

# Boosting Productivity

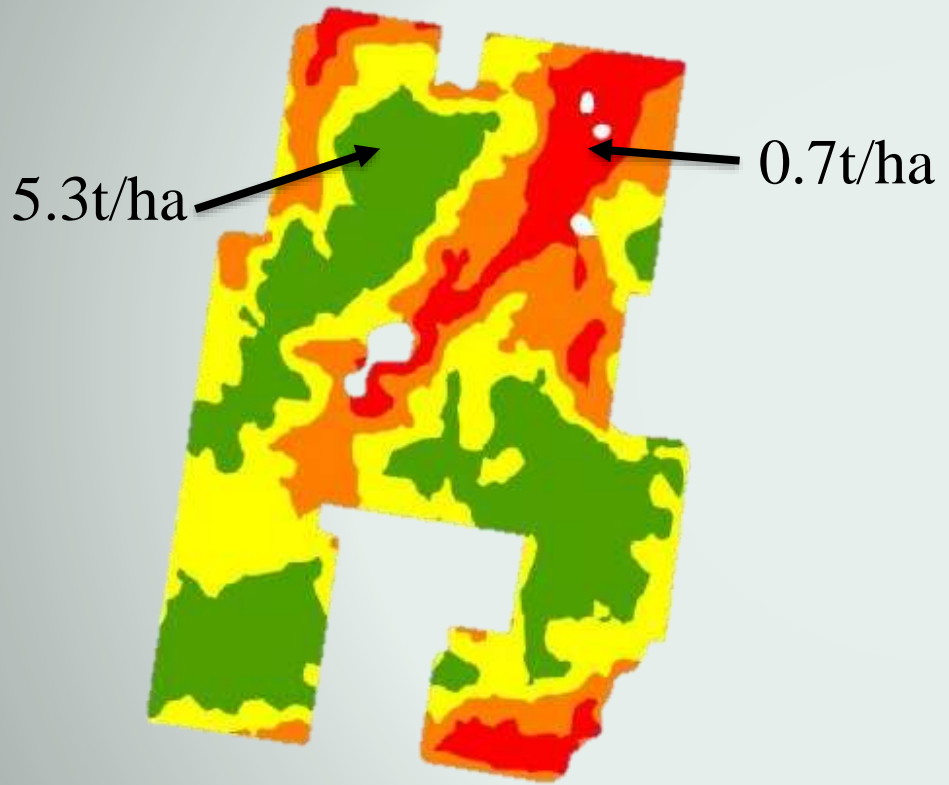
Closing the Yield Gap between grain yield and the soils PAWC



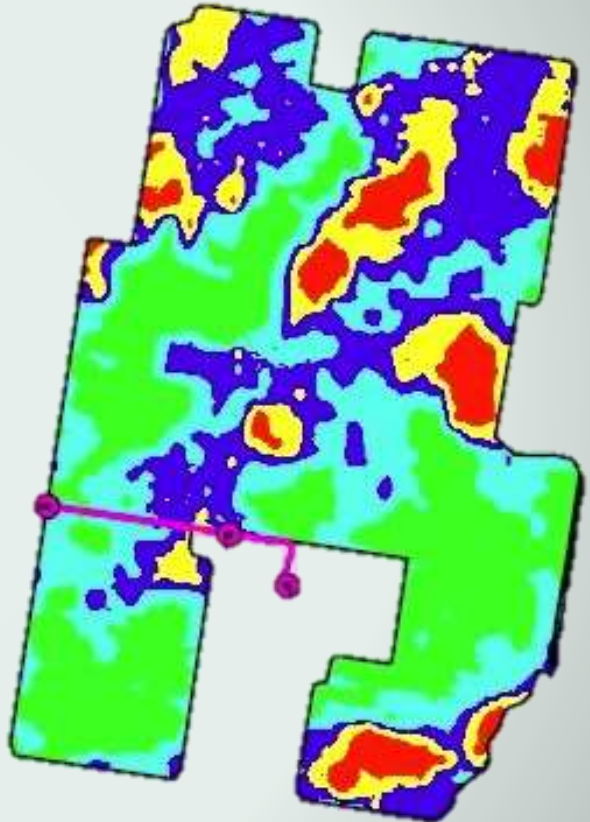
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- Farm Manager – Warakirri Cropping since 1997
  - Orange Park, Lockhart, NSW Riverina. 8,300ha with Brooke, Ed and Sara
  - Dryland Canola, Cereals, Pulses and Hay
  - Three FTOS + Contractor support
  - Investor returns key driver – target 7%/3%

