



Cover cropping

What is the practice we want?

- + Increase adoption of cover cropping

What is the specific change needed?

- + Plant and terminate winter cover crops before planting cotton.

What is the motivation to make that change?

- + Fundamental risk management tool for maintaining yields with variable water availability.

What is the outcome you have seen?

- + Increased water use efficiency, reduced weed burden, reduced herbicide use, big reduction in synthetic N application, healthy fertile soils, increasing soil organic carbon and available nutrient pool for the following crop.

What are some of the barriers to farmer adoption?

- + The perception that cover crops use soil moisture: water use is minimized by terminating before the reproductive stage
- + Concern cover crops aren't a cash crop: you need to treat cover crops as part of the nutrition program – and factor in the added benefits that costly imported nutrients don't provide.

AT A GLANCE: WHAT YOU NEED TO KNOW

NAME: Scott McCalman, Mullaley NSW.

ENTERPRISE TYPE: Mixed cropping 1,150 hectares, on heavy black clays. 60% dryland and 40% overhead irrigation.

What's being done to improve soil health?

- + Planting a winter mixed species cover crop and terminating manually to provide water retention, green manure, generate and build soil nutrition, and weed suppression before planting cotton.
- + myBMP soil health module check level: 3.

Why did you make the change?

- + Risk management: better use of available water and soil nutrition
- + Reduce time and stress of farming
- + Reduce imported nutrients.

What's involved?

1. Plant cover crop into a clean fallow, ideally late summer/autumn to maximise vegetative growth and allow for adequate residue breakdown, nutrient release and cycling, and to alleviate any potential allelopathic symptoms in the following crop.
2. Current mix is cereal rye, field peas and radish to target specific soil health functions.
3. Cover crop is mulched at 12 weeks (at end of vegetative stage and prior to reproductive stage) with a chevron pattern roller crimper (crimping is mechanical termination = cost savings and reduced chemical reliance).
4. Summer crop rotation is planted into the terminated cover crop fallow.

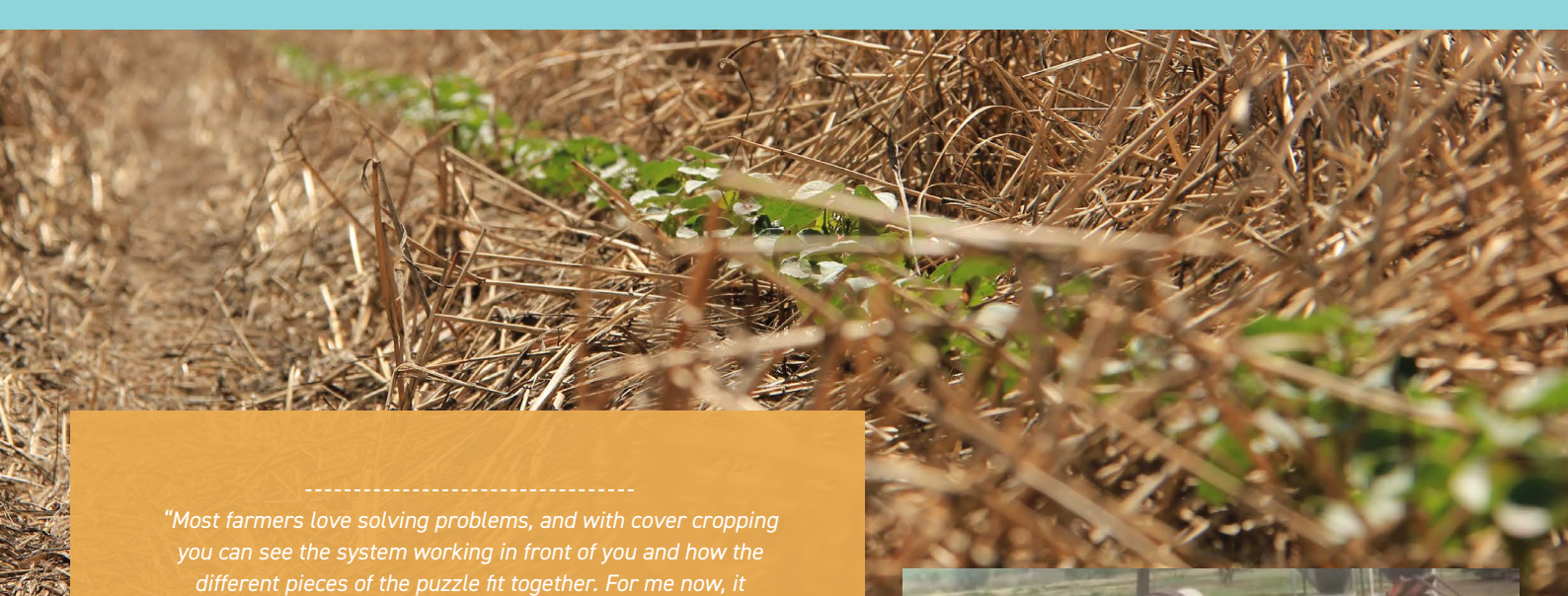
What is the cost/benefit for you?

Cost:

- + Cost of a roller crimper \$100,000 plus, or about \$15,000 in parts if home-made like Scott's.
- + Cost of cover crop seed. Scott negates this by keeping a strip of cover crop to harvest for seed.

