

Yield maps of paddock P5 during 2012 (left) and 2014 (right). Low yield areas (red and orange) have reduced by 20%.

In other areas of farm bordering Hambridge Conservation Park, both kangaroos and emus decimated the best crop that Kerran Glover had seen on those areas. Despite that, the Glover's were thrilled to record a 20% improvement in yield variation over the paddock from the sandy dunes where higher seeding rates were applied through to the flats.

As the Glover's results get better over time, they are hoping to be able to lift what is now at the bottom of the production zone to another level.

"If I can get from a 0-2 tonne area to a 2-3 tonne area, then I consider I've kicked massive goals, and as that improves over time, stubble loads and therefore organic matter are also increasing, which improves the soil fertility."

### Benefits

What the Glover's like about their VRT system is that it is simple to use and takes out the potential element of 'operator error'. They say that it is as easy as loading a shape file onto the computer and the technology essentially does everything itself. The operator simply needs to be able to drive a tractor and turn the air seeder on and in that regard, the Glover's have every confidence that the job is getting done properly.

Another beneficial aspect is that as the Glovers are not using high N fertilisers, they do not have issues with fertiliser blockages. "When we are sowing, we want to be sowing and not running around trying to unblock hoses and heads due to fertiliser sucking up moisture. Also the fact that we know we can apply nitrogen later and we know we need to be sowing early."

All in all, the Glovers say that this gives them the flexibility to tailor their fertiliser application to the season.

### Future Plans

Having made the move to VRT, the Glover's end goal is to use the variable rate with their nitrogen applications. They want to use zones identified in the EM38 maps to then apply nitrogen according to soil type and water holding capacity. Part of the reason for using the EM38 mapping was to come up with reasons for yield variation across their more uniform looking country.

"If I am going to improve the results I am getting, then I need to find out why certain areas are yielding higher and why other areas are yielding low because soil type doesn't visually look to change that much" Kerran said.

Now that the Glover's have identified where the better areas are, the next step is to develop a fertiliser prescription that will ensure that the better country has enough nutrition to reach its potential.



Sandhill in crop during the 2015 season. Higher seeding rates on these areas are proving beneficial in terms of yield, organic matter and surface cover.

### FAST FACTS

**Location:**

Lock

**Rainfall:**

Avg. annual - 345 mm  
Avg. GSR - 265 mm  
2014 total - 356 mm  
2014 GSR - 240 mm

**Property Size:**

2700 arable hectares in two properties

**Soil Type:**

Dune Swale country with non wetting sand  
Red sandy loam

**Enterprises:**

70:30 split cropping/livestock.

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# VARIABLE RATE TECHNOLOGY ON DUNE SWALE SYSTEMS

## 'A Case Study'

*Varying seeding and fertiliser rates can improve crop production resulting in better cover in wind erosion prone areas*

*When developing prescriptions - simple is best*

*VRT can enable flexible and targeted application of nutrients according to the season*







Lock farmers - Kerran & Mel Glover

## Background

The Glover's farm 2,700 hectares on two separate properties. The property north-east of Lock consists of 820 hectares of dune swale land system which has non-wetting dunes which can be prone to wind erosion.

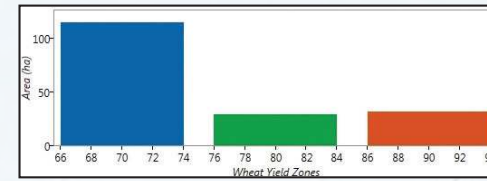
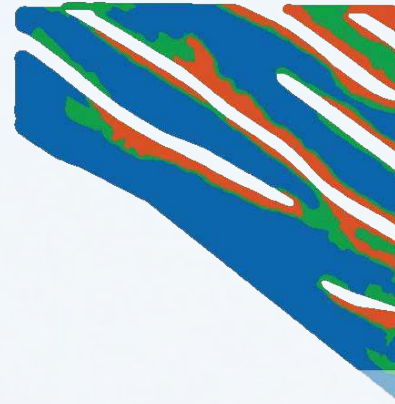
The Glover's felt that they didn't adequately understand their biggest on-farm investment - their soils. After having previously experimented with variable rate technology on a manual and farmer's forum three years ago that provided the catalyst for change. He subsequently secured funding to implement a variable rate system and undertake some EM 38 mapping.