# What/where is the yield gap?

2016 Wheat Yield

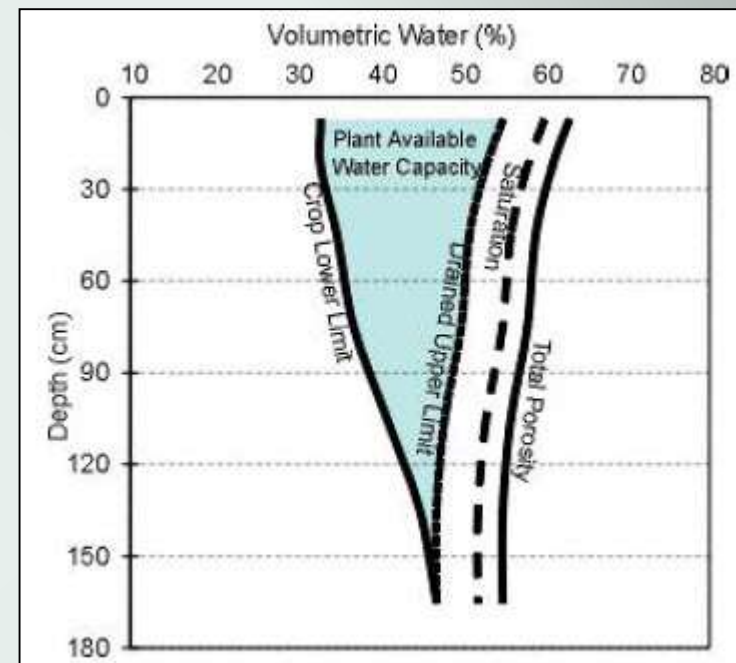


EM38 Survey



# Plant Available Water Capacity

- It's the soil 'Bucket'
- Slow/costly to quantify
- **Highly variable** and crop specific
- A better way?



Red loams, Red Sodic Clays, Grey Sodic clays, Black self mulching Vertisols – one paddock but loads of variety.



# Visits

- Israel – Phytec & SupPlant Ag Tech
- USA - Colorado State University, Texas A&M University, Farmers
- Brazil - Farmers and Co-ops
- NZ – Farmers, Massey University
- Canada - Farmers
- UK - Farmers

# Learnings

- Australian farmers value and understand soil moisture better than the majority of overseas farmers by necessity.



1800mm annual  
rainfall Central Brazil.  
Drainage matters!

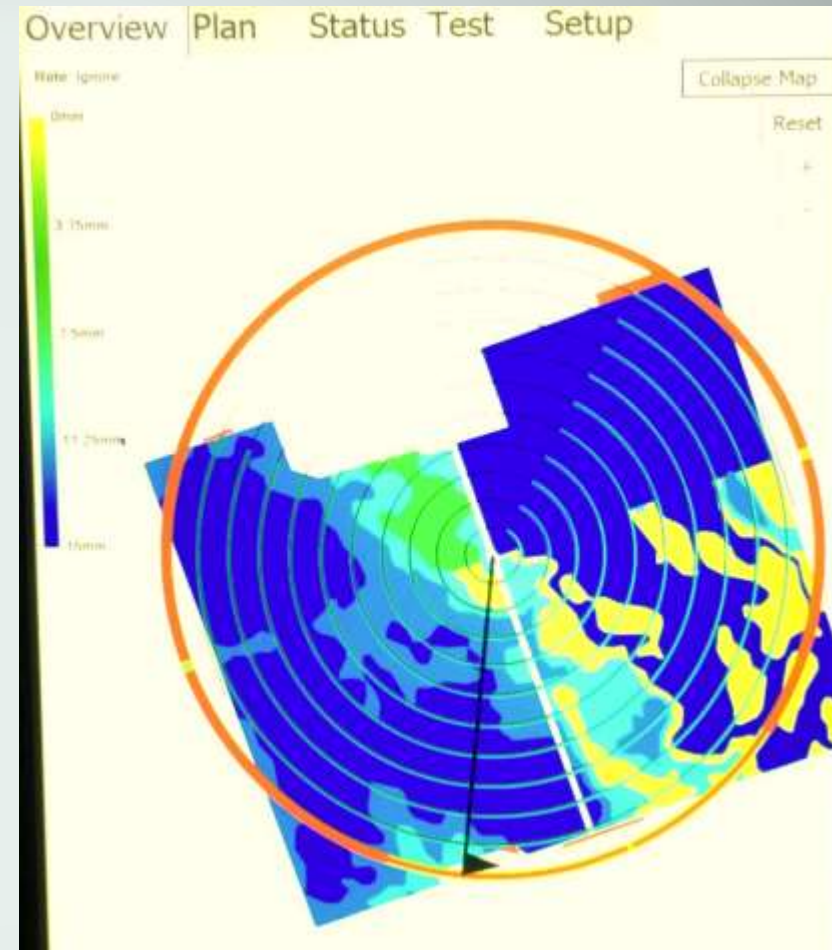
- Policy and regulation and support mechanisms distract many O/S farmers from KPI's.
- Innovation is stifled.



