

Precision Agriculture Project

Gibson Agriculture, "Mill Farm", Hagley

Site details

- dermosol (red/brown clay loam over light red/brown gravelly clay, and dark brown clay loam over light brown light clay)
- 45 ha paddock, divided into 4 quadrants, centre pivot irrigator
- 2015-16 crops – processing peas ($\frac{1}{4}$), grass seed ($\frac{1}{4}$) and two varieties of seed potatoes ($\frac{1}{2}$)
- 2016-17 crops – poppies ($\frac{1}{4}$), onions ($\frac{1}{4}$) and grass seed ($\frac{1}{2}$)
- A yield map was obtained off the harvester for the grass seed. The other crops were hand sampled for yield estimation.

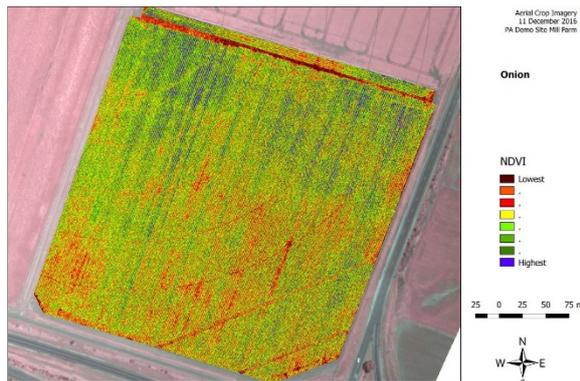
Representative data layers

Various data layers, such as EM38 and soil pH, have been collected previously.

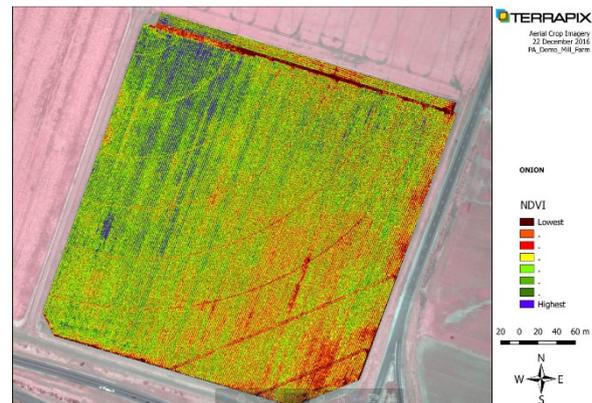
Onions

In-season NDVI images

NDVI images were captured by Terrapix two times during the growing season, as seen below.



