Precision Agriculture Project

Increasing on-farm productivity & sustainability

This is the third newsletter of the Precision Agriculture Project, an on-farm research, demonstration and extension project funded by the Tasmanian Department of Primary Industries, Parks, Water and Environment under the *Cultivating Prosperity: A 2050 Vision for Agriculture* program.

The project, conducted by the Tasmanian Agricultural Productivity Group (TAPG), in conjunction with the Tasmanian Institute of Agriculture (TIA), aims to help boost farm productivity by using precision agriculture technologies to enable better crop management and yield prediction. Other service providers who have assisted with the project include Serve-Ag (Julie Finnigan), Ag Logic (Reuben Wells) for processing and storage of data layers, and Terrapix (Neil Meadows) for aerial NDVI imagery during the crop growing season.

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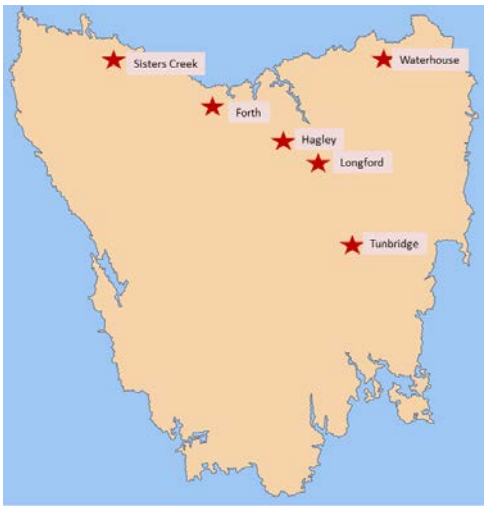
Farm demonstration site activity



Data layers

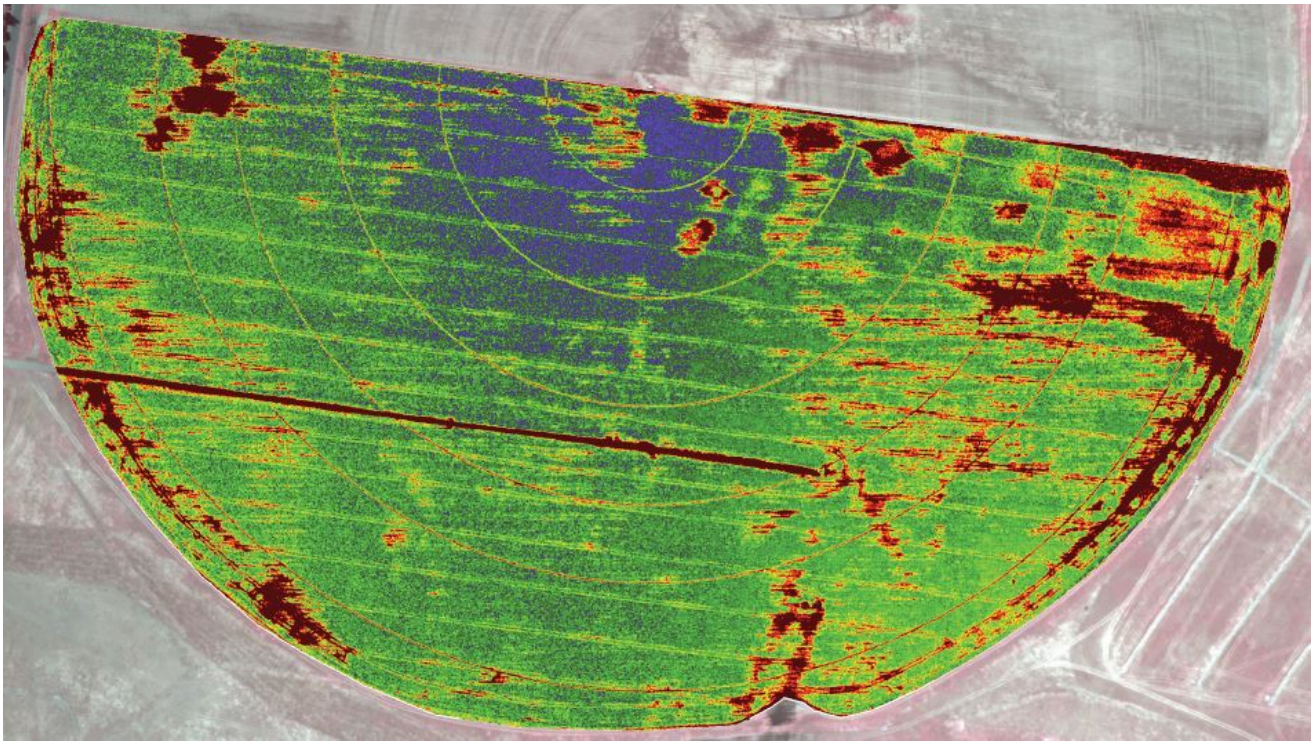
Yield and quality data from hand sample harvests from 2015/16 and 2016/17 have been transformed into data layers which can be overlaid with other data layers for each site. The lack of yield monitoring capacity on most vegetable harvesters is a constraint to preparing reliable and accurate yield maps for each site. The yield maps prepared from hand harvested sample data, ranging from 1 to 5 points per hectare, are not accurate in the way that a machine generated yield map would be, but they do provide useful indications about the variability of yield.