## Situation and Action

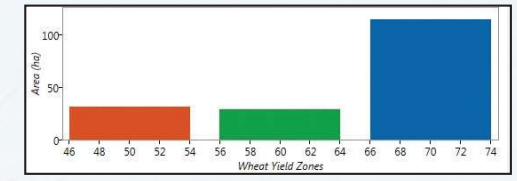
After moving to sowing to date (rather than an opening rain), they struggled with germination especially on the non-wetting dunes. These areas were generally low production zones but high risk for erosion. Kerran felt that there was scope for big improvements on this land system, especially on the mid slopes and dune sides.

Having had variable rate technology ability on their seeder since 2002 and collecting yield data since 2001, the Glover's initially used an aerial photograph to identify areas of low, medium and high risk in terms of both resource management and production. Variable rate prescriptions were then developed and air seeder software was upgraded in order to be able to take the prescriptions for both seed and fertiliser.

As the dune swale land systems are so distinctive, the Glover's did not feel it necessary to map these soil types using EM38 technology. To develop the prescriptions, the Glover's employed a consultant to process their yield maps and set up the yield zones. The aim was to try to get a more even spread of crop from the bottom of the swale to the top of the dune and therefore apply the highest seeding rate on the tops of the hills, then a mid seeding rate and a standard seeding rate for the better soil of the swale.



Seeding Rate Prescriptions



P Fertiliser Rate Prescriptions

Prescription zones - tops of sandhills (red areas) receive the lowest P rate of 50 kg/ha and highest seeding rate of 90kg/ha. The swale area which produces most of the yield (blue areas), receive the highest P rate of 70 kg/ha and lowest seeding rate of 70kg/ha. The prescriptions are essentially mirror images.

The P replacement fertiliser prescription was essentially the reverse of the seeding prescription, with the least amount of phosphorus applied to the areas of lowest yield and where the highest seeding rate was used - namely the tops of the sandhills. Fertiliser applications at seeding only address P replacement because the Glover's feel that on their sandy soils they not only have limited ability to hold nutrients, but as phosphorus is not being dragged out, so there is no need to apply large amounts. Nitrogen is addressed post-seeding.

The Glover's use a single shute system on 12 inch (300 mm) spacings and are mindful of fertiliser toxicity at seeding especially on dry sowing and so do not put out high rates of nitrogen.

## The Glover's VRT Philosophy

An underlying principle of being smarter with where they put their inputs is the Glover's philosophy behind their shift to variable rate technology. They want to ensure that nutrition is put back where it has been taken out or where it where it has the best ability to be utilised.

Yield data is used to determine a P replacement program for seeding based on previously determined yield zones. The Glovers have found that three yield zones are manageable for the air cart with the 0-2 tonne zone getting a base rate of 40 kg of 18:20, the 2-3 tonne next yield zone getting 60 kg and the 3-4 tonne zone receiving 80 kg.

They say that whilst they are not necessarily using any less fertiliser, they are also not using any more - instead putting it back exactly where it has come from rather than treating the whole paddock as one production zone.

## Results

Despite having two good seasons since the implementation of variable rate on their dune swale land systems, the Glover's feel that their system is definitely working with good germination achieved on the sandhills and a visibly thicker crop. However Kerran says that if the degree of success was made on the basis of the yield data alone, a different story could be told, hence the importance of looking beyond purely the data. Various management decisions and other impacts can tell the other part of the story.

The sandy soils on the dune swale land system are nutrient hungry and recognising this, the Glover's apply a split application of 18:20 fertiliser at seeding and a blend of urea and sulfate of ammonia later on in the season. This gives them the flexibility to tailor their fertiliser according to the season.

However last year after a good establishment, they spread their usual rate of urea and sulfate of ammonia at tillering, and being uncertain of seasonal direction and conscious of financial resources, made the decision to hold any further fertiliser applications. With rainfall continuing and the crop running out of nutrition, a subsequent application was made, but yield potential was lost.