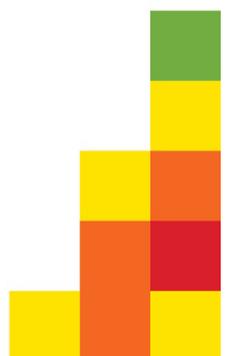
NDVI – 11 Dec 2016

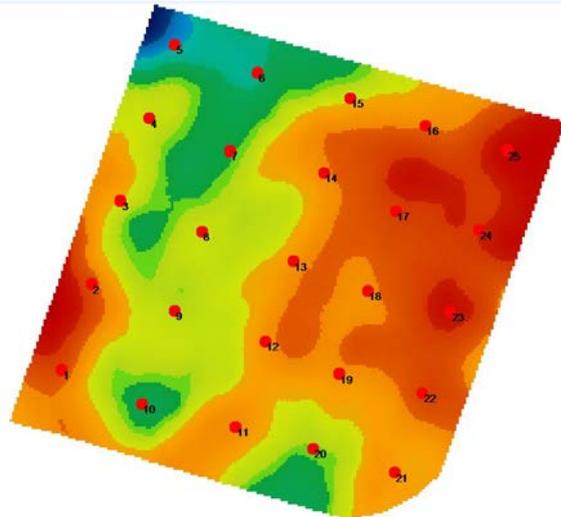


NDVI – 22 Dec 2016

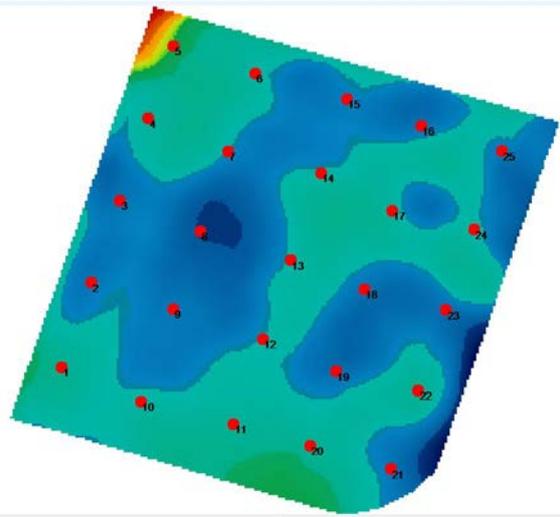
Yield variability

Yield samples were taken from 19 points in a grided pattern across the paddock – see images on next page. This represents about one sample per 0.7 ha. At each sample location, the onions were recovered from 1 linear m of bed, which represents 1.8 m² of crop. Samples were graded to determine marketable yield, being bulbs in the range 40 – 90 mm. Variation in marketable yield across the sampling points is shown on the last page.

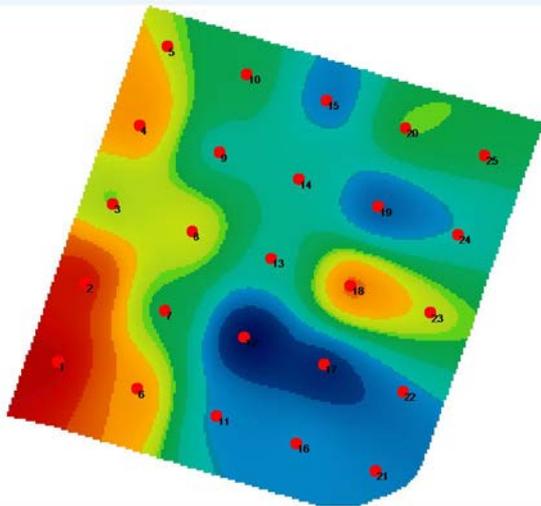




EM38 shallow



EM38 deep



Marketable yield variation - onions

Site	Crop	Measure	Units	Average	Min	Max	Variation ratio max:min
Mill Farm, Hagley	Onions	Yield	t/ha	76	61	88	1.4

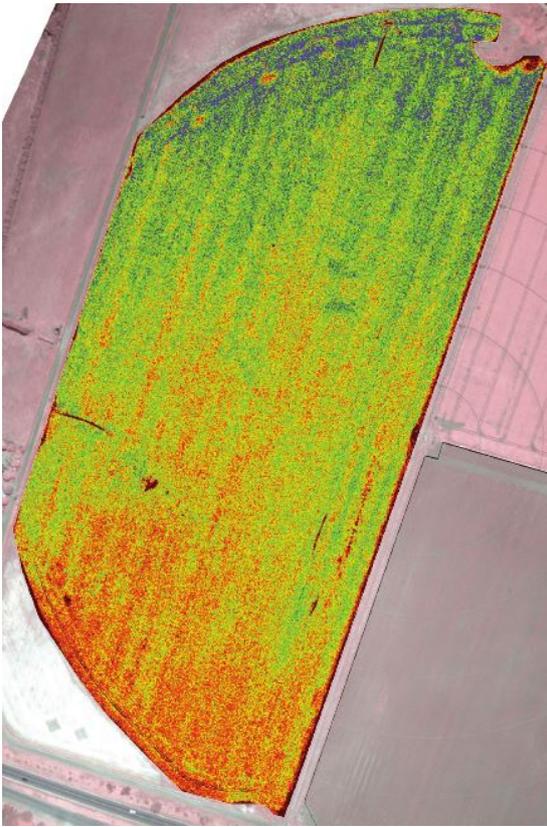
Comments

Overall, the yield in this paddock was reasonably uniform. A variation of less than two from minimum to maximum yield is unusual. The next crop planned for this paddock is poppies.