Benefit:

- + Significant reduction of evaporation and capture of moisture in soil
- + Herbicide cost is at least half normal fallow cost
- + Biological liquid fertilizer is used in combination with cover cropping
- + Cover cropping generates N, which dramatically reduces reliance on synthetic N
- + Maintaining target yield with a more efficient cost of production: less water, less herbicide, less fertiliser
- + Less time, less stress.



"Most farmers love solving problems, and with cover cropping you can see the system working in front of you and how the different pieces of the puzzle fit together. For me now, it feels like I'm on a winning football team where everything is clicking. It's put the enjoyment back into cropping."



MORE DETAILS: SCOTT MCCALMAN

Farm system

"Zero till controlled traffic farming on 3 metre wheel tracks and 12 metre swaths. We moved from 1.5 metre to 2.4 metre cotton rows because I just felt more space was needed to make the most of this soil's water holding capacity."

"The wider spacing encourages a bigger root system to forage the gap for water and produces a far better quality fibre year in year out, especially length and micronaire."

"Wider rows also reduce input costs from having less green hectares. Importantly, the 2.4m row spacing has also allowed us to put our bale picker on controlled traffic farming, and has been an incredible risk management tool for our business."

Choose a diverse but targeted cover crop species mix

"Lots of cover crop proponents advocate a cocktail of a dozen or more species. The problem with that is seed costs money, and if different species mature at different rates, mechanical termination is difficult."

"We choose a smaller mix that targets soil health functions we want to address. Our current mix is cereal rye for biomass and root penetration, field peas for nitrogen and radish to improve soil structure and pull up deep nutrient pool at depth."

Terminate before anthesis

"It's absolutely critical to terminate at the end of the vegetative cycle, and before the reproductive stage – about 12 weeks for our cover crop mix."

"Anthesis is the critical timing window for mechanical termination. There's enough lignin in the plant and it's highly nutrient dense at the end of the vegetative cycle to allow for an effective mechanical termination through the crimping process. All chosen species need to mature at about the same age, to make termination more effective."

Winter v summer cover crops

"We've been cover cropping since 2002. We've tried different cover crop species in summer and winter but have found temperate autumn-winter cover crops species are best for us because they're growing in low evaporation months in winter which produces a far more efficient moisture-building ratio and reduces the cover crop water use. And the amount of water that's trapped by daily dews and small showers in winter is quite incredible."



Lessons and top tips:

"I'd encourage anyone considering cover crops to trial and re-replicate these trials in just a part of their field over a three year period and see the difference it makes."



SUSTAINABILITY FAST FACTS

Soil health

- + Healthy soil is alive. Soil health is defined as “the capacity of soil to function as a living system”.
- + A living system needs food and shelter.
- + The Australian cotton soil health framework is based on following these two principles: soil organisms are provided food by maximising living roots and biodiversity above and below the ground, and soil habitat is protected by maximising soil cover and minimising disturbance
- + Farmers should aim to adopt practices within these principles that are appropriate for their unique circumstances.
- + Adopting more of these practices should have a positive impact on soil properties like soil organic matter, nutrients and compaction, which in turn should help soil better perform functions needed to support a farm enterprise like water holding, nutrient cycling, disease suppression and resilience to weather extremes.

RESOURCES AND MORE INFORMATION:

- + [Australian cotton soil health framework](#)
- + [Scott McCalman YouTube roller crimper videos: Part 1, Part 2, Part 3, Part 4](#)
- + [myBMP: Soil health](#)
- + [CottonInfo: Soil health](#)



MORE DETAILS: SCOTT MCCALMAN

See the natural nutrient cycle at work

“We adopted cover cropping to reduce the impact of drought. But we weren’t expecting the spectacular nutrition boost we get from the big release of nutrition that comes from cover crop biomass breaking down to produce a readily available source of plant-available nutrition (N, P, K, trace elements, etc).

We use a full biological liquid program across the farm to inoculate the crop at planting. Nitrogen is only added to paddocks that had a particularly big crop taken off, or if sap tests show a top-up is required, and then in sulphate of ammonia (22% N, 22% S) which is a highly stable form of product.

Keeping in mind the atmosphere is 78% N, and because cover crops are stimulating soil biology, we are seeing proper N cycling with cover crops drawing N from the atmosphere and then putting N into the soil as the terminated crop decomposes. It shows how much nutrition can be drawn down from cover crops.”

Target yields

“We use cover crops as a risk management tool, not as a yield maximising tool. We aim to grow a healthy yield and maintain it year in and year out with reduced input costs. We no longer target high yields which tie us to high inputs.

“We saw dryland yields of two bales per hectare in the worst drought on record, which proved to us the risk management value in drought. We thought yields would be relatively lower in good seasons, but in the last couple of years we are getting seven to ten bales from dryland cover crop fields, so it stacks up in all seasons for us.

“Under lateral irrigation cover cropping in combination with zero till and controlled traffic has reduced our water use per hectare but maintained target yield.”

Rotate cover crops

“We need some cash flow from winter crops, so typically we plant about 15-20% of winter crop area as a cover crop. We move the cover crops around the farms – areas with emerging weed problems or a soil amelioration issue like wet picks are a really great place to introduce cover crops.

“We have much less trouble with broadleaf weeds in cover crop fallow than in standing stubble fallow. The decaying cover crop does also give us some Allelopathy which gives us a percentage of weed control.”