



PGR Case Study



Applying Plant Growth Regulator (PGR) products such as Pix® to prevent excessive vegetation is a common practice in irrigated cotton growing. The benefits of PGR include protecting against boll rot, making pesticide applications more effective and protecting yield but, if incorrectly applied, can have no benefit and can even reduce yield.

Murrumbidgee Irrigation Area grower and Agronomist Chris Andrighetto uses FluroSense to monitor the performance of his 188ha cotton field near Griffith in NSW and guide his Variable Rate (VR) Pix application. The crop is tracked using satellite multispectral imagery updated 5 - 8 times per month, with aerial imagery taken in mid-December, just prior to the time PGR needs to be applied during the flowering stage.

Chris was already aware of a couple of low performing areas that he suspects have a soil chemical imbalance. The analysis provided by FluroSense, in particular the CCCI (Canopy Chlorophyll Content Index) layer helped Chris identify a third low performing area that he had not previously seen driving around the field.

Because CCCI measures the health of the plant through its chlorophyll content rather than just the biomass, it's more useful than the more widely used NDVI (Normalised Difference Vegetation Index) to detect lower performing areas.

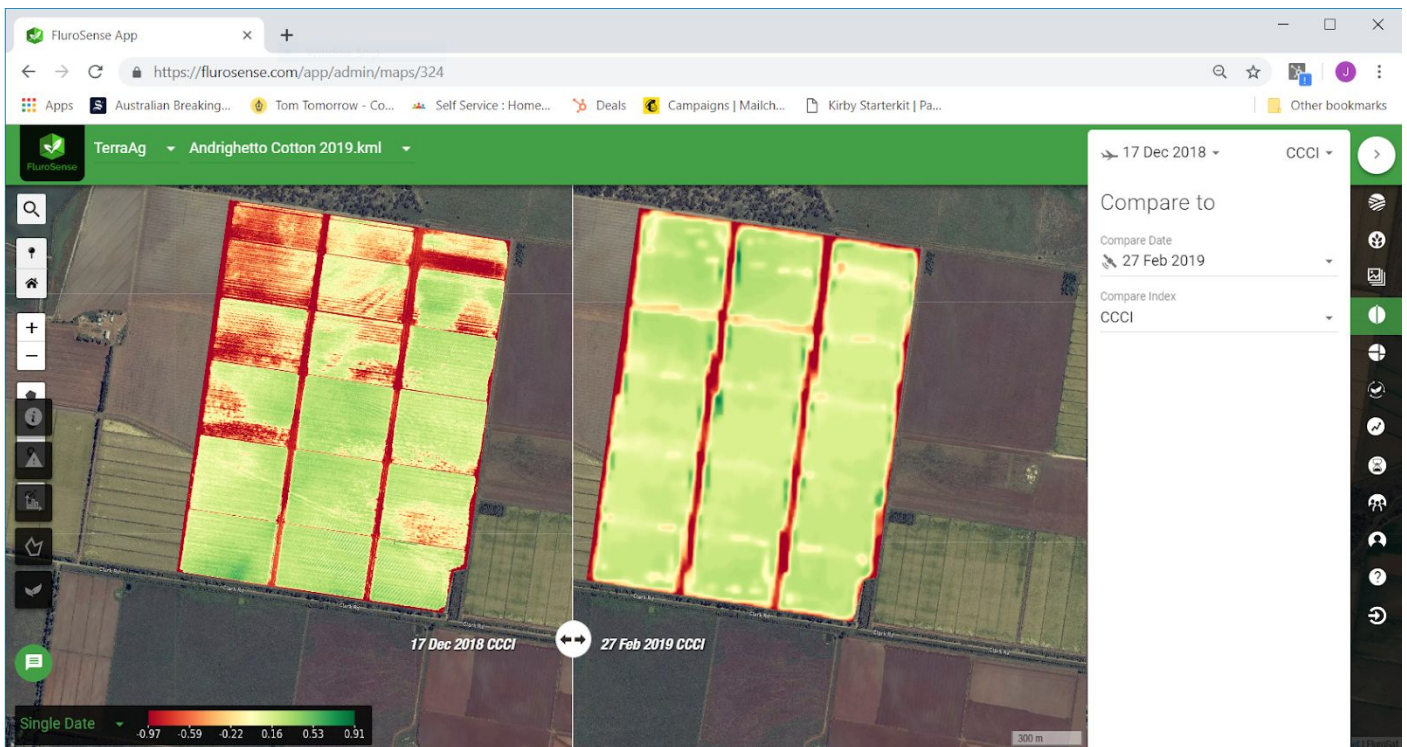
The aerial data helped Chris precisely define the extent of the low performing areas, with the additional level of detail also showing other anomalies like a small strip inadvertently double planted by backing up his tractor. Chris used the CCCI layer and advanced zoning algorithms in FluroSense to automatically generate 3 management zones based on their chlorophyll content.



