

Desperately seeking pest control

SARAH JOHNSON

Retained stubble is protecting against water and wind erosion for one Mid North farmer. It also harbours unwelcome guests.



PAUL LUSH IN A CANOLA Paddock JUST COMING INTO FLOWER.

“The more stubble the more bugs; we’re creating the perfect home for them,” remarked Barabba farmer Paul Lush, whose continuous cropping operation has suffered from increasing pest problems in the past two years.

Paul, with wife Tania, son Nick, parents John and Marjorie and employee Sam Martin, crop 2,400 ha near Mallala.

In 2010 they shifted to a zero-till system and retained stubble they had previously cut and bailed for the export market.

The stubble has preserved moisture but provides the ideal environment for pests such as false wireworms and millipedes.

“We’ve seen a lot of changes since going to zero-till. There’s no doubt straw is keeping a lot more moisture in but we’ve also got a lot more bugs,” said Paul.

According to the Victorian Department of Primary Industries, false wireworms are

the larvae of native beetles that normally live in grasslands or pasture. In cropping they are mostly found in paddocks with high stubble and crop residue and may affect all winter-sown crops.

He believes the system has potential to benefit the environment, protect beneficial organisms and save costs.

Millipedes cause damage to emergent seedlings by stripping the outer layers of young plant stems.

Both pests tend to damage canola more than cereals on the Lush property, with yield losses of up to 50% in affected canola paddocks in 2010.

“The problem is exacerbated because we’re growing more canola. Once upon a time we had two or three paddocks but now we’ve got 15 canola paddocks, so the problem is affecting a bigger percentage of our crop,” said Paul.

Prior to this season, the Lushes sprayed chlorpyrifos, a crystalline organophosphate insecticide, during seeding.

“We were spraying and getting frustrated,” said Paul. “The chemical wasn’t having an effect and even after spraying again we were still losing plants.”

He believes spraying chlorpyrifos has limited effect on soil-dwelling pests in a stubble environment because the stubble prevents the chemical from effectively penetrating the soil.

“I know plenty of farmers who have sprayed chlorpyrifos but not killed all of the bugs this year because they’re under

LUSH FAMILY EMBRACE 'HAVE A GO' ATTITUDE

Pioneering a self-engineered pest solution is a brave move, yet this is just one of several major changes made by the Lush family to their Mid North farming operation in the past two years.

In 2010, after 14 years of no-till farming, the family bought a John Deere 1890 disc seeder, which is set up for 190 millimetre row spacing, and converted to zero tillage. Proving they don't do things by halves they also purchased a Liquid Systems (SA) in-furrow liquid delivery system at the same time.

This year they have installed soil probes to analyse available plant moisture in their paddocks.

"When we changed to zero-till we went the whole hog," Paul said.

"It has been a big change because you've got to logistically handle 150,000 litres of liquid as well as everything else at seeding time."

The Lushes chose the Liquid Systems 2010 TBT Rate Control unit with SPIKER module to apply fungicides into the delivery stream, rather than mix them with their fertiliser. They also use the SPIKER to apply trace elements and this year to apply chlorpyrifos in-furrow to fight false wireworms and other pests.

Their change to liquid delivery was driven by soil tests showing their soils were low in trace elements.

"It was all driven by soil tests. We saw that we were low in zinc, copper and manganese in all of our paddocks. We've addressed it with liquid and we've seen a huge difference," said Paul.

"We did trials last year and saw a 15% yield increase." This year he has started replicated trials to quantify the results of applying trace elements by liquid delivery.

The family moved to a zero-till system in order to sow into stubble. For five years before they made that change they handled the stubble by cutting it and exporting the straw to Japan.

"We couldn't sow through it with a tine, so we went through a stage of exporting it," said Paul. "We did 8,000 bales of straw and eventually our workforce said, 'that's it, we've had enough'. We were all worn out.

"So now we've progressed to sowing into the straw with a disc and keeping all that organic matter on the soil."

The Lush property is located at Barabba, a farming settlement between Mallala, Owen and Hamley Bridge. They own 1,000 ha and lease or share-farm another 1,400 ha, cropping all of the available land.

The main impetus behind their zero-till system is to capture and retain moisture. "It's all about water. That's the driver, nothing else.

"With zero-till they're saying we have an extra 10% rainfall

because there's less evaporation.

"And the off-season rainfall is more important than we ever thought. The ability to store moisture from autumn rainfall means you come into seeding with plant-available subsoil moisture to grow a crop during winter time. That deep moisture grows a lot of grain."

The annual average rainfall at Barabba is 400 mm, with 315 mm of rainfall during the growing season, from April to October.

This year the Lush family invested in technology to monitor moisture levels.

They installed two soil probes and a weather station in one paddock and plan to install another weather station depending on the profitability of this season. Each soil probe costs more than \$5,000.

"The idea would be to have soil probes in five different soil types, because different soils give us different moisture," said Paul.

The soil probes, which are inserted a metre down into the soil, measure and retrieve soil moisture data, which Paul can access on his mobile phone, using an application that shows the data in graph format.

In April, when the probes were installed, the plant-available moisture in one paddock registered at 40 mm. When SANTFA interviewed Paul at the end of July, after significant rain events in May and June, the probes showed 125 mm of plant-available moisture. "The soil profile is now nearly full," said Paul. "We've got moisture all the way down to 900 mm below the surface on that paddock. In a paddock near Hamley Bridge, where it hasn't rained, there is only about 80 mm of plant-available moisture and the deepest moisture is only 500 mm down.

"With the probes the information is at our fingertips; they are telling us what moisture we've got and we can use that data to work out how much nitrogen we need to put out."

