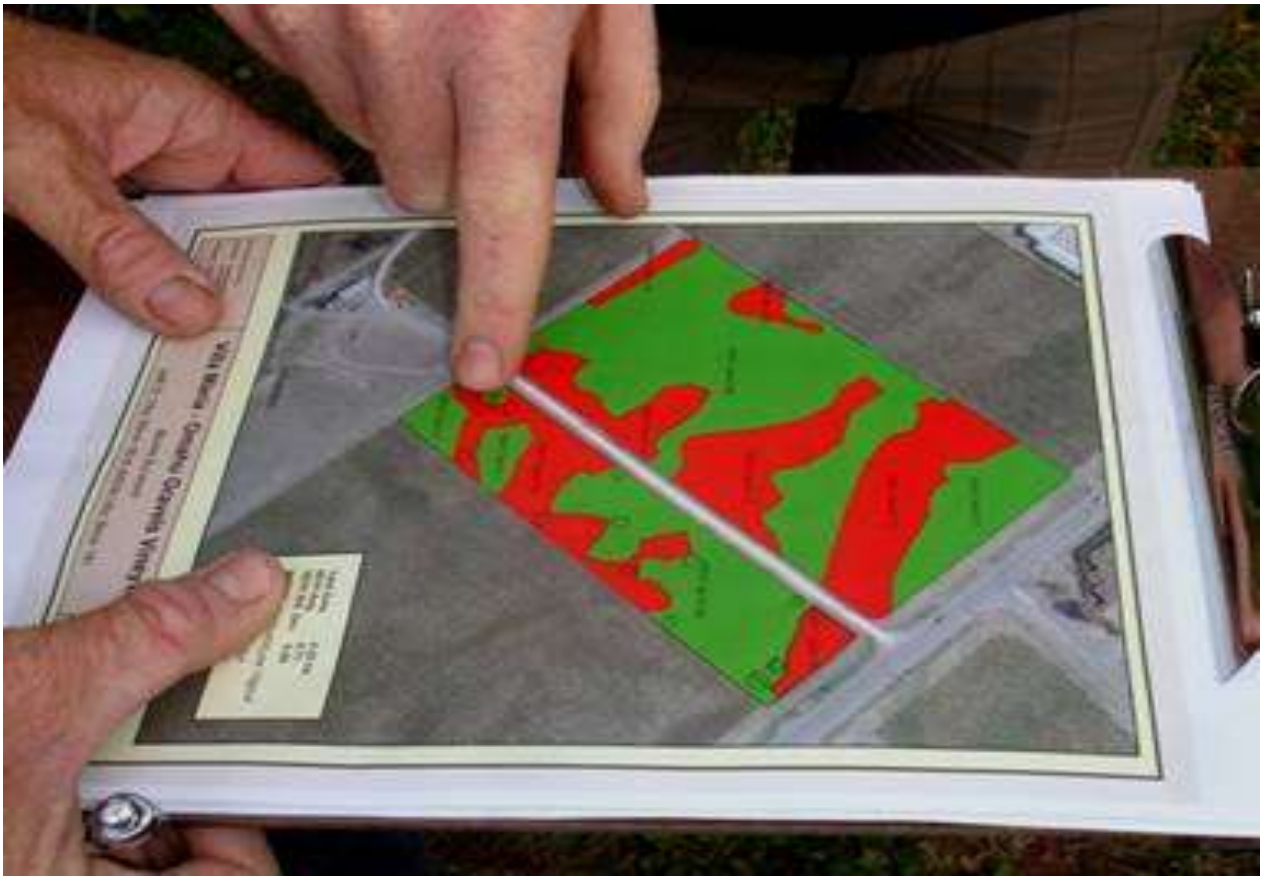
Site Specific Vineyard Management



Precision Viticulture:

- ***Assumes uniform management is not an optimal strategy.***
- ***Seeks to gain control over the production system***
- ***Aims to increase the likelihood that outputs are desirable ones***

- Rob Bramley CSIRO

About LandWISE

- A sustainable farming group established in 1999
- Provides extension and research to support cropping
- Strategic relationships: farmers and growers, regional councils, sector groups, science and industry
- An incorporated society of voluntary members

- Resources freely available at www.landwise.org.nz
- Regional and topical discussion groups sharing ideas within and between sectors
- An Annual Conference in May

Introduction

Welcome to "*Site Specific Vineyard Management*", a new MAF Sustainable Farming Fund project focused on enhancing the financial sustainability of grape growing.

Winegrowers and viticulturists in Hawke's Bay have teamed up with LandWISE to look at benefits of managing different vineyard zones differently; planning and implementing practical site specific management strategies and assessing financial costs and benefits.

Different parts of vineyards have different inherent production characteristics. Variability causes non-uniform development, implying benefit from different management strategies. Uniform management means some areas under-perform while others have excessive inputs for the value achievable. Targeting appropriate inputs to defined zones can save money and improve quality.