“With the worst performing zones averaging 3 nodes behind the rest of the crop, it was important not to do anything that would further delay growth there.” Chris explained. “If I applied the same rate of Pix across the field, those zones would not catch up with the rest of the field and subsequently decrease the overall yield potential of the crop.

Chris assigned a different rate of Pix to each zone, ranging from nothing applied to the zone with the lowest average CCCI values to 620ml/Ha to the zone with the highest. Chris exported the management zones from FluroSense into Proagrica Summit to easily modify each zone to make it more suitable for the large grids required for the aerial spraying required by the size of his field. However, Chris believes that “Auto-zoning will be good for ground-based spraying, where you can vary the rate more accurately over smaller areas”

Since the variable rate Pix was applied, those poor performing areas have almost caught up with the rest of the field, responding well to Chris’ irrigation timing, insecticide, herbicide and fertilizer management over the summer. The CCCI map (below) shows the improvement and near uniform performance in the 8 weeks since the initial application.





FluroSat

Landmark Winter Grain Season Case Study

Leading AgriBusiness innovator teams with innovative startup to create accurate and actionable grain crop nutrition maps.

Key findings:

- High correlation between remote sensing data analysis and tissue sampling
- Mapping N, P, K and other nutrients for the entire field, not just for a few scattered sampling points
- Nutrient content grouped in zones, allowing for precise/efficient applications
- Strong correlation between Nitrogen content mapped at key growth stages) and the resulting yields.

Landmark is Australia's leading agribusiness company, servicing over 100,000 clients from their national network of around 400 locations. A part of rural Australia for 150 years, Landmark is widely recognised for their vision of growing value through a world of innovation, practically applied.

Recognising both the innovation and practical application of FluroSat, Landmark partnered with FluroSat to trial the FluroSat platform's analysis of grain crop nutrient and moisture content at key growth stages across 24 of their customers' fields in the Jamestown, SA region. The relationship between the resulting yield and Nitrogen content at an early key growth stage (Tillering - Z20 - Z29) was also validated by regressing harvester spatial data from a selection of the fields against the Nitrogen maps produced by FluroSat.

FluroSat is a crop health monitoring startup that allows agronomists and growers to proactively improve yield performance and efficiency. Agronomists use FluroSat's remote sensing data in maps and graphs of their paddocks to target and optimise nutrition, irrigation, disease and pest strategies.

With a unique multi-layered data approach that combines multi and hyperspectral imagery acquired by satellite, aircraft and UAVs calibrated with in-crop ground-truthing, FluroSat is a comprehensive yet detailed analysis and decision support tool for precision agriculture.

A unique feature of the FluroSat platform, FluroViewer, is its multi-layered data approach that combines multi- and hyperspectral imagery acquired by satellite, aircraft and UAVs. This means that data can be acquired ad-hoc by aircraft or drone during periods of cloud, with the FluroSat platform then calibrating the analysis results with satellite imagery to create regularly updated maps throughout the season.

For this case study, satellite multispectral and radar data along with drone multispectral data was collected across the season. This data was calibrated with in-crop ground-truthing by conducting tissue sampling at the time the data was captured, the results then correlated against the reflectance values generated by the FluroSat platform's analysis.

The Landmark team were highly encouraged by resulting high correlation between FluroSat and the ground truthing provided by the tissue sampling. The Nitrogen, phosphorus, potassium, zinc and iron content detected at the Tillering stage all had an R^2 coefficient ratio of 0.51 or higher.

According to Steve Richmond, Agronomist at Landmark, *"Being able to map nutrient levels across a paddock allows identification of specific areas of deficiency, adequacy and toxicity within a paddock, which*



FluroSat

leads to zonal management of nutrition. This gives far more useful information than the traditional method of tissue sampling for nutrients, which is generally a bulked sample from multiple areas of a paddock.”

A key component of the FluroSat platform is its ability to generate management zones within each field by grouping areas with similar nutrient values detected. The number of zones and the algorithm used to create each zone is highly configurable. The zones can be exported as shapefiles to a wide range of farm management applications.

Being able to sort, classify and compare data from different algorithms is important to Steve as it *“allows for real and subtle differences in paddocks to be identified and managed if required. In a recent practical example, an NDVI photo showed no significant differences in biomass across a paddock, whereas a canopy chlorophyll content index (CCCI) image on the same day clearly identified a change in a liquid fertilizer treatment applied at sowing. “*

In addition to multispectral data, FluroSat have successfully applied their analysis to hyperspectral data, allowing earlier and more accurate detection of nutrients as well as other common stressors like water, pest and disease. Hyperspectral sensors provide much finer resolution than multispectral by dividing the data into more bands which make it possible to detect even the slightest changes in reflection.

Other data sources such as satellite radar and thermal imaging are also been used by FluroSat to generate accurate wet biomass and plant water content maps, strongly correlated with yield data at R^2 coefficient ratios in excess of 0.70. By combining these multiple data sources of the same crop, FluroSat delivers a uniquely comprehensive crop analysis that is a game-changing decision support tool for agriculture.