



## IRRIGATION RESEARCH & EXTENSION COMMITTEE

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FOR IRRIGATION CROPPERS

### **Agriview – remote sensing for irrigated agriculture**

**Paper prepared by**

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Ongoing improvements in the acquisition, processing and delivery of remotely sensed crop imagery continue to generate considerable interest across a wide range of dryland and irrigated cropping farming systems, with quantitative assessment capability under current development set to further enhance the opportunities to improve the efficiency of allocation of resources and inputs.

Of particular interest to irrigated cropping managers will be the potential ability to

- Estimate crop leaf area and biomass
- Quantify crop growth rate
- Directly measure crop nitrogen uptake
- Predict crop yield and quality parameters, and to
- Incorporate spatial variability assessment into risk management strategies.

## Background

Since incorporation in 2000, Terrabyte Services has been actively involved in the development of crop imaging services for dryland and irrigated farming. Typically this has involved the use of standard vegetation index calculation to highlight within field differences in crop growth. This information has then been used to develop directed crop monitoring strategies to investigate the cause, magnitude and implications of the variability.

For rice growers, this imagery has highlighted crop growth variability associated with;

- Crop establishment
- Cut and fill practices
- Water depth and quality
- Weed infestation
- Pests
- Crop nutrition, and
- Crop yield

In recent seasons, an increasing number of growers have been able to generate variable nitrogen application strategies from the targeted crop monitoring activities with considerable success.

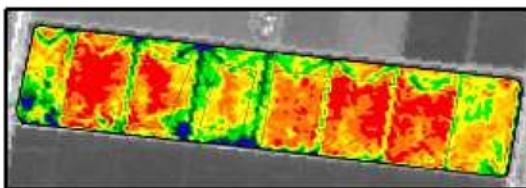


Fig. 1

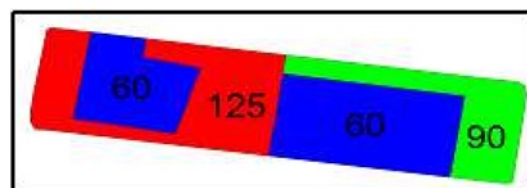


Fig. 2

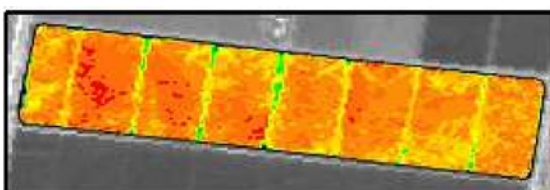


Fig. 3

*Time series showing variable, initial crop vigour image (Fig.1), Nitrogen application plan (Fig.2) and post fertilisation, uniform crop vigour image (Fig.3)*

To date, cotton, corn, bean and winter crop irrigators have primarily used remote sensing to highlight crop variability to develop targeted sampling strategies. Typically, these activities are then used to determine the most appropriate whole field management plan. Importantly, the imagery is being routinely used to assess uniformity of irrigation activities to improve water management.

## Future remote sensing services

Operational experience has demonstrated that while Crop Vigour Indices offer a reliable means of mapping variations in crop growth and health across a paddock, there is significant scope to extend the diagnostic capabilities of the service in relation to crop assessment, growth regulator and nitrogen management together with yield and quality prediction.

To achieve this, Terrabyte Services is working with EADS Astrium, the European Aeronautical, Defence and Space Organisation that currently offers the Farmstar Crop Imaging service in Europe with more than 6,000 subscribed farmers monitoring over 16,000 fields. This collaboration is working towards the development of quantitative imagery services customised for Australian crops, climate and management systems.

Current development activities are working towards calibration and evaluation of capability to directly estimate

- Crop leaf area and biomass
- Crop growth rate
- Crop nitrogen uptake

to predict crop yield and quality parameters.

Additionally, work has commenced to incorporate existing crop growth model, nutrient management and irrigation scheduling capability to further develop crop, irrigation and risk management processes.

This work involves incorporation of a range of agronomic parameters provided by the growers including

Crop variety

Sowing rate and date

Row spacing / planting configuration

Soil type, and

Target plant population and yield.

together with daily climatic information.

The resulting capability will provide quantitative assessment techniques that will enable

- Direct comparison of estimated parameters across regions, through time and within fields against standard benchmark values, and
- Utilisation of the evolving application of agro-meteorological crop models to simulate crop growth and evaluate likely implications of proposed management activities.

For further information visit – [www.terrabyte.net.au/agriview](http://www.terrabyte.net.au/agriview)