Three case study vineyards have been identified, representing small and large producers. Canopy sensing to define management zones will build on successful trials by Spatial Solutions. Other information such as soil, vigour or harvest quality maps will be assessed by LandWISE, growers and viticulturists.

Vineyard management advisory teams including the grower, viticulturist and winery representatives are meeting to develop block management plans. Plans will include recommendations for pruning, through canopy management and crop loading, to harvest.

Today is the first opportunity to join an over-arching discussion group. If you want to be involved in the project, register your interest with:

Dan Bloomer, 021 356 801, info@landwise.org.nz

The Villa Maria Omahu Road Vineyard

The vineyard at Omahu Road is on the edge of the Gimblett gravels, where the effect of varying soils is noticeable. Deposited by the Ngaruroro River when it flowed along what is now Omahu Road, the soils have the typical braided-river effect with varying textures and stone content. This shows in the vigour of the planted vines.

In 2010, Spatial Solutions measured the vigour of the canopy in a trial area using a GPS-connected Crop Circle sensor. A biomass / vigour map was created. The vineyard trial area was divided into two management zones, and harvested as two separate batches.

In August 2011, the site was mapped using an EM 38 sensor. This identifies soil variability based on electrical conductivity. The soil data was not available for planning the 2011-12 season, but will be combined with biomass data to refine management zones.

Winter pruning at Omahu Vineyard adopted different strategies for three zones, high, medium and low vigour. To control the high vigour zone, irrigation will be carefully controlled. In the low vigour zone, spurs were pruned to single buds, aiming for a low yield of reserve quality juice.

How did the manager:

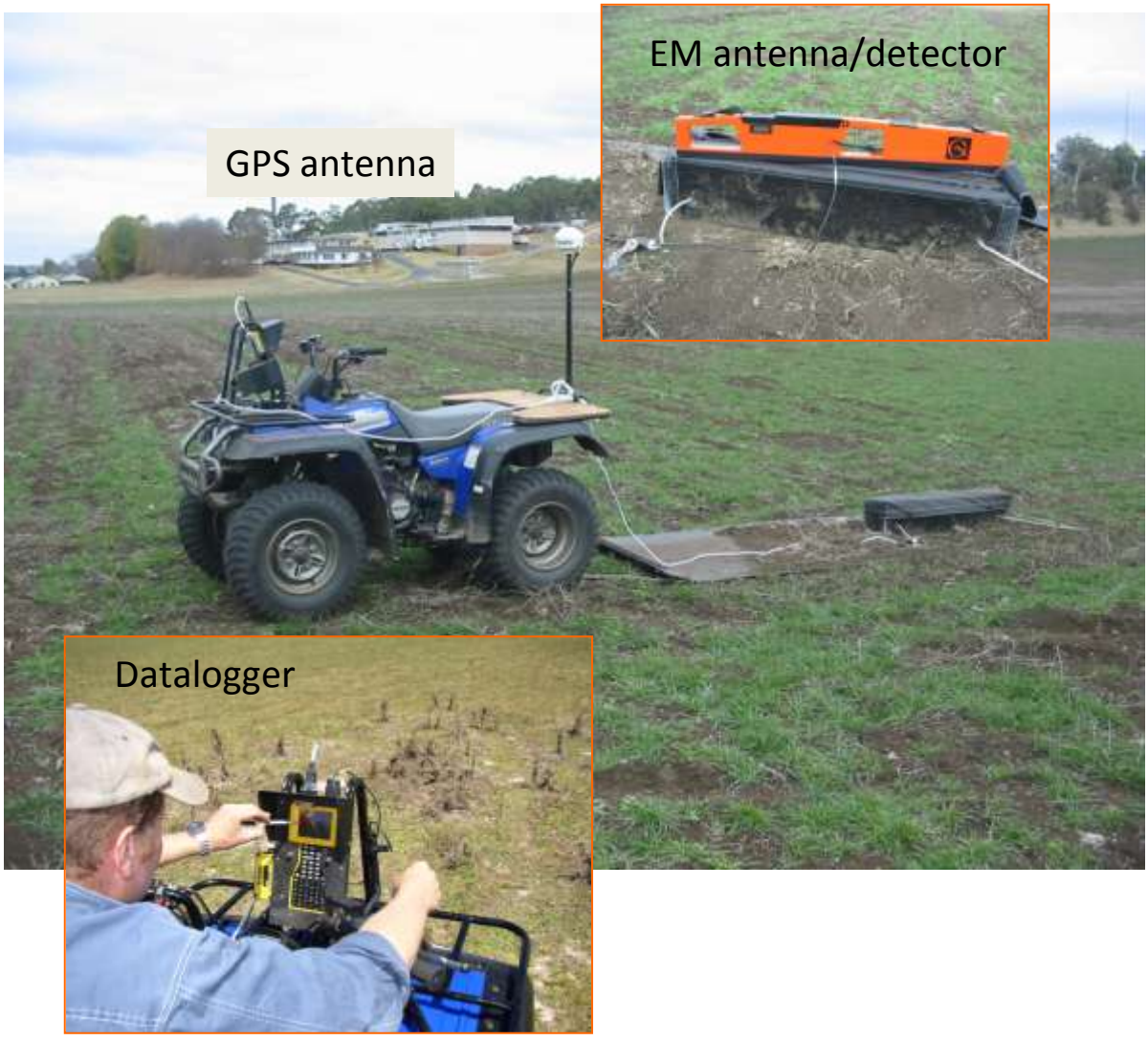
- determine appropriate pruning strategies?
- calculate a suitable contract rate?
- ensure pruners knew what was expected?
- ensure the right thing was done in the right place?

