which makes it easy for us at seeding time because we can just fill both boxes with lupins and go,” Josh says.

“It’s what we’ve always done to stop any fertiliser toxicity and it works well for us.”
HARVEST LUPINS LAST

The Carsons harvest lupins last with their 45-foot Case front but they will always harvest their lupin seed before any rain event.

“We usually harvest them last because you don’t tend to lose any yield or quality like we do with the wheat – it doesn’t really affect the lupins,” Josh says.

While other growers have commented on the potential for shatter loss with PBA Jurien®️, the Carsons did not notice a difference between Coromup and PBA Jurien®️ in 2017.

IN SUMMARY

- Switched to wide row initially for improved drought tolerance and height
- 150kg/ha Super Potash 2:1 is spread prior to seeding
- Switched to PBA Jurien®️ after it out-yielded Coromup by about 200kg/ha

MORE INFORMATION

Josh Carson, 0418 923 653, carso89@icloud.com

“We spread 150kg/ha Super Potash 2:1 pre-seeding, which makes it easy for us at seeding time because we can just fill both boxes with lupins and go.”

- JOSH CARSON, BINNU

The attraction of moving to wide row spacing was predominantly driven by improved drought tolerance and the additional height of wide row lupins compared with narrow row.

PHOTO: CUSSONSMEDIA
Wide row lupins allow consistency at Balla

Evan Reynolds knew something in his lupin management had to change after watching his neighbour, wide row lupin pioneer Rohan Ford, successfully grow tall lupins that were a breeze to harvest, unlike his own lupins which he was scraping off the ground and ending up with sand in his sample.

“His lupin crops used to be always like a metre high and looked awesome all the time and I thought, what’s he doing different?” Evan recalls.

“The fertiliser and paddocks were the same, the only thing different was that he was doing wide rows.”

WIDE ROW LUPINS
Shifting across to growing wide row lupins was not difficult as they were able to pull every second tyne up on their DBS hydraulic tyne bar. Their standard spacing is 30cm so now their lupins are on 60cm spacing.

“The way we do that with a hydraulic tyne is we just release the pressure on it out of the accumulators and then you just manually pull the tynes back,” Evan explains.

“We then put a 100mm billet underneath the tyne, so the tyne’s sitting at 90 degrees, parallel to the bar.”

The main reason Evan Reynolds changed from narrow to wide rows was to improve lupin height, particularly on his sandplain country, to make harvest easier. He believes he is minimising risk in poorer seasons because he can harvest every lupin rather than not being able to harvest drought-affected, short lupins.

“There’s a lot of research that says they don’t yield as much in the end, however we could still get 1 to 1.5t/ha in the poorer years because we’re getting underneath them and then we’re still exceeding 2.5t/ha on the good years,” Evan explains.

“Our lupins don’t yield more than 3t/ha, so we aren’t getting a top end yield, but getting under them in the poorer years, when we get more poorer years than not, seems to be a lot better advantage for us on the sand.”

“Even on the poor year like 2017, we only had 100mm of rain and we harvested every lupin.”

Evan believes the wider rows provide additional moisture for the lupins to access in spring for grain fill.

“The taproot goes down and the feeder roots go along the furrow and then it’s not until they get stressed later in the year that they start accessing moisture in between the rows,” Evan says.

“We’ve dug holes in between the rows in late August and into September and they’re still wet.

“By the end of September, that moisture is being accessed and the feeder roots have started to venture out to the sides and they seem to hang on a lot longer.”

Evan is transitioning from Mandelup to PBA Jurien® lupins, which he sows at about 100kg/ha, adjusting the rate to take into account seed size and quality, with an overall aim of 30 to 40 lupin plants/m². Inoculant and Rovral® Liquid seed dressing are also used. The lupins are usually sown dry, as shallow as possible (10 to 15mm), so they germinate on the first rain and are not too deep if furrow fill occurs.

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NUTRITION
The Reynolds family is actively involved in the Northern Agri Group and recent trials gave them confidence to modify their fertiliser placement.

“Our DBS has double shoots and we were banding half of our fertiliser, and then recent trials in the Northern Ag area banded the total fertiliser amount without toxicity issues, so we have shifted to banding 50kg/ha MAP with 20 to 30kg/ha MOP,” Evan explains.

WEED CONTROL
Initially, when Evan moved to wide row spacing, he found they were not getting enough soil throw when seeding at eight km/h to fully incorporate trifluralin. This was resulting in a 50-mm gap in the inter-rows where a line of ryegrass was germinating.
“We ended up increasing our speed to 10 to 12km/h on the wide rows and now we’re getting that soil throw and getting coverage with the trifluralin,” Evan says.

Another bonus of wide row spacings is the increased spray coverage on late germinating ryegrass, as they are able to get good herbicide contact before the lupins fill the inter-row.

To control radish, Evan applies a three-way mix of simazine, metribuzin and diflufenican at the eight-leaf stage, and has been getting good results. He attributes this positive outcome to removing triazine from the canola phase, so they are not doubling up on triazines, and because he is getting better herbicide contact on smaller weeds.

Evan believes he gets the benefits of competition late in the season when the lupins grow their lateral stems from around 20cm and fill in the inter-row.

“They throw the laterals because they’ve got room to grow and when they do, you can’t see the ground within a few months anyway,” Evan says.

While blue lupins are not a significant issue on his farm, Evan has had experience with them on another property and believes they are becoming a more difficult issue to manage.

“Theyir seed lasts about 10 years in the ground and you can bury them, yet they still come up from the depths,” Evan says.

**HARVEST**

Evan has observed that the bud on the first primary stem of his wide row lupins is nice and high on the plant, which makes harvesting easier.

“I do notice that you get two lots of primaries on your lupins, and the first flower bud is 30 to 40cm off the ground and as your primaries are where you get most of your lupins from, they are well and truly off the ground at a harvestable height,” Evan says.

Evan runs RTK on a 12.2m tramline and harvests the lupins with a 12m Honey Bee draper front comb, a machine he has found is working better than their previous MacDon.

“We were smashing one of the rows instead of cutting it, whereas the Honey Bee is just that little bit wider, so we can cut 40-foot and get around that outside row,” Evan says.

**CONSISTENT SUPPLY**

Evan believes by shifting their lupin program from narrow to wide row he is becoming a more consistent supplier, which will assist in assuring an adequate market for lupins in WA.

“People say we need to market lupins better but the market is there,” Evan says.

“It’s all about the supply – if we can’t produce enough, we will lose our market and that’s when soybean meal or other alternatives are used. If we can grow lupins – and that’s where wide row lupins come in – we can be more consistent with our supply and then have a consistent market to produce for.”