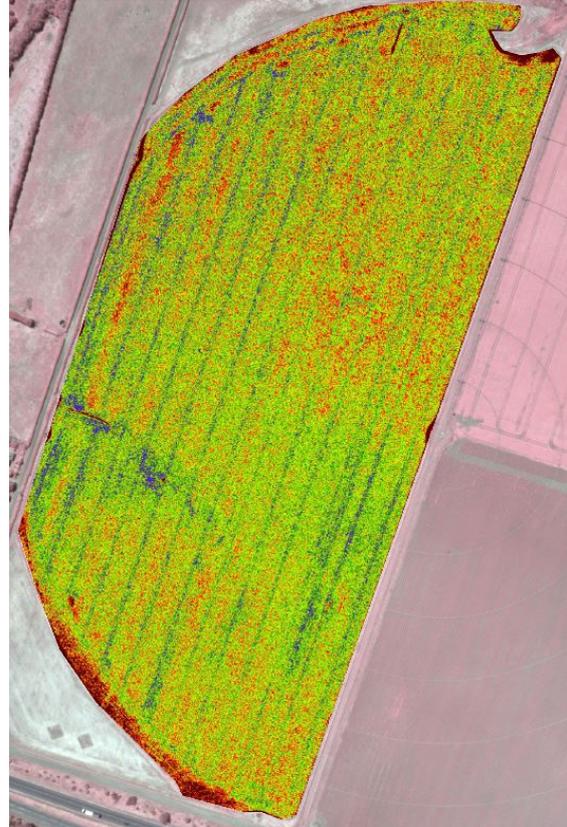
Grass seed

In-season NDVI images

NDVI images were captured by Terrapix two times during the growing season.