Does different management based on vigour potential appear to be a winning strategy at this stage?

Tool Kit Options 1: Soil Mapping

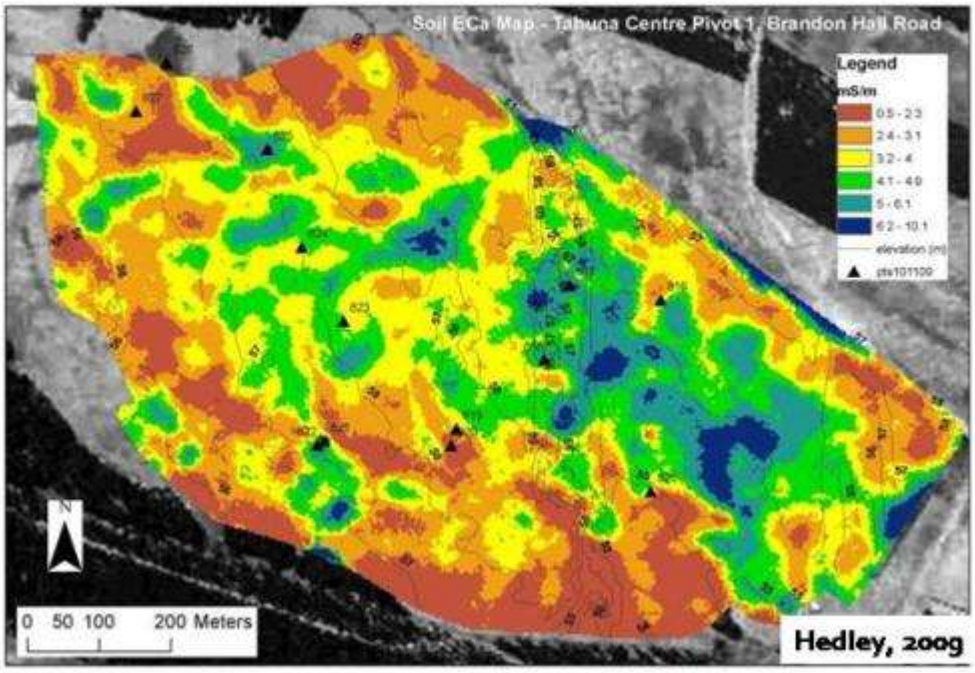
EM38 – Electro-magnetic resonance

EM38 is a technology that measures the apparent electrical conductivity of the soil. Conductivity is affected mostly by water and clay content, along with density and salinity. On very gravelly soils, the responses are often quite low compared to results from silty or clay loam soils.



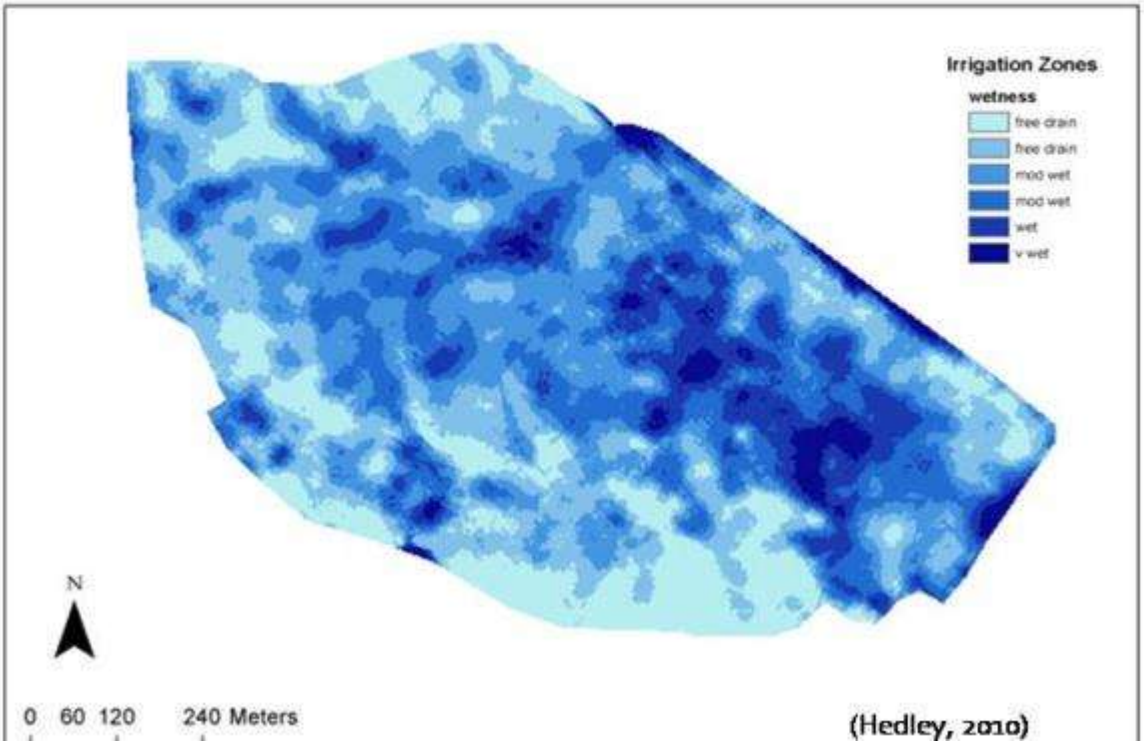
Thanks: David Lamb, University of New England, Armidale, NSW