**IN SUMMARY**

- Increased height improves ease of harvest
- Wide row lupins minimise yield loss in tough years
- Wide rows allow for good herbicide contact with weeds

**MORE INFORMATION**

Evan Reynolds, 0438 947 116, efreynolds@bigpond.com
Wide row lupins equal improved weed control at Binnu

SNAPSHOT

GROWERS: Craig and Robyn Simkin
LOCATION: Binnu
FARM SIZE: 3200ha
ENTERPRISES: 100 per cent cropping
GROWING SEASON RAINFALL: 220mm
SOIL TYPES: Mainly yellow sands over gravel, red loams and York gum loams
2018 CROP PROGRAM: 1800ha wheat, 750ha canola and 650ha lupins
LUPIN VARIETIES: Coromup

Binnu grower Craig Simkin has seen a lot of harvests – 49 in fact – yet the contrast between the poor 2017 season and the much improved 2018 season still stands out. The Simkins have a long history growing lupins, with Craig’s father becoming a certified lupin grower when the industry was just developing.

WIDE ROW LUPINS

Craig believes the adoption of wide row lupins in the northern agricultural region has really been driven by the work conducted by researcher Paul Blackwell with grower Rohan Ford.

“Paul Blackwell called it drought-proofing lupins and he was on the money, because instead of fighting for moisture, the roots just use that soil-stored moisture in-between the rows late in the season and I think that’s a huge benefit,” Craig says.

After transitioning from a disc machine to a knife point system on a 26cm row spacing, the need to better manage stubble flow saw Craig move from growing narrow row lupins to wide row lupins.

“We tried adding a coulter system on the DBS and because that didn’t solve our problem, we pulled back every second tine, and blocked every second seed head, and went into a 52cm row, which mostly got rid of the stubble problem,” Craig explains.

While the Simkins generally prefer to sow their Coromup lupins into moist soil, they are more commonly sown dry at 65kg/ha to a depth of about 10 to 20mm and with about 70kg/ha of MAP. Generally, 10 units of potassium is applied in the cereal phase the year before.

“Back in 1997, we did extensive seeding rate trials between 50 to 80kg/ha, and the best yields for a period of three years were from areas that had between 65 to 70kg/ha, so we stick with that and we don’t go above 70kg/ha,” Craig says.

While the Simkins block every second seed tube to avoid fertiliser toxicity, they leave every fertiliser tube open so the fertiliser is applied both under the seed and spread out the back of the raised tynes.

After seeing no benefit from their own farm trials, the Simkins no longer use seed treatments and have not applied inoculant for the past few seasons.

IMPROVED WEED CONTROL

Since moving to wide row lupins Craig has found both improved weed control and a reduction in the effect of chemicals on germinating lupins.

“You can travel a little bit quicker and because you can throw more soil away from the seed, you can give it a little bit more chemical without seeming to affect the lupins much,” Craig says.

The Simkins apply the common mix of simazine, metribuzin and propyzamide presowing and then come back post-emergent with Brodal®, simazine and metribuzin. Craig believes the wide rows offer a twofold benefit for weed control – he is not triggering another germination by disturbing the weed seeds in the 52cm inter-row and the post-emergent chemicals have good herbicide contact with target weeds.

LONGER ROTATION FOR BLUE LUPINS

Like many other farmers, managing blue lupins is an issue for the Simkins and, aside from waiting for them to germinate in problem paddocks before seeding, they will extend their rotation if necessary.

“I will probably take them into a longer rotation so, wheat, wheat, canola, wheat and then I might go back to lupins in a one-in-five rotation rather than a one-in-four,” Craig says.

“We have also tried using Garlon® 10 to 15 years ago, but that seems to have all gone by the wayside and unfortunately you have just got to be patient, take a hit and change to a rotation that is most appropriate.”

Therefore, the development of a herbicide tolerant lupin that would allow for the management of blue lupins would be very attractive for the Simkins.
HEIGHT IMPROVEMENT

Another benefit in growing wide row lupins is that competition in the furrow makes lupins grow taller, which is an added benefit at harvest time.

“I believe that it works very well because you get a bit more competition height-wise, so it makes it easier to get under them with the draper front,” Craig explains.

“Last year, in a poor season, we still managed to get under our lupins and we didn’t think we would.”

BAT REEL

Three or four years ago, when their lupin crops were light, after much trial and error the Simkins added plastic flappers to their draper front.

“We tried rubber, we tried tin and then we went to a plastic manufactured in Geraldton,” Craig says.

“It’s a 3-mm plastic, 30cm deep and they are bolted onto the fingers and spaced across the reel in a staggered formation, so they just turned our finger tynes into a part bat reel, part finger reel.

“When the reel rotates it has a part fanning effect and part pick-up, this flicks or fans them and it keeps the knife relatively clean and anything that is bouncing off seems to bounce back, so it works very well.

“You’ll still get cutter bar loss with this but it’s nowhere near as much as the open finger tyne and probably the most loss we get now is off the end of the draper, getting onto the centre draper.

“We’ve only had it for two years so we are still learning.”

IN SUMMARY

- Fertiliser is applied under the seed and spread via the raised tynes
- Rotation is used to manage blue lupins
- Part bat reel, part finger reel reduces harvest losses

MORE INFORMATION

Craig Simkin, 0427 361 048, carsimfarms@bigpond.com
Wide row lupins play integral role in Ogilvie rotation

SNAPSHOT

GROWERS: Ben and Ange, Terry and Ros Cripps
LOCATION: Ogilvie
FARM SIZE: 5100ha
ENTERPRISES: 100 per cent cropping
GROWING SEASON RAINFALL: 200 to 250mm
SOIL TYPES: Yellow sandplain and a clay red loam, with some gravel-based soil types
2018 CROP PROGRAM: 3300ha wheat, 1050ha canola and 750ha lupins
LUPIN VARIETIES: Gunyidi, PBA Barlock® and PBA Jurien®

Lupins play an integral role in the rotation on the Cripps’ family farm at Ogilvie and without them, Ben Cripps believes they could not sustain a viable wheat crop.

“Theyir rotational effect with herbicides, disease management and the nitrogen that is put back into the ground; all these aspects help us to maintain our wheat yield and quality,” Ben explains.

Originally lupins were grown by Ben’s father Terry and his brother to improve the wheat crop and to provide an excellent feed source for their sheep. As they transitioned out of sheep, they focused on making the lupins profitable in their own right. The success of Binnu farmer Rohan Ford in growing wide row lupins changed Ben’s approach.