Rich (wet) Gulf Coast  
Texan soil discussing crop  
insurance!



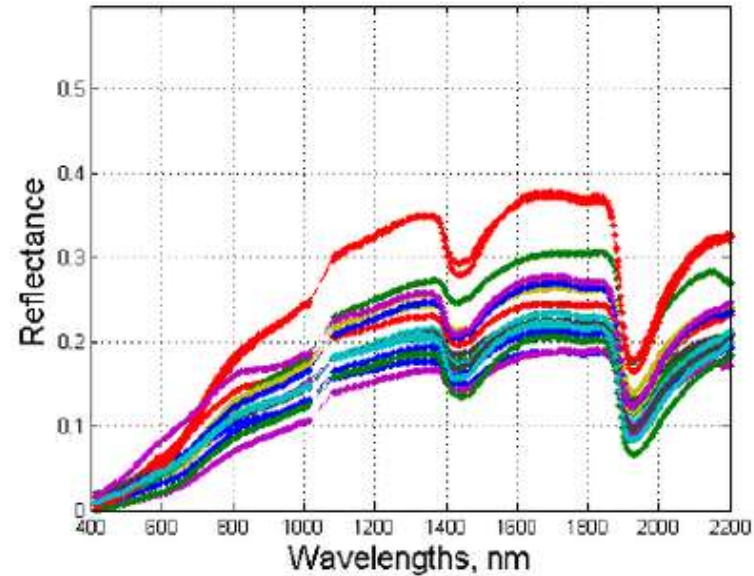
- EM survey is used by leading growers globally - a great start point for soil characterisation



Variable Rate Irrigation –  
Methven NZ

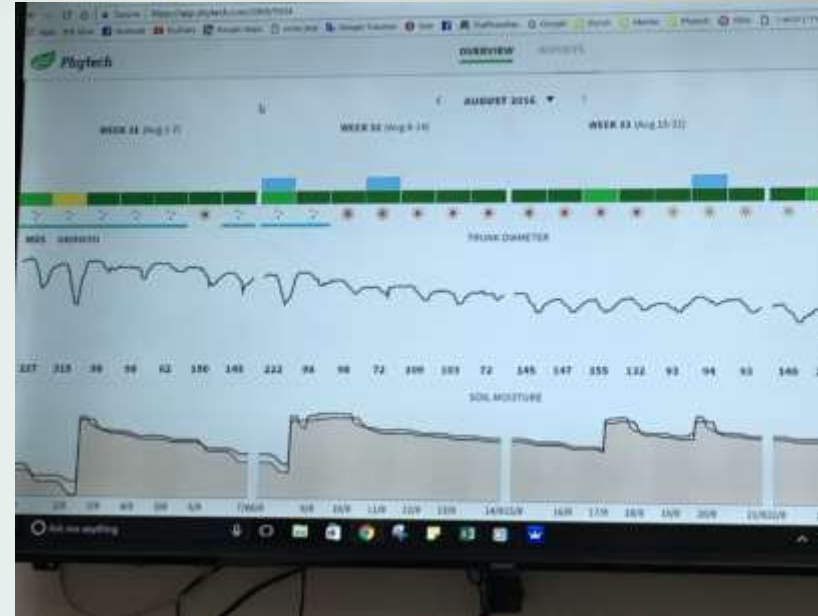
# Could this be the future?





- Penetrometer/NIR in-situ testing of soils - like a 3D view of soil sub surface. Characterisation of the future?

- Plant Stress Monitoring has great potential – connectivity the issue.