Soil variation – EM38 Map



Maps must be 'ground-truthed'

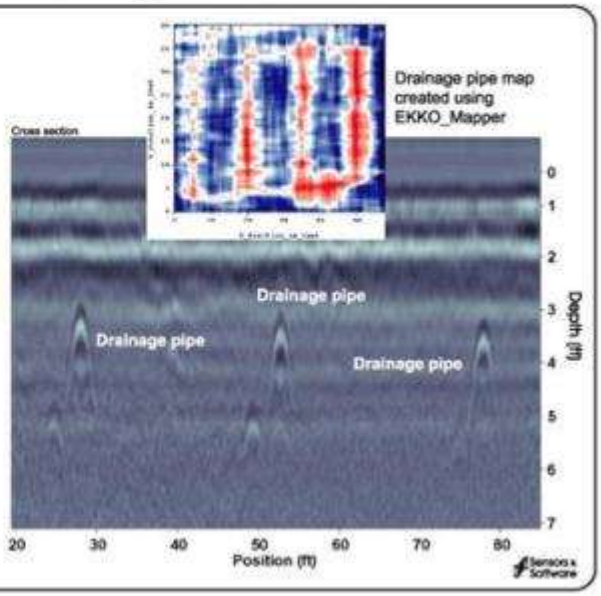
Irrigation Zones from EM38 Map



Other Technologies . . .

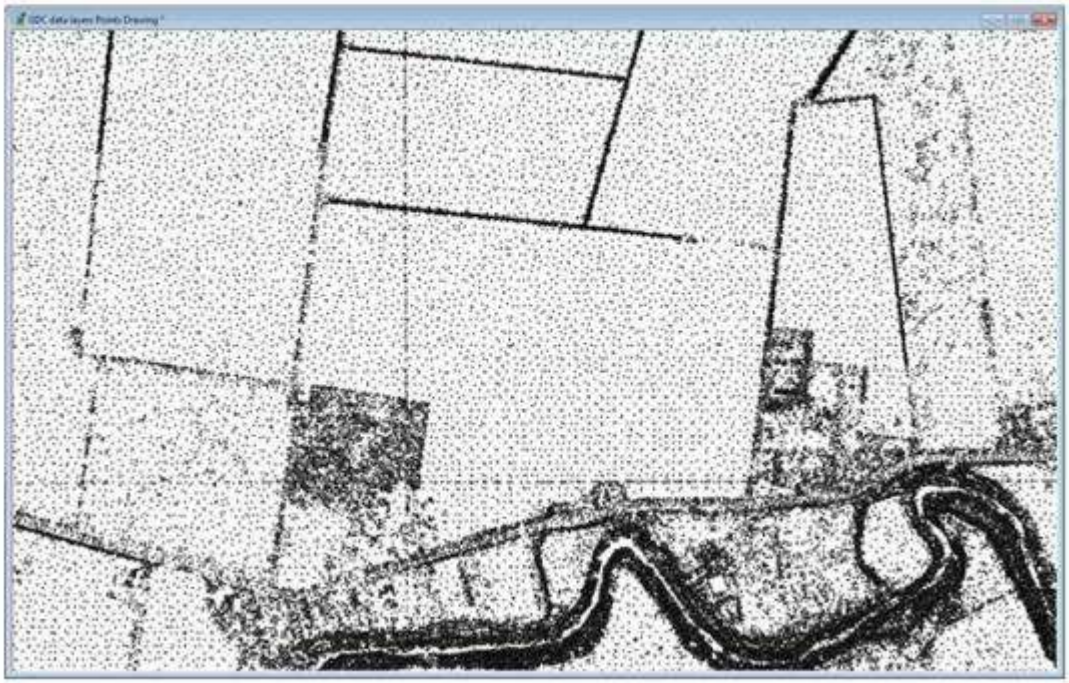
Ground Penetrating Radar

Knowledge of existing agricultural drainage pipes is critical to extending drainage or repairing drainage systems. In this example, GPR profiling and mapping determined the depth and locations of the drainage pipes. The pipe locations appear as linear features in the map view.