Since 2013, the Cripps family has sown all its lupins on 60cm spacings using a Bourgault 3320 PHD coupled to a Flexi-Coil 4350 air cart, dual shoot, with paired rows. Ben likes this system because it has good consistent depth control and reasonable stubble handling. Importantly, it also easily allows them to change between 30cm and 60cm spacing.

WIDE ROW ADVANTAGES

The main reason the Cripps shifted to wide row lupins was because of the improvement in harvest height. In harder years lupins can be short and difficult to harvest. Ben also believes their drought tolerance is improved because the lateral roots have more area to harvest water in the inter-row. Additionally, he believes cost of seeding is reduced.

“Being wide-row, having only half the gear in the ground reduces fuel consumption, I think by about 25 per cent, and productivity also goes up during seeding by probably 3 hectares per hour, so over 1000ha that adds up,” Ben says.

He also sees weed control benefits in wide row lupins, as they allow for better herbicide contact with radish, ryegrass and brome grass. However, weed management for Ben Cripps is not confined to a single crop type or single year; it is a whole-system approach.

“It is all about numbers and a zero tolerance through all crops to achieve good weed control, so we use multiple herbicide/group applications, harvest weed seed management, VRT, timing and rotation to help with weed control,” Ben says.

Looking ahead, the biggest weed management challenge in lupins for the Cripps is going to be managing blue lupins as there is no herbicide control available and they are starting to affect their rotation and timing of seeding.

TIME OF SOWING

2017 was a tough year for many, including the Cripps family. The dry start, coupled with a soft finish, meant Ben was not happy with the performance of his lupins and so has changed his approach to time of sowing.

“After last year, I made the call that lupins are probably my riskiest enterprise in a hard year, so if we reach a point where there’s not enough time for them to yield properly, we will cancel the lupin program and fallow that country instead,” Ben says.

“We have a WEEDit, so we can quite easily change it to a fallow and still achieve the same end point for the wheat crop the following year, but we can minimise the damage in a bad year.”

As a result, the Cripps family will now only commence seeding the lupin program when they know a decent rain is coming. If they are planning on seeding paddocks with a high blue lupin loading, they will wait until after a germination and then if the next rain looks promising, that’s when those paddocks will be sown.

Lupins are generally sown between 100 to 110kg/ha at a depth of 40 to 50mm, depending on seasonal conditions. As a general rule, they apply 40 to 50kg/ha of MAP, which is split from the seed and banded below. On sandplain soils, they generally add 10kg/ha of potash to the MAP.
BLUE LUPINS

Managing blue lupins is front of mind for Ben and he is considering the use of a shielded sprayer, which would allow earlier sowing rather than waiting for a germination and therefore a longer growing season, to maximise yield. Better blue lupin management would also improve the harvestability of lupins with their 13.6m MacDon draper front.

“In lighter and shorter crops, it’s harder to use a plastic finger or something on the end of the front to catch a few seeds because the blue lupins jam them, so if we can control those blues, we can increase our harvesting efficiency,” Ben says.

IN SUMMARY

- Lupins are integral for nutrition, disease and weed management
- Lupins will be pulled from the program if there is a late start
- Managing blue lupins is increasingly challenging

“Being wide-row, having only half the gear in the ground reduces fuel consumption, I think it’s about 25 per cent, and productivity also goes up during seeding by probably three hectares an hour, so over 1000 hectares that adds up.”

– BEN CRIPPS, OGILVIE

MORE INFORMATION

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PHOTO: CUSSONSMEDIA

GROWING LUPINS WITH WIDE ROW SPACING IN THE NORTHERN AGRICULTURAL ZONE

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Narrow row lupins the way to go at Yuna

SNAPSHOT

GROWERS: Ash and Belinda, Brad and Jan Eastough
LOCATION: Yuna, Ogilvie, Horrocks, Nabawa and Nanson
FARM SIZE: 6000ha
ENTERPRISES: Cropping, sheep and cattle
GROWING SEASON RAINFALL: 300 to 450mm
SOIL TYPES: Eradu sand to heavy loams
2018 CROP PROGRAM: 3000ha wheat, 200ha barley, 900ha canola and 1600ha lupins
LUPIN VARIETIES: Mandelup, Coromup and PBA Jurien

While Yuna farmer Ash Eastough is not a fan of growing lupins, he does concede his family would be lost without them for both the cropping and livestock enterprises across their five farms. The Eastoughs buy in lambs, starting in around September/October, and many of the lambs go straight onto lupin stubbles or into one of two feedlots until the lupin stubbles are ready.

“The livestock benefits of lupins are huge, especially if we can get a good cereal crop the year before. We can really graze the stubbles hard without it blowing and the benefit to the wheat crop following lupins is just like chalk and cheese,” Ash says.

“If you grow canola as a break crop, the amount of nitrogen you’ve got to put on the yellow sandplain is just ridiculous, and while we’re finding that canola is a lot better if we’ve got a weed problem, the lupins just provide so much nitrogen to the soil.

“On the yellow sandplain, if we didn’t have the lupins we wouldn’t be farming, it’s that simple.

“Even when lupins were $90/t, at least a third to a half of our sandplain country was lupins as we’ve just got to have it in our rotation.”

VARIETAL IMPROVEMENT

Ash believes there has been a significant improvement in the varieties available since they first started growing lupins in the 1980s and now they are much easier to grow. The Eastoughs grow Mandelup, Coromup and are trying PBA Jurien for the first time in 2018. They grow a range of varieties to match the diversity of their farms.

“Mandelup does really well out here but we do have a problem with shedding, so we’ve gone to PBA Jurien this year for that reason and Coromup seems to need a bit longer season, so we grow those closer to the coast,” Ash says.

Ash also believes the newer varieties have improved chemical tolerance, which is necessary to keep on top of radish in particular. The Eastoughs work hard on trying to keep the radish numbers down throughout their rotation and Ash believes when they do have blowouts it is generally the result of seasonal conditions.

“On our bad paddocks we’re actually hitting the radish with a three-way chemical mix, twice,” Ash says.

Unfortunately, in 2018 the Eastoughs really saw the herbicide tolerance of their lupins tested.

“For the last two years I have used a wetter with the lupins and I don’t know if it’s got anything to do with the chemical attraction holding the moisture there but, with our good break this year, we got a horrible amount of chemical damage with propyzamide, trifluralin and metribuzin,” Ash says.

“So, with the hypocotyl being shortened and thickened right up, if they were any deeper than 25mm, they wouldn’t have made it, so we’re pretty fortunate that we sowed them shallow.”

Ash is a firm believer that applying chemicals also helps to prevent the lupins from staying in the vegetative stage.

“At our coastal farms, if we don’t whack them with something they’ll grow metre high with just bulk and not have a lot of lupins on them, so we hit them pretty hard from the time they are four-leaf upwards as they’re pretty resilient once they get to that age – I think that’s the real key to them,” Ash says.