NDVI – 11 Dec 2016

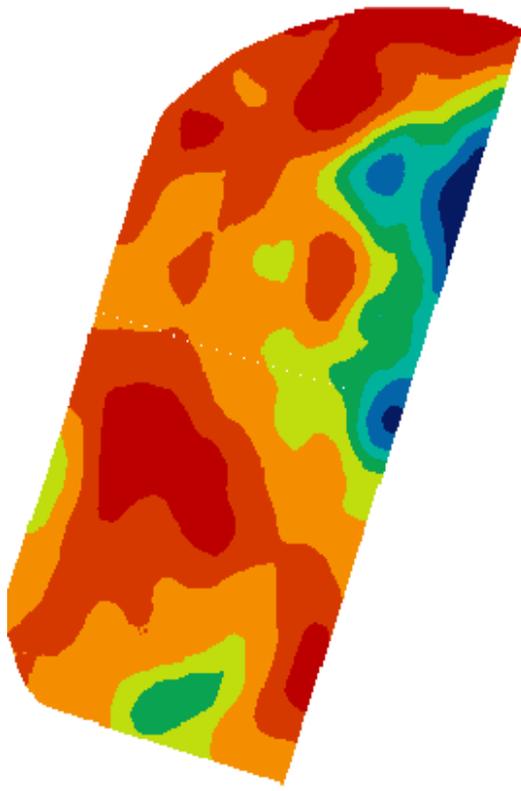


NDVI – 22 Dec 2016

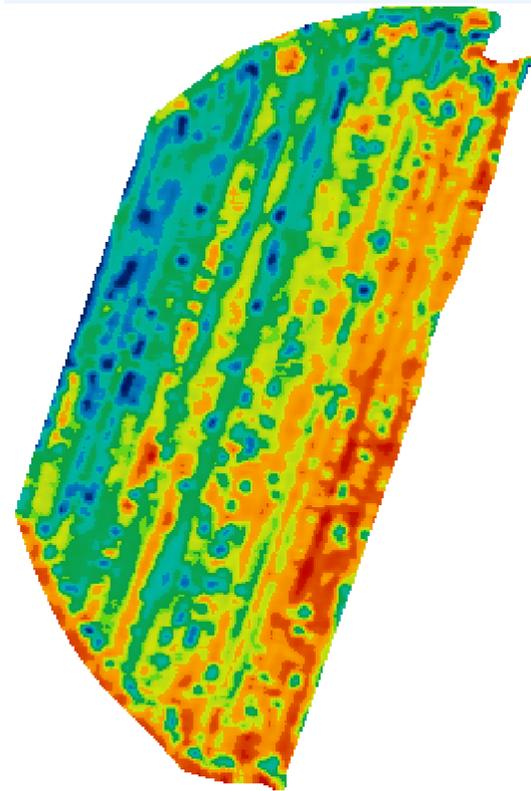
Yield variability

Yield mapping was done using a grain harvester, giving a full layer of yield data. The pictures on the page demonstrate the difference in resolution between the hand sampled yield map of seed potatoes in 2016 and the grain harvester yield map for grass seed in 2017.

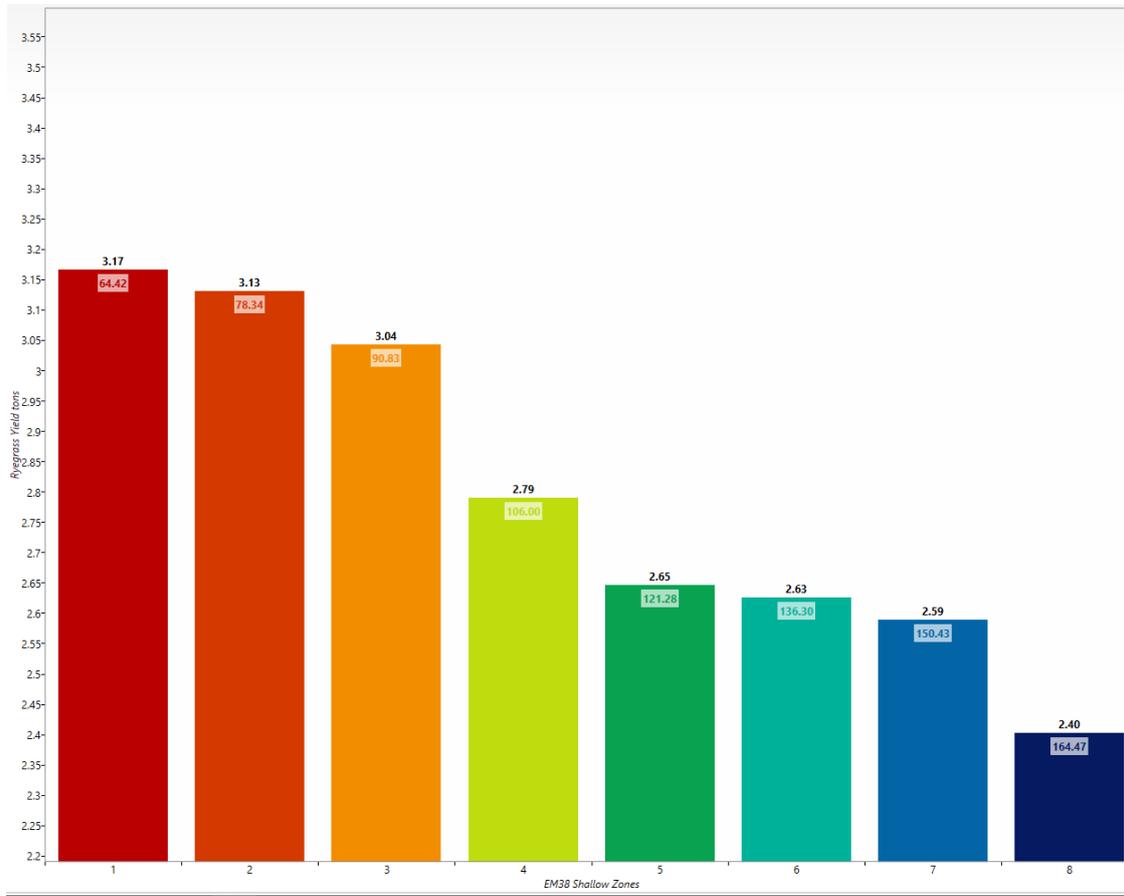
Site	Crop	Measure	Units	Average	Min	Max	Variation ratio max:min
Mill Farm, Hagley	Seed potatoes (2016)	Graded yield	t/ha	48.8	9.9	74.6	7.5
		% grade	%	80	61	92	1.5
	Grass seed (2017)	Yield	t/ha	3.0	1.7	4.4	2.6