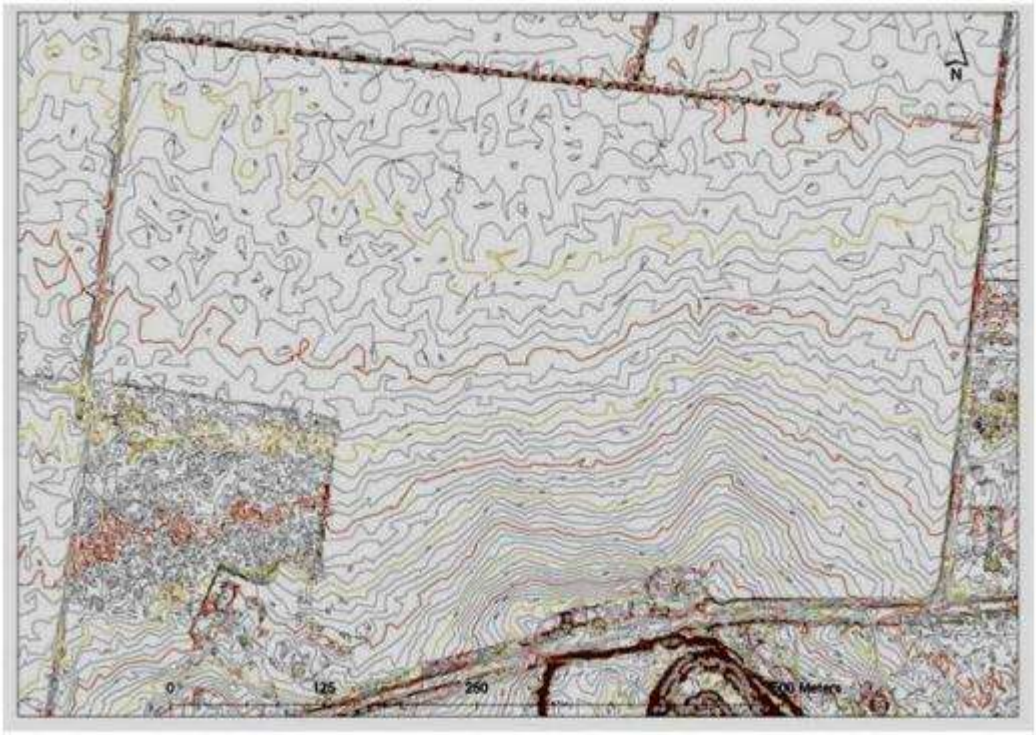


Veris pH Sensor

LiDAR Survey



Contour Map

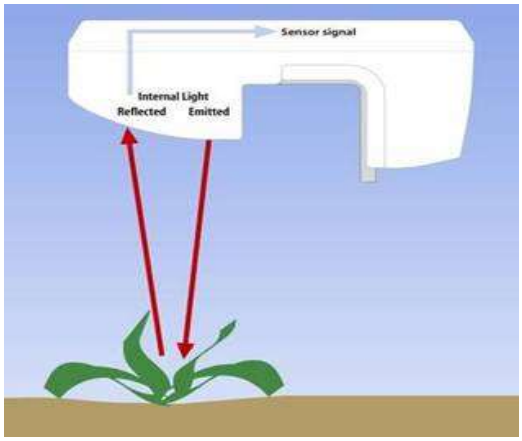


Tool Kit Options 2: Canopy Sensing

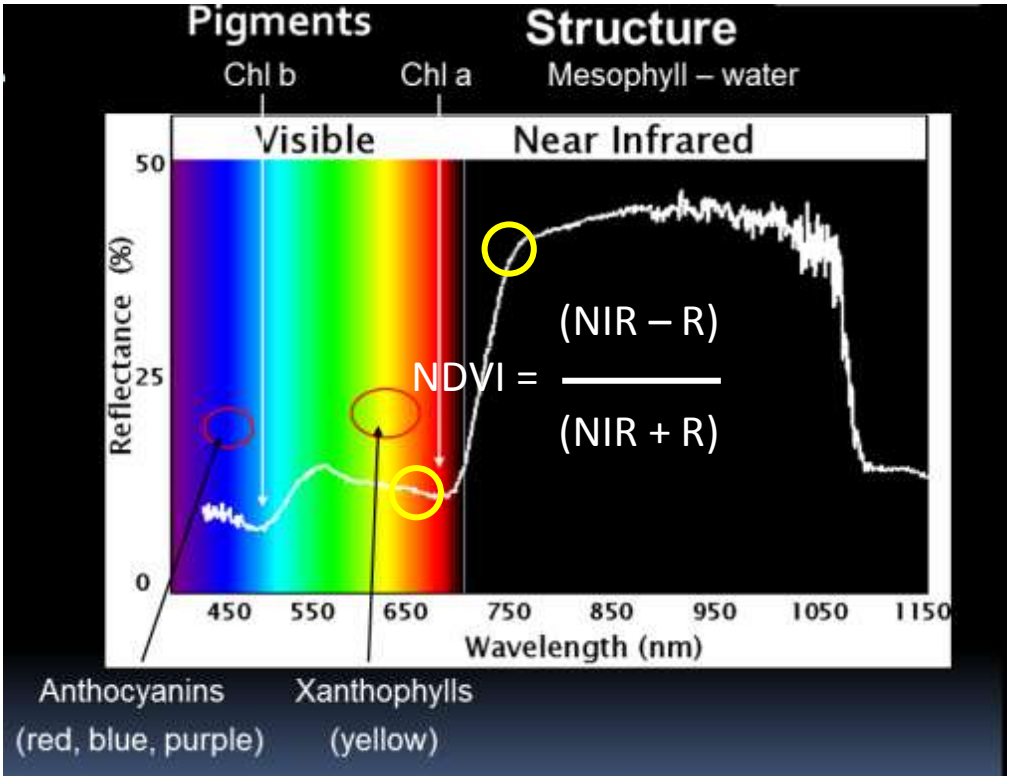
Light Source

Detector

Infrared Detector

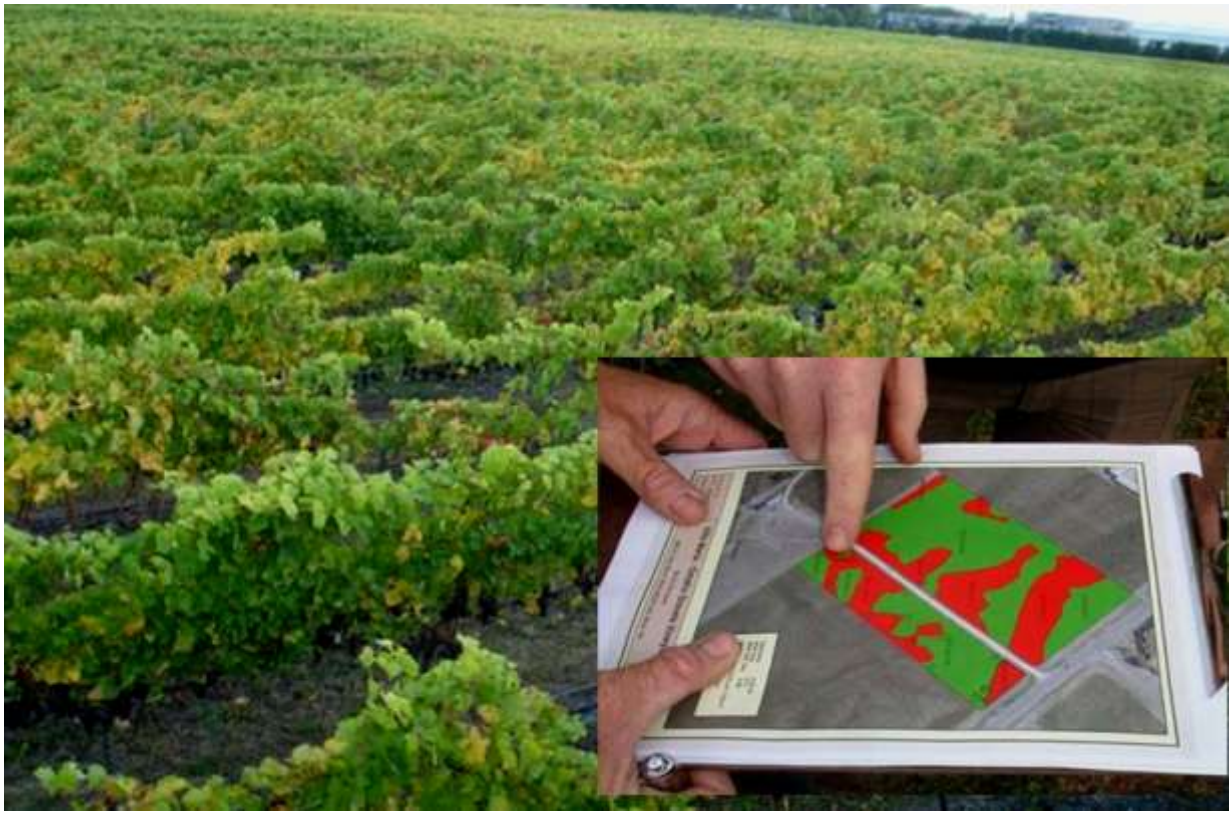