NARROW ROWS

The lupins are the first crop in the ground for the Eastoughs, sown with their modified DBS on 30cm spacing with splitter boots, which brings the row spacing back to 23cm. Ash is keen to get them sown as early as possible as they don’t seem to have a problem
“On the yellow sandplain, if we didn’t have the lupins we wouldn’t be farming, it’s that simple.”

ASH EASTOUGH, YUNA

with them bulking up. While Ash tried a lower seeding rate for a few years, he has found 100kg/ha at 90 per cent germination produces better establishment.

“I’m a firm believer that the closer the rows, the better we are, especially for weed control and ground cover,” Ash says.

“If you don’t chop your lupin stubble through the headers, just turn your choppers off, that just does a magnificent job of sitting all the chaff on top of the ground so you don’t get any soil wind erosion – it’s amazing.

“The only problem is, in a really good season we do have a bit of trouble getting through the stubble, but there’s always a trade-off, isn’t there?”

The livestock component of their business is another important reason why the Eastoughs are not looking to move to wide row lupins, as Ash believes with more unprotected soil between the rows the livestock will cause greater wind erosion.

POTASH

While their potash levels are generally suitable for crop production, the addition of potash to their lupin program has really improved production on their sandplain country.

“I use a lot of potash on my lupins and I just keep the P rates right up there so, depending on the country, we apply 14-plus units of P and 20 to 25 units of K, which goes in a boot that we had made up to take it right through the profile,” Ash says.

ADJUSTING SEEDING DEPTHS

The Eastoughs generally seed their lupins at 20mm, but if they have had summer rain and there is moisture at depth Ash is comfortable to seed them down to 75mm and will increase his seeding rate to 110kg/ha.

“You have got to be really careful with furrow fill when you do that, but they do come up and it’s amazing how far they come from,” Ash says.

“But in 2018 we sowed them really shallow and we got a huge amount of chemical damage from the furrow fill that we had with a big blow on the break of the season. However, if we didn’t sow them shallow they’d be dead – it would be that simple.”

CROP-TOPPING

The Eastoughs crop-top their lupins and have found that in addition to allowing them to harvest their lupins when they want to, the crop-topping has reduced the weed burden in subsequent crops.

“For $8 to 9/ha, you pick it up easily, and I’m finding that we seem to be getting cleaner paddocks, especially in a year like 2018, where a lot of people around the area are having trouble with brome grass,” Ash says.

“It’s the later brome grass that’s causing the problem and where we’ve done all the crop-topping it doesn’t seem to be there.”

HARVESTING

With the tough season in 2017 producing short lupins, the Eastoughs set their two draper front headers differently to see if they could improve their harvest efficiency.

“In 2017, we had one machine set up with everything we could possibly put on the comb, and the other machine didn’t have anything, yet they performed similarly,” Ash says.

“We had sweeps on the reels, we had extended fingers and everything was laid back whereas with the normal draper front, we laid that right forward and hit them really fast and caught them.

“It was amazing the difference because one machine was taking us two or three hours to set up while the other one we were going straight in and just doing some adjustments from the cab.”

IN SUMMARY

- Lupins integral for livestock and grain enterprise
- Turning the choppers off allows for better ground cover and less erosion
- Band 20 to 25 units of potash with the lupins

MORE INFORMATION

Ash Eastough, 0429 201 035, whellerplains@harboursat.com.au

PHOTO: CUSSONSMEDIA

In 2018 with an excellent break, the Eastoughs have had chemical damage on their lupins after applying propyzamide, trifluralin, metribuzin and wetter. This resulted in a thickened and shortened hypocotyl and Ash Eastough believes that if they were sown deeper than 25mm they wouldn’t have germinated.

PHOTO: CUSSONSMEDIA
Heavy stubble load prompts wide row lupin trial at Sandy Gully

SNAPSHOT

GROWERS: Daniel Gill
LOCATION: Sandy Gully
CROP AREA: 1350ha
ENTERPRISES: Cropping and sheep
GROWING SEASON RAINFALL: 400mm
SOIL TYPES: Red sandy loam and sandplain
2018 CROP PROGRAM: 800ha wheat, 200ha barley, 100ha canola and 250ha lupins
LUPIN VARIETIES: PBA Jurien\(^\text{a}\) and Mandelup

With large stubble loads from the 2016 season causing blockages as lupin seeding began, Daniel Gill from Sandy Gully, west of Northampton, knew he had to make some changes.

“We were getting blockages sowing into a 4.5t/ha barley stubble, which was pretty thick to get through, however by going to wide rows we were able to get through 95 per cent of it without any blockages,” Daniel says.

As the Gill family runs livestock and a Merino stud, Daniel was nervous about whether grazing livestock on wide row stubbles would cause more wind erosion.

“I was a little bit hesitant because of the sheep side of things, where I thought there will be more dirt that’s going to blow over summer,” Daniel says.

“But it was actually the opposite. I found the lupin and barley stubble retained on the soil surface actually gave it more protection from the wind.”

“Our neighbours had burnt their stubble and sowed lupins on their normal 10-inch row spacing and their paddocks were a lot barer than what ours were and we had grazed ours.”

The Gills own a DBS on 25cm spacings, so when they decided to try wide row spacing it was an easy transition.

“Inside the distribution head you can put a plug in to block off that seed tube, which are the tynes we can lift up and put a chock in there that keeps them up, which allows a lot more clearance between the tynes,” Daniel says.

Daniel also didn’t change from his standard seeding rate of 85kg/ha on his red country and 100kg/ha on non-wetting sandplain. The Gills use the higher rate on their non-wetting sandplain to account for non-germination.

“We didn’t change the seeding rates; the theory was you’re still going to want the plants there to be able to create and I also like the idea of the weed competition,” Daniel says.

It was also apparent in wider rows that the lupins had much thicker stems and a bigger plant structure, which Daniel guessed was due to plants trying to grow up and chase the sunlight. They were also very easy to harvest, especially on the Gills’ challenging hill country. However, with a lower stubble load from 2017, Daniel made the decision to return to their standard row spacing for the 2018 season.

“I’ve gone back to the traditional 10-inch row spacing in 2018 and we weren’t getting any blockages so it will be interesting to see how it goes over summer,” Daniel says.

“I didn’t burn any stubbles so I should still have stubble coverage on the ground but I won’t know until I get through this season.”

IMPROVED YIELD WITH PBA JURIEN\(^\text{a}\)

In 2017, the Gills bulked up PBA Jurien\(^\text{a}\) and Daniel was really impressed with the yield and the structure of the plant. He still prefers the early vigour of Mandelup over PBA Jurien\(^\text{a}\).

