



# RESEARCH SUMMARY

## ELD118

### FAST FACTS

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#### PROBLEM

There is a lack of understanding in regard to how multi-spectral technologies can be used in precision agriculture farming methods such as yield mapping and nitrogen applications.

#### PROJECT

Investigating the accuracy of NDVI and NDRE in detecting canola response to nitrogen to create a variable rate map.

#### PARTICIPANTS

Elders:  
Adam Hancock  
Kalyx, Southern Precision  
Ag (SPA)

#### DATES

Start: April 2018  
Finish: April 2019

# HIGH RAINFALL ZONE CANOLA VARIABLE RATE NITROGEN (VRN) PROJECT

The aim of this project was to investigate the accuracy of using normalised difference red edge index (NDRE) and normalised difference vegetation index (NDVI) sensors to detect responses in canola growth to nitrogen applications. The project also investigated how the data generated from these sensors can be used to generate variable rate maps of 10-hectare areas.

These variable rate maps were then assessed against a yield map and pre and post-harvest deep nitrogen soil tests to determine the value for farmers and expand the knowledge on the subject from related data accumulated by similar studies.

### BACKGROUND

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Multi-spectral technology such as NDVI and NDRE are effective tools farmers can utilise and are becoming more frequently used as part of aerial imagery for yield mapping. The ability to bridge a clearer understanding of how the data generated by these technologies is interpreted into farming practices could advance the uptake by farmers and the effectiveness of how they are used.

### RESEARCH AIMS:

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The core objectives of the project were:

- Assess the accuracy of NDRE and NDVI on detecting the response of canola to nitrogen applications
- Use the data generated to create a variable rate map over 10ha of canola and assess against a yield map and pre and post-harvest deep-nitrogen tests
- Compare aerial NDVI imagery vs handheld assessment
- Assess whether NDVI and NDRE are more affective at certain timings or growth stages
- Determine whether there is an ideal growth stage linked with using these sensors to determine yield and nitrogen response

### IN THE FIELD:

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Several multi-spectral sensors were used over a canola trial site near Frances in the South East to test their ability in generating a variable rate nitrogen map. The trial site used canola seeding rate, nitrogen rate and nitrogen timing as calibration for the sensors before being used by the cooperating grower over a 10ha area of canola.

Images from these sensors were collected at three different stages by Southern Precision Ag (SPA) using a fixed wing drone with mounted sensors.



The variable rate map generated from the data was created for paddock application using NDRE by SPA and built using Pix4D.

Due to above average rainfall experienced in August during testing, trafficability in the paddock was limited and nitrogen applications were delayed. However, a significant amount of data was collected by the sensors prior to these heavy rain events.

## RESULTS:

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Key findings from this project include:

- The variable rate map generated showed a significant amount of paddock variability, indicating sensor imagery such as this would be a worthwhile method in determining precise nitrogen application.
- NDRE is less sensitive to plant population and bare soil readings than NDVI.
- NDRE is more sensitive to crop shadowing than NDVI.
- Results indicated NDVI had the strongest relationship to yield at late flowering.

## VALUE FOR GROWERS:

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Findings from this project indicate that multi-spectral sensor technology could possibly be used to drive variable rate nitrogen application in canola with further research.

Although there were some issues with variable rate mapping following above average rainfall and waterlogging of the trial site, the sensors indicated significant paddock variation with testing up until this point in the project.

The trial site was open to growers and presented at the MacKillop Farm Management Group's Frances crop walk, with raw data and the final report made available on the GRDC's Online Farm Trials website following completion.

A single page fact sheet was to be created for growers in the South East for processes and outcomes of using sensors measure VR nitrogen. However, this was deferred until the project can resume.

The project also received coverage in the Stock Journal.



Elders agronomist Adam Hancock.

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### MORE INFORMATION:

Adam Hancock, Elders

M: 0427475254,

E: adam.hancock@elders.com.au