Crops

The crops grown during the 2016/17 season at each of the sites were: Sisters Ck – processing carrots; Forth – fresh market carrots; Hagley – poppies, grass seed, onions; Longford – peas; Waterhouse – seed potatoes; Tunbridge – seed potatoes, poppies.

Imagery

During the season, aerial NDVI images were collected on two occasions for some crops. The image on the next page shows an NDVI image of a pea crop with some clear features. The rust red region on the right of the image is a low/no growth area of the peas which was subject to water logging. Spray run wheel tracks are clearly visible, but what is also visible is a series of parallel lines that are



rust red in colour, indicating regions of low vigour in the crop, particularly near the water logged area in the right of the image. It is clear that these are due to tractor tyre impacts, quite possibly compaction, most likely caused either during pre-seeding tillage or seeding itself.

Yield variability

One objective of the project is to measure yield variability in crops. Yield variability is present in all crops, and depending on its cause, it may be possible to reduce it using site specific management techniques applied with precision agriculture technologies. Ideally, data would be collected using yield monitoring equipment on each harvester, which could then be used to produce an accurate yield map. Unfortunately, yield monitoring equipment is rare on vegetable harvesters, and none has been available to use at the project case study sites over the past two seasons. The only yield map that has been produced from machine collected data was for grass seed in the 2017 season. In all other crops, yield variability was determined by hand sampling at the rate of 1-5 samples per hectare. The sample data can be used to produce a yield map (of sorts), although it has to be recognised it is very coarse data, and should not be relied on for accurate estimation of the yield at any location other than the original sample points. Yield variability calculated from the sample data is shown in the table on the next page. The shaded rows represent 2016 season data, while the unshaded rows are 2017 season data.

It is clear from the last column that there is considerable yield variability in some crops and locations, up to 20 times difference from minimum to maximum yield.

Table 1. Data on crop variability derived from sample harvests at case study sites

Site	Crop	Measure	Units	Avg	Min	Max	Variation ratio max:min
Sisters Ck	Proc. carrots	Marketable yield	t/ha	95	12	125	10.5
	Proc. potatoes	Yield >250 g	t/ha	38	3	60	20
Waterhouse	Seed potatoes	Graded yield	t/ha	33	11	51	4.5
	Seed potatoes	Graded yield	t/ha	29	12	43	3.5
Longford	Peas	Yield	t/ha	10	1	18	18
		MI		170	95	263	2.8
	Onions	Marketable yield	t/ha	73	37	97	2.5
Hagley	Poppies	Straw yield	t/ha	4	2.5	5	2
	Onions	Marketable yield	t/ha	76	61	88	1.4
	Grass seed	Yield	t/ha	3.1	2.1	4	1.9
Hagley	Peas	Yield	t/ha	8	3.5	11	3
		MI		124	86	153	1.8
	Seed potatoes	Graded yield	t/ha	49	10	75	7.5
Forth	Fresh carrots	Marketable yield	t/ha	107	62	128	2
	Poppies	Straw yield	t/ha	4	2.3	5.1	2.2
Tunbridge	Seed potatoes	Graded yield	t/ha	29	4	47	12
	Poppies	Straw yield	t/ha	3	1.7	4.5	2.6

Other services *

- An effort was made in the last season to use a satellite-based service for crop imagery (iEK-base), but it proved to be too unreliable with cloud cover regularly obscuring the sites.
- The Forthside site was mapped using the Soil Information System, from Trimble, which provides multiple layers of soil mapping information. Data is still being reviewed to determine the value of this approach – contact Stephen Jobson, BMS LaserSat

* Mention of a product or service is included for the information of the reader, and does not imply endorsement or support by the project team over similar products offered by other providers.