



# Using multispectral imagery to manage rice fields


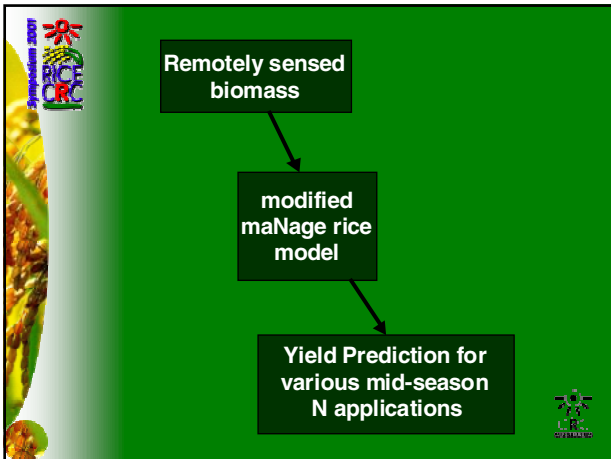

Sarah Spackman

Project 2102


# AIM

To use remote sensing and a crop growth model to predict spatial variation in yield and nitrogen requirements within rice fields

# Objectives

1. Modify maNage rice model
2. Obtain calibrated imagery of rice fields
3. Derive biomass from imagery
4. Incorporate into the model




# The model




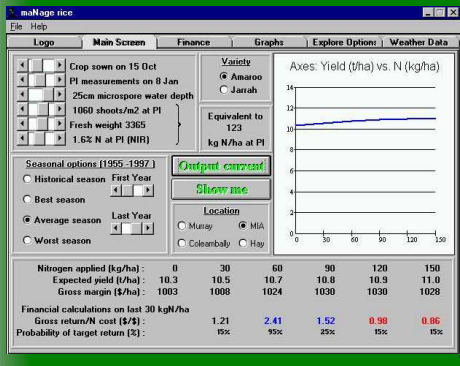
Version 4.1

A Software package to assist Riverina ricegrowers with decisions about topdressing nitrogen fertiliser.



Rice Research and Development committee of RIRDC








Nitrogen applied (kg/ha):	0	30	60	90	120	150
Expected yield (t/ha):	10.3	10.5	10.7	10.8	10.9	11.0
Gross margin (\$/ha):	1003	1008	1024	1030	1030	1028



Financial calculations on last 30 kg/ha					
Gross return/N cost (\$/t):	1.21	2.41	1.52	0.98	0.86
Probability of target return (%):	15%	95%	25%	15%	95%





## 1. maNage Rice™ parameter inputs

- sowing date
- date of panicle initiation (PI)
- measurements at PI
  - plant biomass
  - plant N (%)
  - water depth

## 2. Image requirements

Collection of imagery (mid-till, PI, flow., pre-harv.)  
4 fields




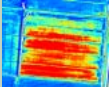






Image calibration



Conversion to NDVI  
 $NDVI \rightarrow (nIR-R)/(nIR+R)$





Correlation to ground biomass measurements

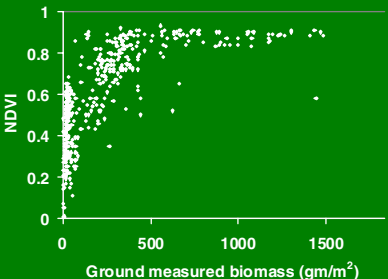


## 3. Relating imagery with ground biomass

### Coincident Field Sampling (with overflights)

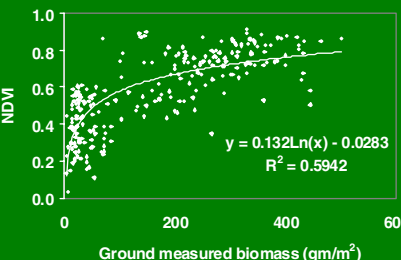


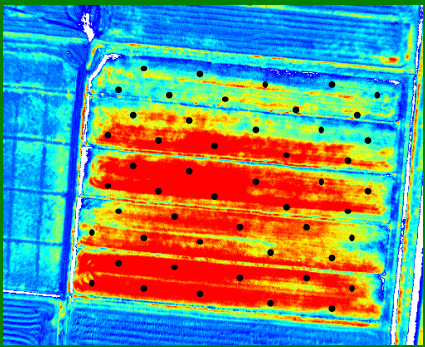

- biomass (gm/m<sup>2</sup>)
- plant N (%)

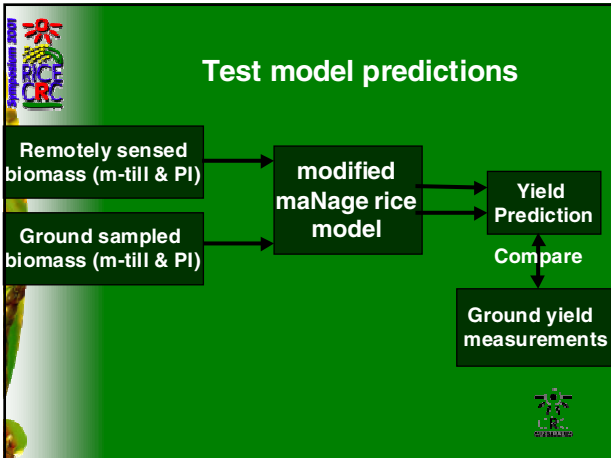



## Relating NDVI to ground measured biomass

## < 500 gm/m<sup>2</sup> biomass relationship with NDVI



**Yield predictions  
(4 sites, 2 sampling dates)**

	Actual - Estimated
Ground samples	1.5 t/ha
Remote sensing	2.7 t/ha

**Future directions**

- Improved errors in biomass predictions
- Estimate strategic N application within the field
- Establish the capability to apply N spatially within field

**Acknowledgments**

CRC for Sustainable Rice Production

Charles Sturt University

- Farrer Centre, Jon Medway
- Supervisors; Dr David Lamb, Dr John Louis, Gary McKenzie and A/Prof Scott Black
- Prof Graeme Batten

NSW Agriculture

- Rob Williams
- Kate Marr & numerous field assistants