“The PBA Jurien\(^\text{a}\) yield was phenomenal and while we don’t see too much of the Mandelup shedding because we don’t have a massive program, the PBA Jurien\(^\text{a}\) did still shed a little bit, so I’m not totally sold on it yet,” Daniel says.

DIFFERING NUTRITION STRATEGIES

Given his background working as an agronomist with a fertiliser company before returning to the farm, it is not surprising that Daniel has two different nutrition strategies for his two different soil types. On the sandplain he spreads out 140kg/ha of Super Potash 4:1 pre-seeding, while on his red country he applies 55kg/ha of MAP down the tube.

“On the sandplain the Super Potash is spread out pre-seeding as it makes the system flow quite smoothly,” Daniel says.

“I know I won’t have to fill up for another 50 to 60ha and there’s been some trial work that’s shown there’s no major difference in applying Super Potash pre-seeding or at seeding.
“On the red ground though, I typically use MAP down the tube, as I find a little bit of early nitrogen quite handy for the lupins to get up and away a bit faster because they do use some in their early life until they nodulate.”

Split seed resulting from a manganese deficiency is an issue for the Gills on their sandplain country, so Daniel only retains seed from his red country. Also, getting the timing right for a foliar application of manganese is tricky.

“In the past, I haven’t done a foliar manganese on the sandplain because usually it’s the wrong timing to be doing it,” Daniel says.

“When I want to do it, it is too early for the lupins and when I should be doing it, I’m busy doing other things, because it typically doesn’t work out to be the right time to put on another chemical spray.”

MANAGING DISEASE
While overall disease is not a huge issue for the Gills, brown leaf spot is a problem, so they apply Rovral® Liquid seed dressing as a precautionary measure. Previously they applied Thiraflo for anthracnose control, but it caused problems with blockages and at the time Daniel wasn’t seeing a huge advantage, so they no longer use it.

The Gills do not have a lot of canola in their program but Daniel has seen sclerotinia in his canola, which he treated with a fungicide. With lupins, canola and pasture in his rotation, he is concerned that there are plenty of hosts for the disease to develop further.

“In the canola, the season dried up straight after that application, which may have made it a complete waste of money,” Daniel says.

“That’s one of the risks of farming up here, it depends on when the season shuts off, but if it’s wet and looks like more rain coming, I’ll spray for sclerotinia in canola.

“With lupins I’ll probably still need to see more trial data to be confident that I’m not throwing money out the window.”

WEED CONTROL
Like many in the district, radish, ryegrass and double gees are problem weeds. Daniel believes having livestock in his enterprise mix gives him more tools to beat them through strategies such as pasture manipulation. On his sandplain country, he has some resistant ryegrass and with the poor season in 2017, Daniel took the opportunity to let that area go to fallow.

“It was quite late in the season, I didn’t think it would actually be able to produce much of a crop and the ryegrass came up like hair on a cat’s back, so given I had sheep, fallow made sense as I got a good graze out of it as well as good weed control later on,” Daniel says.

On his sandplain paddocks, which have a high blue lupin loading, Daniel has been sowing serradella.

“On those paddocks with blue lupins, typically we use the serradella instead of a lupin phase as, with our livestock, it just gives us a greater economic benefit overall.”

— Daniel Gill, Sandy Gully

IN SUMMARY
■ Change to wide rows did not increase wind erosion
■ Nutrition strategy changes between soil types
■ Serradella is grown on paddocks with blue lupin issues

MORE INFORMATION
Daniel Gill, 0428 341 166, sandhurstmerino@gmail.com
When Sandy Gully grower Russell Teakle learnt of the benefits of shifting to wide row lupins, he thought they would have a good fit in his family’s cropping program. While he has not seen any yield improvement, other benefits are making him persist with trialling wide row lupins.

“What I heard about them made sense, like saving moisture in the inter-row for later in season if you have a dry cut off and they can yield a little more,” Russell says.

“But to be honest, I haven’t actually seen them yield any more but I haven’t seen them yield any less either.

“The main reason for persisting with wide rows is because our bar does trash in quite a lot of stubble on our 10-inch rows, so when we go to 20-inch rows we leave a lot of standing stubble, which protects the lupin crop.

“And then if you have a failure, the paddock doesn’t blow away and you have a lot more of the older season wheat stubble for that next summer as well.”

**WIDE ROW BENEFITS**

The main reason Russell wanted to try wide row lupins is he thought the improved airflow would reduce the risk of sclerotinia. However, he has not observed much of a difference.

“Once the lupins get bigger, they bush out and cover the 20-inch rows and get sclerotinia anyway, and unfortunately there doesn’t really seem to be a lot we can do about it,” Russell says.

Russell believes the reduced soil disturbance in wide row lupins is reducing weed numbers and any weeds that do grow through the herbicide band in the inter-row still get good herbicide contact because they are not shaded out.

“Most of the radish I see coming up in the crop is in the row with the lupins, not in the inter-row, so by going to wide rows, I’m reducing the area the radish can germinate from,” Russell says.

The wider row spacing also allows the Teakles to travel faster and create a deeper furrow which, combined with the greater amount of standing stubble, protects emerging seedlings from wind damage.

“In 2018 we had some lupins sown on a 10-inch spacing and we got a big wind before the break which just flattened them, so I do think wide rows help protect seedlings from wind a lot,” Russell says.

**PBA BARLOCK**

The Teakles grow PBA Barlock® lupins predominantly for stock feed at their home farm, while at their west Binnu block, a wheat and lupin rotation works well on the sandplain. Russell has noticed the PBA Barlock® seed appears smaller than other varieties but he does not believe it affects their vigour. They are commonly sown at 30mm deep.

“I think I have actually increased plant density even though we kept our seeding rate at 100kg/ha on the wide rows,” Russell says.

“With the smaller seed size we are getting more plants per square metre.”

**WEEDINESS DETERMINES TIME OF SOWING**

Time of sowing is dictated by the weed burden in paddocks, with weedier paddocks less likely to be sown dry.

“Especially at our west Binnu block, there are quite a lot of blue lupins and they’ll smash the crop if we don’t get control of them first, so that dictates which paddocks we can put in dry and which ones we have to wait for the break,” Russell says.

“It is not so bad here at Sandy Gully, so we can put them in dry here.”