EM38 shallow



Grass seed yield map



EM38 (shallow) vs rye grass yield.

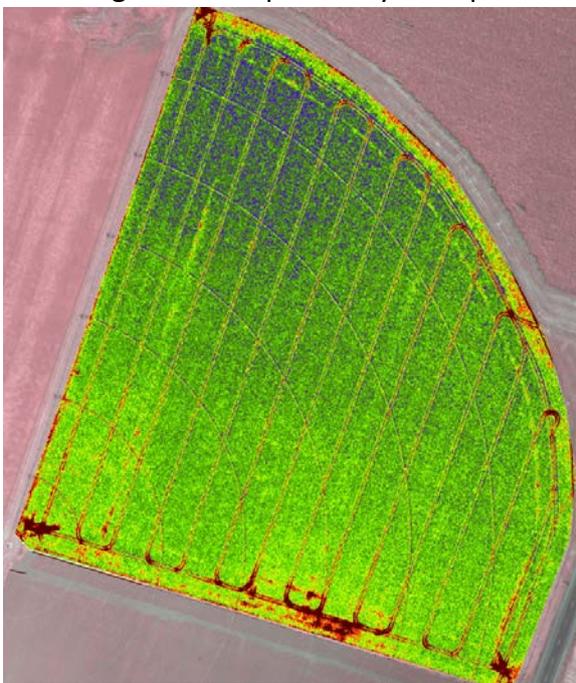
Comments

The first NDVI image shows a low vigour area that is a low lying area subject to waterlogging. By the time the second image was taken two weeks later, it seems the wetter zone has changed into an area of high vigour. There is not a clear pattern between NDVI and final yield, but there is a distinct trend from lower yield on the right of the image to higher yield on the left. There appears to be a relationship between EM38 (shallow) and yield, with higher EM readings matching with lower yield. This is probably a reflection better drainage (low EM) supporting a higher yield compared to areas with waterlogging potential (low EM). The next crop planned for this paddock is poppies.

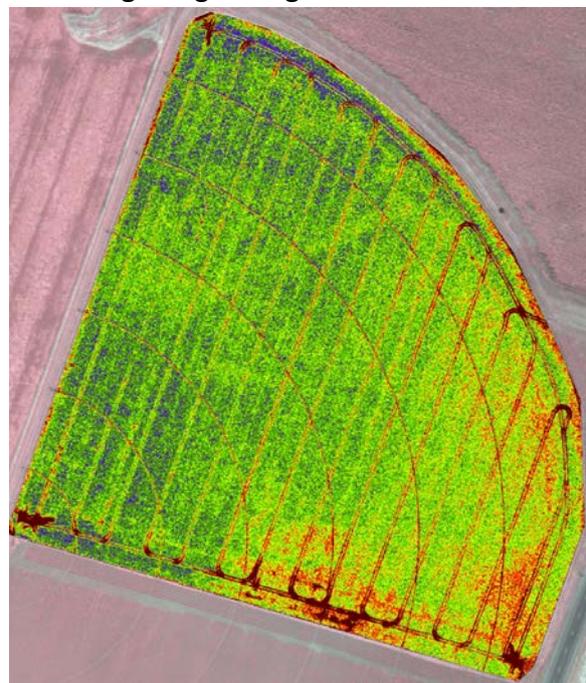
Poppies

In-season NDVI images

NDVI images were captured by Terrapix two times during the growing season.