NDVI – ratio of near-infra-red and red reflectance

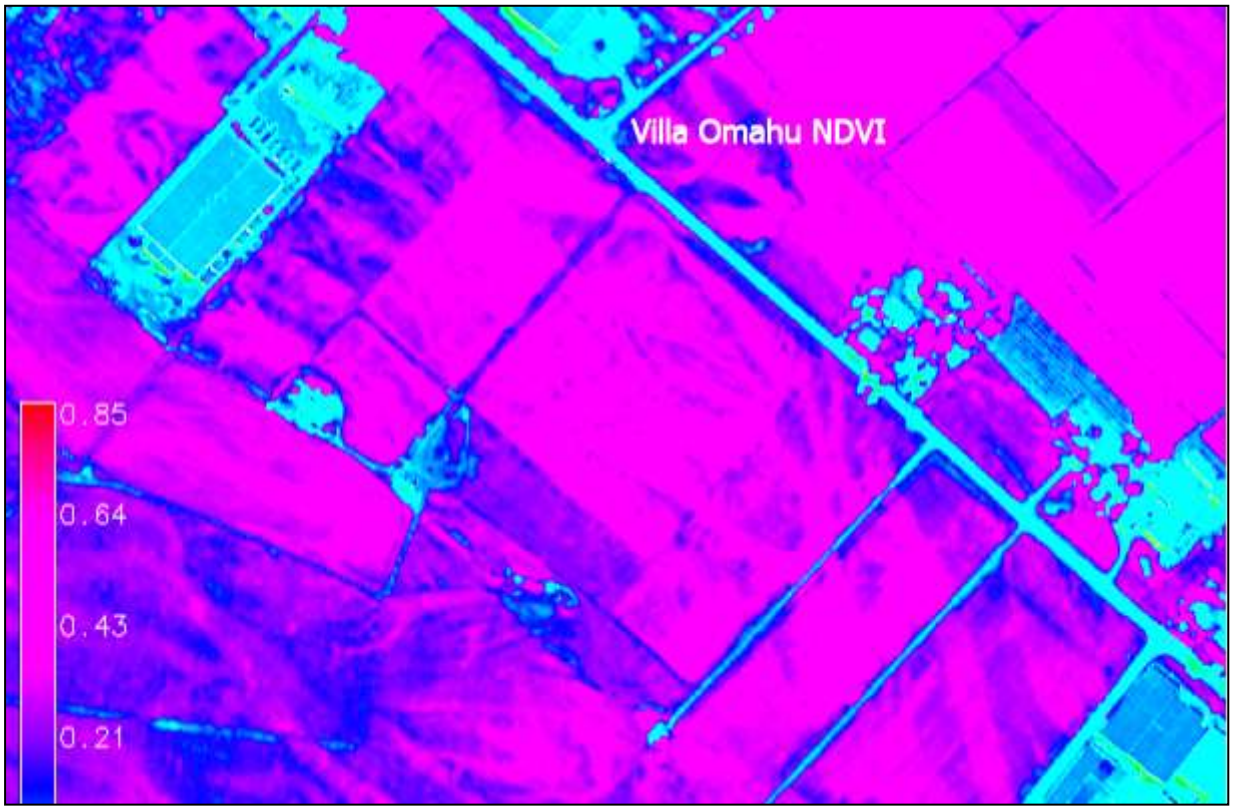


Thanks: Eileen Perry, DPI, Vic

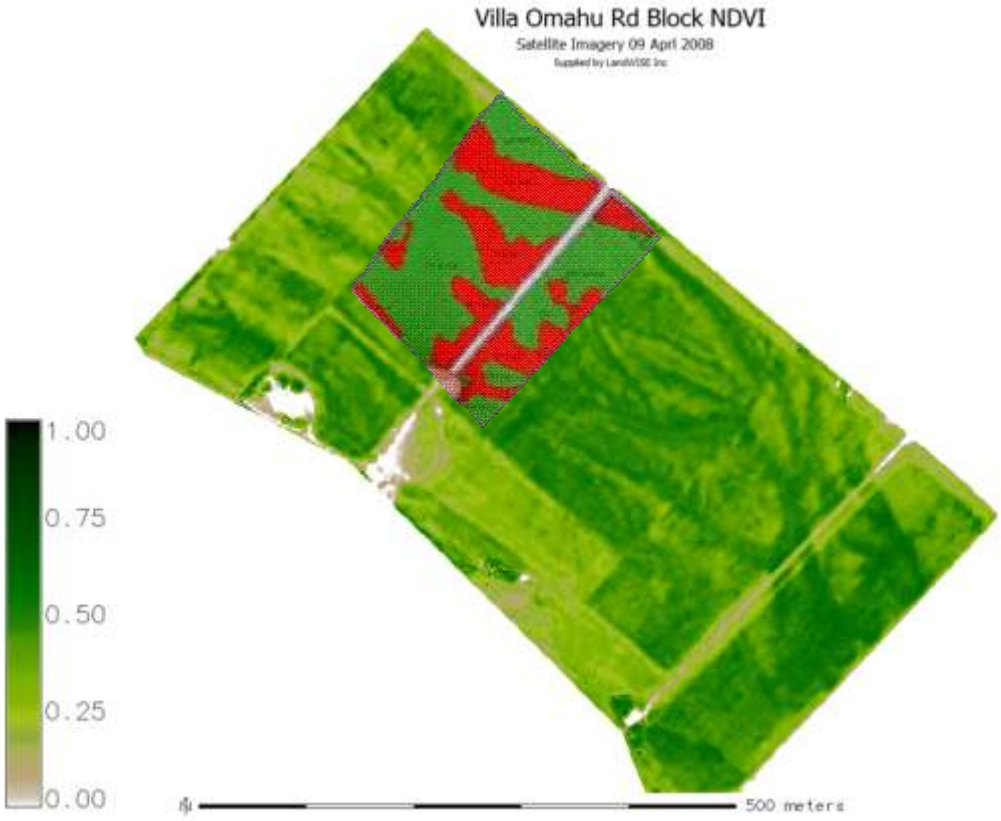
The Omahu Road Crop Circle Canopy Map



Satellite NDVI image from October 2009



Satellite NDVI compared to Crop Circle NDVI

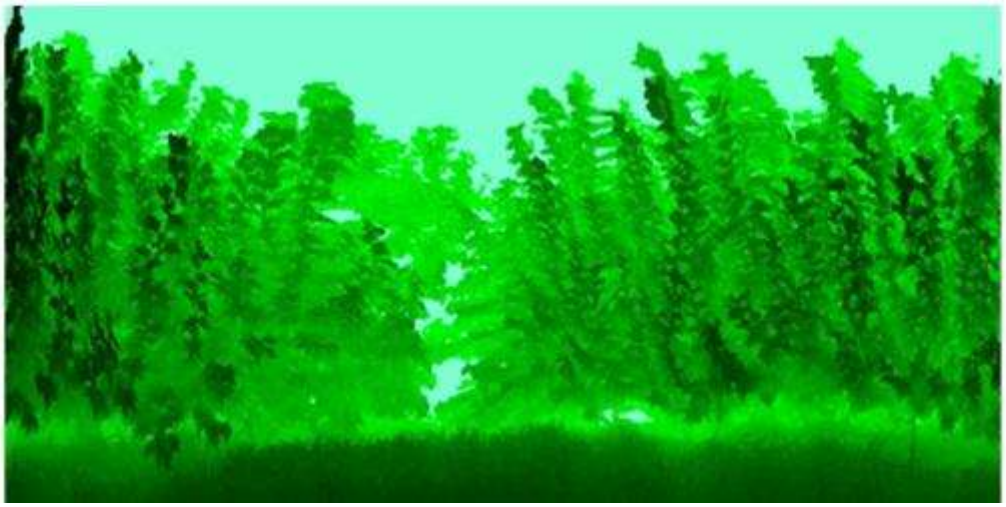