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**SNAPSHOT**

**GROWERS:** Russell and Amy, Greg and Jane Teakle  
**LOCATION:** Sandy Gully  
**FARM SIZE:** 4000ha  
**ENTERPRISES:** Cropping and sheep  
**GROWING SEASON RAINFALL:** 340mm  
**SOIL TYPES:** Red sandy loams, river loams, grey clays, gravelly loams and sandplain  
**2018 CROP PROGRAM:** 1320ha wheat, 530ha barley and 825ha lupins  
**LUPIN VARIETIES:** PBA Barlock®

Russell Teakle, pictured with his daughter Evie, is finding his wide row lupins are on par with his narrow row lupins.

PHOTO: CUSSONSMEDIA

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GROWING LUPINS WITH WIDE ROW SPACING IN THE NORTHERN AGRICULTURAL ZONE
While the Teakles used to apply MAP down the tube with their lupins, to avoid fertiliser toxicity especially on the wide rows about 110kg/ha of superphosphate is spread on the non-sandplain soils prior to seeding and on the sandplain soils, 20kg/ha MOP is also spread with the super.

REDUCING WEED NUMBERS

For the next few years, the Teakles are focusing on bringing down weed numbers because Russell believes the biggest expense of growing lupins is the opportunity cost in having to wait for weeds to emerge before sowing.

“I don’t know that I’ll ever get rid of the blue lupins on the sandplain but I’ll try because they are pivotal,” Russell says.

“I’m trying to change from just a wheat/lupin rotation to add barley and I’m trying a little bit more wheat-on-wheat, which we traditionally haven’t done because wheat-on-wheat doesn’t work very well – but I don’t have many options on that sand.”

HARVEST

Since trialling wide row lupins the Teakles have not found consistent differences between their wide and narrow row lupins when harvesting. Russell says that any height improvement is not significant.

“Sometimes the wide rows are easier to harvest but that’s not always the case,” Russell says.

To get through their stubbles in 2017, the Teakles decided to sow their lupins on a 15-degree angle and not only did it make seeding easier, it benefited harvest operations, too.

“The lupins were really easy to harvest because we were going across the wide rows instead of trying to just cram all these plants onto the same little knife section, so I might try it again at harvest time in 2018 and see if we get the same result.”

– RUSSELL TEAKLE, SANDY GULLY

“While the Teakles have not seen any yield advantages with their wide row lupins over the narrow rows, the wide rows leave more stubble cover which helps to protect the lupin crop.

PHOTO: CUSSONSMEDIA

IN SUMMARY

■ Wide row lupins are on par with narrow row yields
■ Wide rows give improved chemical efficacy and wind protection
■ Blue lupins are a major challenge on sandplain soils

MORE INFORMATION
Russell Teakle, 0428 314 389, teaks18@hotmail.com
Breeding better lupins is the way forward for the lupin industry

“The difference between a wheat-on-wheat rotation and a wheat-on-lupin is huge – I’d reckon it would be 0.75t/ha as a rough rule on our better country,” Rod Cosgrove says.

GERMINATION TESTING

Each year the Cosgroves test their PBA Barlock\(^0\) and now PBA Jurien\(^0\) seed for germination percentage, anthracnose and cucumber mosaic virus and they adjust seeding rates based on the results.

“The old rule of thumb back when we first started growing was 80 by 80, 80kg/ha by 80 per cent germination and now I've gone up to 80 by 90 or 90 by 90, depending on the country,” Rod says.

“If conditions are dry, you want a couple extra lupins there just in case, like 2018 we had them in and then we had six millimetres of rain resulting in a bit of lost vigour and thinning out but due to the higher seeding rate, there's still plenty of numbers there.”

NO NEED FOR ROVRAL\(^\text{®} \) LIQUID

The Cosgroves do not apply a seed dressing for the control of brown leaf spot because Rod believes the disease only appears with colder temperatures and by then the lupins are growing well.

“I've never seen crops affected badly up here in the last 10 years by brown leaf and sure they get a little bit, but I think for the cost and the trouble I can’t see the value in it,” Rod says.

With soil types suited to lupins, and scelerotinia issues from his canola rotation, Rod Cosgrove is turning from canola back to lupins on his three blocks in the Mullewa and Irwin shires. The standard rotation for the Cosgroves is wheat followed by lupins, while some paddocks will be wheat, wheat and then lupins. Rod says he sees a big jump in yields when wheat follows lupins rather than wheat-on-wheat.
EARLY GERMINATION

The key to growing lupins for Rod Cosgrove is to get them to germinate as early as possible. Lupins are sown on 25cm spacings with a 13cm press wheel using an Air Hoe Drill.

“If you can get the lupins out of the ground by the first of June you can always look at around 2t/ha crop, and with newer varieties we might even do better,” Rod says.

The Cosgroves generally sow lupins dry at a depth of about 10mm but at their ‘Table Top’ block in the Irwin shire they sow them about 75mm deep to place the seed out of the band of non-wetting soil.

“On that block, we aim to put the lupins into soil that will wet up, because if you go too shallow, which we’ve done before, it gets caught in the unwettable band and the water just goes straight past so it takes too long for them to germinate,” Rod says.

In 2018 the Cosgroves are trialling PBA Jurien® against their staple variety, PBA Barlock®.

“In a 2017 where we only had 160mm of rain, the PBA Barlock® was a little short in the Mullewa shire, however it still yielded well but hopefully the PBA Jurien® will be a little taller,” Rod says.

“I have seen PBA Jurien® shed more than the PBA Barlock®, so we will just have to wait and see how they go this year.”

To improve germination on their non-wetting soils, Rod has been focusing on spading to remove the non-wetting soil from the surface.

“Spading has cleaned up a lot of non-wetting country and I’ve noticed this year our chemical has worked really well, its best-ever performance,” Rod says.

SPREADING SUPER AND POTASH

On two of their three blocks, the Cosgroves spread 150kg/ha super phosphate and 50kg/ha MOP before seeding, while at the other block the super and MOP are spread after seeding.

“On the non-wetting soils at our Table Top block, we always apply the fertiliser after seeding because if you go out in front and we get minimal rain, it takes too long to wet up and move through the soil,” Rod says.

“If we had sheds down there we could put it down the tube, but we don’t, so we put it out afterwards and there is a sort of ‘water harvesting’ effect when it rains.”

TIN FRONT

The Cosgroves have two header fronts, a belt front and a tin front, and Rod believes the tin front far outperforms the belt front every time they have compared the two.

“We have put the belt front on thinking it will do the job, but it doesn’t stack up side-by-side, as I believe there are way too many losses and we don’t run stock to benefit from the lupins on the ground,” Rod says.

As another weed control tactic, they windrow lupin stubbles to concentrate any ryegrass or radish seed prior to burning them.

“If you can get the lupins out of the ground by the first of June you can always look at around a 2t/ha crop and with newer varieties we might even do better.”