NDVI – 11 Dec 2016

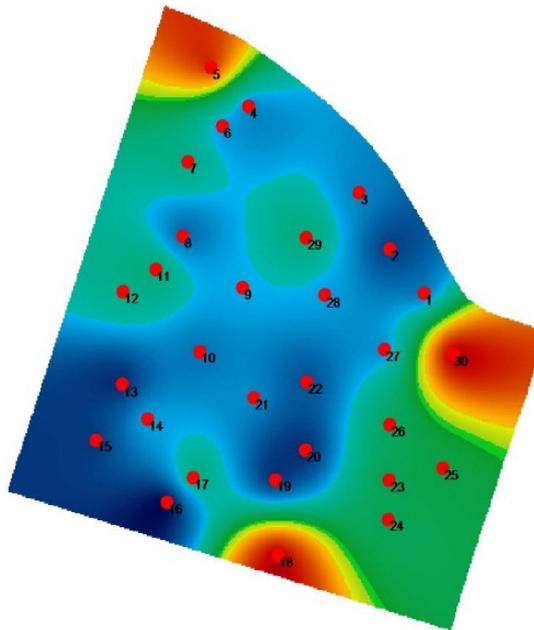


NDVI – 22 Dec 2016

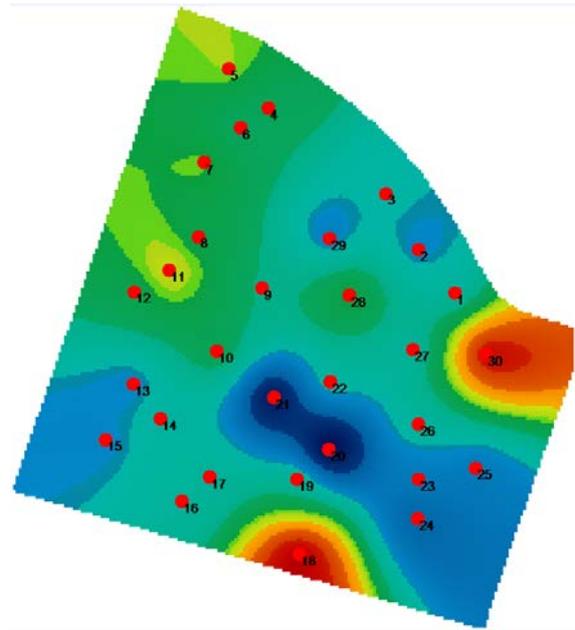
Yield variability

Yield samples were taken from 30 points in a random pattern across the paddock – see images on next page. This represents about three samples per ha. At each sample location, the poppy capsules were harvested from 1.56 m² of crop. The capsules were processed and analysed at the SunPharma laboratory.

Site	Crop	Measure	Units	Average	Min	Max	Variation ratio max:min
Mill Farm, Hagley	Peas (2016)	Yield	t/ha	8.2	3.5	10.5	3.0
		MI		124	86	153	1.8
	Poppies (2017)	Straw yield	t/ha	3.9	2.4	5.0	2.1



Pea yield (2016)



Poppy yield (2017)

Comments

A fairly uniform crop, with a variation of double from minimum to maximum straw yield. The next crop planned for this paddock is onions.

Overall, the yields are reasonably uniform. That's not to say variation could be reduced, but compared to some paddocks in the project, yield variation has been less than 3-fold, with the exception of the seed potatoes in 2016, which got caught out with extreme in-season rainfall and waterlogging.

Considerations for this pivot:

- Drainage in some areas, particularly on the western side of the pivot, restoration and/or expansion of existing underground drains.