Paul uses the CSIRO nitrogen calculator, plugging in data from the moisture probes, to work out his attainable yield and the amount of nitrogen to apply.

"There's no guess work. If we only had moisture down to 300 mm we wouldn't spread nitrogen."

"Using this technology this year, we've got crops flowering and we're bang on.

"So that's why we've got all the stubble; it's keeping the water there and I've seen a marked difference already."

Paul is looking to stabilise the farming system the family now has in place, but maintains a 'have a go' attitude to farming.

"Don't be frightened to have a go, simple as that. If you think you've got a problem, address it.

"We've made a serious lot of changes in the past two years and what we've got is working, until the next thing comes along."

the soil,” he said. “Chlorpyrifos is supposed to be a bare-earth treatment. It’s really good on bare earth, but not with stubble. When you spray it on the stubble, the bugs are insulated from it.”

This year Paul is trialling a new approach; applying chlorpyrifos in the seeding slot during seeding. He devised the method after extensive internet research, where he read about a United States’ farmer who applied chlorpyrifos granules in the furrow when sowing maize. Paul’s agronomist Andrew Parkinson also found Australian cotton farmers using a similar approach.

“They spray a narrow band above the cotton then water the chlorpyrifos into the soil,” said Paul. “But we don’t have the luxury of irrigation.”

Instead he used the liquid delivery system he bought from Liquid Systems (SA) in 2010 and applied chlorpyrifos in the furrow in areas where false wireworms are known to inflict the most damage on emerging plants.

“It’s the larvae that cause the trouble, not the adults,” said Paul. “They’ll either eat it before it emerges or ring bark it at ground level and the plants fall over and die.

“We don’t lose the entire crop but do lose a lot of yield, because by the time you rectify the problem, you’ve got weak, thin stands of canola.”

The Lushes treat their seed with an insecticide such as fipronil to target pests such as redlegged earth mites.

Working out the in-furrow chlorpyrifos rate was a matter of ‘flipping a coin’. Paul usually applies 1 L/ha as a surface spray and decided to use a rate of 300 mL/ha in furrow and apply 700 mL/ha as a surface spray.

In one 200 ha paddock he applied 400 mL/ha in the furrow without a surface spray and another paddock was burnt ahead of seeding and received no chlorpyrifos.

The in-furrow treatment, applied using the Liquid Systems (SA) SPIKER module that is part of their liquid delivery system, was used on every second seed row, with fertiliser applied in the rows where the insecticide wasn’t used.

“I didn’t know whether insecticide in the furrow would kill all of the pests or whether we still had to spray,” Paul said. “We’re going to need two or three years to work out if they’re all going to crawl into

the trench and die, because there’s potential that they’ll survive in between the furrows.”

“I kept a close eye on the first paddock that wasn’t sprayed because I was pretty nervous; you’re investing a lot of money when you’re sowing a crop,” he said.

“I actually found a dead false wireworm halfway out of his hole in the furrow where we put the insecticide. We’d killed it without putting anything on top with the boom spray.

“We wouldn’t have got it with a surface spray because he was down 20 mm deep in the furrow. It seems to me that they’re attracted to freshly-tilled soil.”

The health of this season’s crop is good, with early flowering and even emergence. “The proof is in the crop. We don’t have a bare patch anywhere, except the paddock we didn’t treat,” said Paul.

That untreated paddock was burnt ahead of seeding instead of being sprayed. “We thought burning would kill all of the insects, but we started losing plants and found that it was false wireworms at ground level.”

There is a lot of rubbly, limestone soil type in that paddock’ conditions Paul believes false wireworms thrive in. “They seem to be attracted to it. You’ll find millipedes across the whole paddock and



THE PATCHY EMERGENCE OF THIS CANOLA CROP, SOWN ON RUBBLY LIMESTONE SOIL, IS THE RESULT OF DAMAGE BY FALSE WIREWORM.



A HEALTHY YOUNG CANOLA CROP – IN PARTS. EMERGENCE IS BETTER ON THE LOAMY RISES THAN ON RUBBLY FLATS THAT APPEAR TO SUPPORT HIGHER POPULATIONS OF FALSE WIREWORM.

false wireworms in the rubbly soil. And we've got lots of that. Apart from our home block, every paddock has limestone in it."

Paul is cautiously optimistic about extending the in-furrow system in the years ahead.

"It will depend on yield numbers, but I'd like to get to the stage where chlorpyrifos only goes in the furrow. We'll do another trial next year, targeting a paddock with bad bugs," he said.

"The approach will also depend on the summer. If we have a dry summer and the insects don't build up we might just go in-furrow. If we have a bad paddock we would probably give it a double whammy and apply a surface spray as well, but if insect numbers are low we'll just apply it in-furrow.

"Our insect numbers built up to huge levels the 2010 summer. The rows were black with them."

He believes the system has potential to benefit the environment, protect beneficial organisms and save costs. "Chlorpyrifos is not a nice chemical, but we don't want



THE CONTROL PANEL OF THE SPIKER SYSTEM; AN IMPORTANT PART OF THE LUSHES' LIQUID DELIVERY SYSTEM.

to lose it. If we can use it in-furrow, rather than spraying it into the atmosphere, it's got to be a good thing," he said.

"Targeting the furrow means we limit damage to the soil and all of the beneficials, like ladybirds and spiders. It

will also be a cost saving if we find that we can apply it at a third of the normal rate.

"More research needs to be done. We need to know how low we can go with our rates. We may be able to get back to 100 to 200 mL/ha in-furrow." 

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