– ROD COSGROVE, ALLANOOKA

BREEDING BETTER LUPINS

The issue of how to manage blue lupins is at the forefront of Rod’s mind and he thinks the industry really needs better tactics to control them. He believes there is a Roundup Ready® lupin out there that will change the lupin industry if released.

“The blue lupins issue is huge – I know guys are sowing late and it’s costing them a fortune in yield, waiting for the blues to come,” Rod says.

“Even if they had a lupin that yielded 70 per cent of our best yielding variety, you could use it as a tool.

“I’m not saying bring out a lupin that is totally the number one lupin in the world, but just something so we have another option.”

According to Rod, another improvement in lupin breeding would be to improve shatter tolerance of the newer varieties.

“When we first started sowing lupins back in the late ’70s, they used to shed really badly and while our current varieties don’t shed anywhere near as bad, we still haven’t come up with a really tough lupin,” Rod says.

“That is one reason we went away from Mandelup – they were starting to shed – and I am concerned about how much PBA Jurien® will shed, too.”

IN SUMMARY

- Lupins can provide a yield benefit of 0.75t/ha to the subsequent wheat crop
- Lupins sown deep to place seed away from non-wetting band
- Herbicide tolerant lupin to control blue lupins would benefit the industry

MORE INFORMATION

Rod Cosgrove, 0427 276 029, blackmonty@bigpond.com
Lupins up and away on the first rain at Mingenew

While the Dempster family farm has changed over recent years to become a predominantly cropping operation, the benefit of the lupins to their livestock enterprise cannot be underestimated.

“We run the ewes on lupin stubbles through joining, and our conception rates and lambing percentages have really improved,” James Dempster says.

“After the lambs have been weaned they generally go straight onto the lupin stubbles as well, where they grow quickly, which suits our system to get them off the farm.”

The Dempsters grow around 1000ha of lupins and 2018 is the first year they have grown all PBA Jurien after seeing a significant yield advantage both on their own farm (about 0.5t/ha in 2017) and in Mingenew Irwin Group trials. The tolerance of newer varieties to metribuzin has been a real positive to the Dempsters, as they rely on that chemical as part of their weed control strategy.

“We probably grow less lupins than we used to because the profitability of conventional and GM canola has moved in on the lupin hectares a little bit, but our soil is very much suited to growing good lupins,” James says.

WARM SOILS FOR BETTER GERMINATION

Generally, the Dempsters sow canola first, followed by lupins, with an aim to have them germinating in warm soils after the first rain. The lupins are sown anytime from late April to early May at 100 kg/ha with their John Deere 1830 bar on 30cm spacing with stiletto points and 14cm press wheels.

“We know to grow a good yielding lupin crop you need to get it up and away early before it gets cool, so that’s why we really want them coming up on that first rain, unless it rains really early,” James says.

“Due to the size of our program, we’re finding that our lupins are often going in dry at around 30mm deep and while our bar is probably not ideal for dry seeding, we keep our seeding rate nice and high and they bounce out on the first rain.”

The Deepters are prepared to sow lupins if they are chasing moisture is about 50mm; however, having observed volunteer lupins emerge from their spaded country, James says they could be more ambitious. More commonly, if it is wet below and dry on the surface, they will place the lupins in the dry soil with the plan of them germinating on the next rain.

PADDOCK SELECTION

The Dempsters give careful consideration to the weed burden in paddocks before deciding on their lupin program because of the limited in-crop weed control options.

“Particularly in a drier year, you can have blowouts of weeds and there’s not a lot you can do from a chemical point of view, so that needs to be avoided,” James says.

In addition to broadleaf weeds, ryegrass is also an issue for the Dempsters. While they can apply a two-way mix of simazine and Brodal® at the two-leaf stage of the lupins, the addition of metribuzin means they need to wait a little longer before applying that mix and the subsequent grass selective.

“We would consider the grass spray before the broadleaf weeds in the lupins to try and get the grass while it’s smaller and younger, but there’s generally just not enough up and we know there’s more coming, so we apply the metribuzin, Brodal® and simazine first and come back 10 days later with Select®,” James explains.

While the Dempsters also use the pre-emergents trifluralin and propyzamide to control their ryegrass, they often take the opportunity to crop-top their lupins with parquat to stop ryegrass seed set. James is sceptical of the clethodim resistance status and so is considering adopting some harvest weed seed management techniques.

SNAPSHOT

GROWERS: James and Fiona, Phil and Liz, Tim and Chela Dempster
LOCATION: Mingenew and Arrino
FARM SIZE: 5200ha
ENTERPRISES: Cropping and sheep
GROWING SEASON RAINFALL: 350mm Mingenew and 280mm Arrino
SOIL TYPES: Predominantly sandplain with heavier red soils at Arrino
2018 CROP PROGRAM: 2600ha wheat, 700ha canola, 200ha barley and 1000ha lupins
LUPIN VARIETIES: PBA Jurien

PHOTO: CUSSONSMEDIA
SPLIT APPLICATION OF FERTILISER

Splitting their fertiliser application by spreading 100kg/ha of Super Potash 1:1 followed by 50kg/ha of Big Phos Manganese down the tube at seeding time works well for the Dempsters.

“We just never see any split seed or manganese-type deficiencies and we know lupins like a healthy dose of phosphate early, so we give them that,” James says.

“Logistically it works well because we’re sowing a pretty small rate at seeding time and we can load a couple of the bins up with lupins and go all night basically.”

FUTURE RESEARCH

For James Dempster, the development of a genetically modified lupin would be of significant benefit to the lupin industry.

“I’d like to see new chemistry that we can use in our lupin program to control weeds,” James says.

“I hope there’s money getting allocated towards lupin agronomy because it’s just fantastic having a legume that we can grow profitably.

“I know we’re very lucky compared to other parts of the state where they’re still searching for an option.”

IN SUMMARY

- Aim to have lupins germinating in warm soil for optimal yield
- Split application of fertiliser works well
- Sheep conception and joining rates have improved with lupins

MORE INFORMATION

James Dempster, 0458 191 183, jamespdempster@gmail.com
While lupins have traditionally been grown at Andrew Sandison’s farm at North Eneabba as a break crop and for nutritional and feed source benefits, he is now questioning the fit of lupins in his system.

“The recent upsurge in wool price along with reasonable sheep prices has made me rethink lupins in our rotations,” Andrew says. “From a gross margin point of view, lupin prices need to be around $340 per tonne FIS for the lupin gross margin to compete with the livestock enterprise and most of the time the lupin price is well below these levels.

“ Weed control is better in a pasture phase and we can move away from grass selectives and expensive pre-emergents; however, lupins do provide a better disease break than a grassy pasture and also fix nitrogen.”