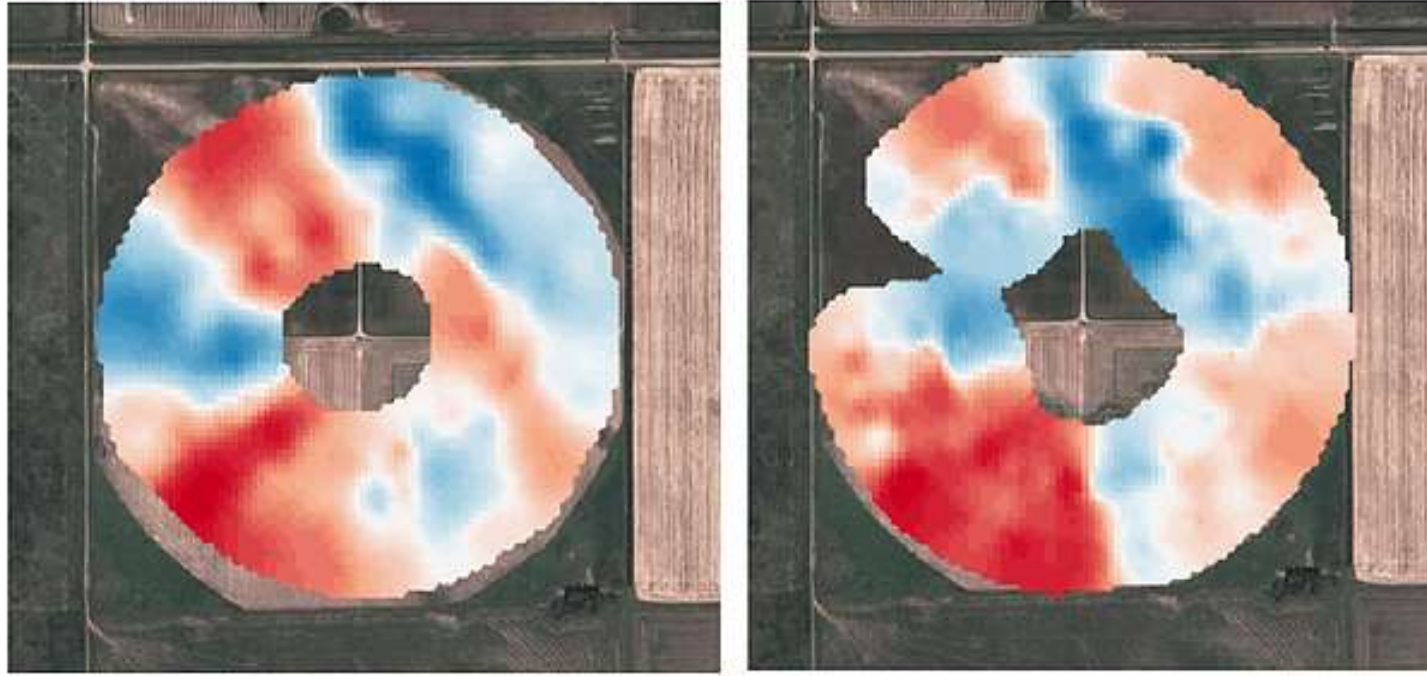


• Plant Stem goes here

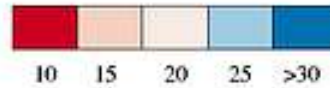
## Smart Drop Soil Moisture Maps

June 21, 2017

July 17, 2017



Volumetric Water Content (%):



Skaha Remote Sensing Ltd.

- Microwave Soil Moisture sensing

# Where has all this led me?

- Dryland farming systems need better environmental monitoring systems
- IoT for Agriculture – Cheaper sensors and more of them
- Hi-tech soil measurement solutions evolving- bring them to Australia to trial

- Continue to focus on the low hanging fruit – ameliorating pH, Sodicity, fertility > PAWC
- Farmer education on the importance of understanding soil properties is critical

# Implementation at home

- 2Ha Grid sampling for pH variability  
=VR Lime
- EM38 for soil zone mapping and  
sampling = VR Gypsum
- Regular Satellite NDVI Imagery
- Harvest Yield mapping



# Next Step – PAW monitoring

- LoRa WAN Gateway rollout with rain gauges, capacitance probes



# Blue Sky

- Trial NIR/EC Penetrometer?
- Trial Microwave H<sub>2</sub>O mapping?
- GRDC farming systems trial host
- Drive local research and adoption.

# Discussion

- Optimizing yield = matching inputs to potential
- Moisture Knowledge critical – big \$ risked or wasted without good data

# Massive thanks to:

- GRDC Northern Region
- Nuffield Australia
- Warakirri Cropping
- My Family!
- My Farm Staff
- Global hosts



# Thank You

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