Andrew believes they will always grow some lupins for sheep feed, for both the grain and the stubbles for summer grazing.

“It becomes a tricky one from a management point of view, because the question we’re asking ourselves now is, ‘do we invest in improving our pastures, making that commitment to the sheep side of the business, or do we just hold back, don’t spend that money, and just do what we’ve been doing?’” Andrew explains.

DRIY SOWING

At present, the Sandisons generally dry sow their PBA Barlock lupins in late April to early May. In an effort to gain better weed control by waiting for a germination, Andrew has tried delayed sowing in late May but saw large yield losses. The lupins are sown at 100kg/ha on 30cm spacings with Agmor boots, placing the seed at a depth of 20 to 30mm in the sides of the furrow.

In 2017, they had moisture at 50 to 60mm, so a precision seeder would have been ideal as their Air Hoe Drill cannot sow that deep. However, most years the topsoil is bone dry, so Andrew believes it would be hard to justify the investment. In addition, stubble cover is very important at Eneabba, so the Sandisons prefer not to sow lupins into their pasture paddocks.

TOP DRESSING SUPER/POTASH/MANGANESE

A local trial by CSBP has changed the Sandisons’ lupin fertiliser strategy, transitioning from applying a super/potash/manganese mix down the tube to topdressing it out in summer.

“CSBP had a trial in our area in 2015 where they had a range of different lupin fertiliser products banded to the side and below the seed, so in theory it should have been a really good, safe way to put the fertiliser down the tube,” Andrew explains.

“But some products were really toxic and the lupin establishment was really poor where they did that, and even the really so-called safe products really thinned the crop out, too.

“The best establishment was where they just spread fertiliser on top, so after seeing that trial we decided that’s the way we’d go, so now we spread fertiliser out in front in summer and just sow without any fertiliser down the tube.”

Andrew believes that while in some years fertiliser toxicity is not an issue, he prefers to manage the risk by removing the possibility of damage.

“I’m sure some years it’s not a problem at all to have fertiliser down the shoot, but the way the weather is these days, every second or third year’s pretty patchy, so it just makes sense to reduce the risks and try and get the best lupin establishment you can,” Andrew says.

SCLEROTINIA

In 2016, sclerotinia was present in the Sandisons’ lupins and Andrew estimates it caused a yield loss of between 300 to 500kg/ha. However, he believes the best management practices to manage sclerotinia are far from clear.

“We know how to manage sclerotinia in canola but I don’t know of any work being done in lupins,” Andrew says.
“We don’t know if there are cultural practices we should change, like row spacings or whether there are fungicides we could use and if so, how well they will manage sclerotinia, what the timings are for applying those fungicides, etc.

“In 2016, it looked like some of the varieties were worse than others, so there could be varietal differences that we don’t know about, so it’s just a black hole for us at the moment.”

TIPS FOR THE WEST MIDLANDS SOIL TYPES
For West Midland growers, Andrew offers the following tips to improve lupin production:

■ Apply plenty of phosphorus and potassium, and tissue test for manganese, applying if required.
■ Sow into good stubbles.
■ Avoid simazine and diuron presowing and instead opt for metribuzin, which is far safer
■ Do not drill or band fertiliser with seed.
■ Maintain good boom hygiene – the Sandisons’ SP is a dedicated no SU machine.
■ Harvest with an extended tin front and do not harvest when hot.

WIDE ROW LUPINS?
As for future plans, Andrew is considering wide row lupins but is concerned about achieving adequate crop density given their non-wetting soils. Techniques such as mouldboarding are not attractive, as the Sandisons mouldboarded a paddock three years ago and it is still blowing. Instead, Andrew is very interested in new work looking at applying wetters to seed.

IN SUMMARY
■ Given the livestock gross margin, the role of lupins is being questioned
■ Top dress fertiliser to avoid fertiliser toxicity
■ Sclerotinia management for lupins is not understood

MORE INFORMATION
Andrew Sandison, 0427 239 997, wildwood10202@outlook.com
Six of the 10 growers in this booklet had experience in growing wide row lupins and they were all north of Northampton, predominantly around Binnu, which is known to have some tough seasons. The growers who chose narrow rows were not convinced of the benefits of wide row lupins as most felt the returns would not be any better and they were often concerned about weed control.

**Benefits of growing wide row lupins**

The following were identified by growers as advantages of growing wide row lupins over narrow row lupins.

**RISK MANAGEMENT** Most used the wider row spacing as a form of risk management — although wide row lupins may not yield as well as narrow row lupins in the best years, growers felt the downside was limited in the poor years.

**INCREASED HARVEST HEIGHT** Concentrating the seed in wide rows means the plants often are taller, which is particularly important in the dry years so growers can get the header front underneath the crop without contacting the ground.

**INTER-ROW MOISTURE** Many growers felt wide row lupins ‘hang on’ better because their lateral roots seek moisture from the inter-row later in the season.

**STUBBLE MANAGEMENT** Wide row lupin growers also cited being able to seed more easily into heavy stubbles as an additional benefit.

**COST EFFECTIVE** With fewer points in the ground, some growers commented they had significant savings in fuel and less wear on their bar.

**LESS CULTIVATION = LESS GERMINATION** While some narrow row lupin growers were concerned about controlling weeds in wide rows, the wide row growers felt they did not get the germination of weeds because they were not cultivating between the lupin rows. In all instances, the wide row growers had the ability to pull a tyne back to make the wide rows.

**Lupin agronomy**

As the agronomy does not differ between wide and narrow row lupins, the following observations came from both wide and narrow row growers.

**FERTILISER SEPARATION** Trials conducted by CSBP in the past few years have influenced fertiliser placement with many growers now top-dressing compound fertiliser rather than banding it.

**DISEASE** While many did not have disease concerns, those with more growing season rainfall seemed most concerned about sclerotinia and felt there were not clear guidelines on how the disease should be managed in lupins.

**TIME OF SOWING** Most lupins are sown dry, the only exception being paddocks with a blue lupin issue to manage. In those cases, many aimed to wait for a germination of blue lupins so they could control the weed before sowing white lupins.

**VARIETIES AND SEEDING RATE** Most growers interviewed were trying the newest variety PBA Jurien® and other varieties included PBA Barlock®, Coromup, Mandelup and Gunyidi, which were commonly sowed at 100kg/ha.

**BLUE LUPINS** Blue lupins are a major concern for lupin growers in the Geraldton port zone. As there are no registered chemicals available for their control in-crop, the only option available is to avoid those paddocks with a heavy burden, or delay sowing and wait for a germination. This is very costly as growers acknowledge that for optimum yield and profitability, lupins should be sown early into ideally warm and moist soils.
References


Notes