Tractor LiDAR

LIDAR (three dimensional canopy imaging technology) to describe canopy continuity and density

Can define chemical application rate requirements

NZ testing includes pruned canopy yield potential



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Predicting Juice Quality from Vigour Maps

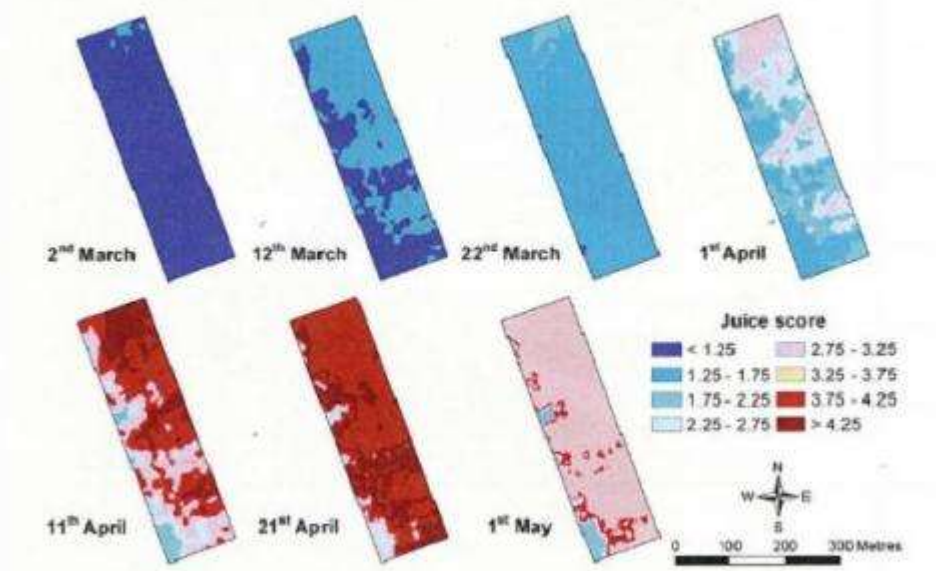

Figure 4. Spatial variation in the development of fruit quality / maturity over time in a 5.9 ha Sauvignon Blanc vineyard.

Trought, Praat and Bramley

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Predicting Juice Quality from Vigour Maps

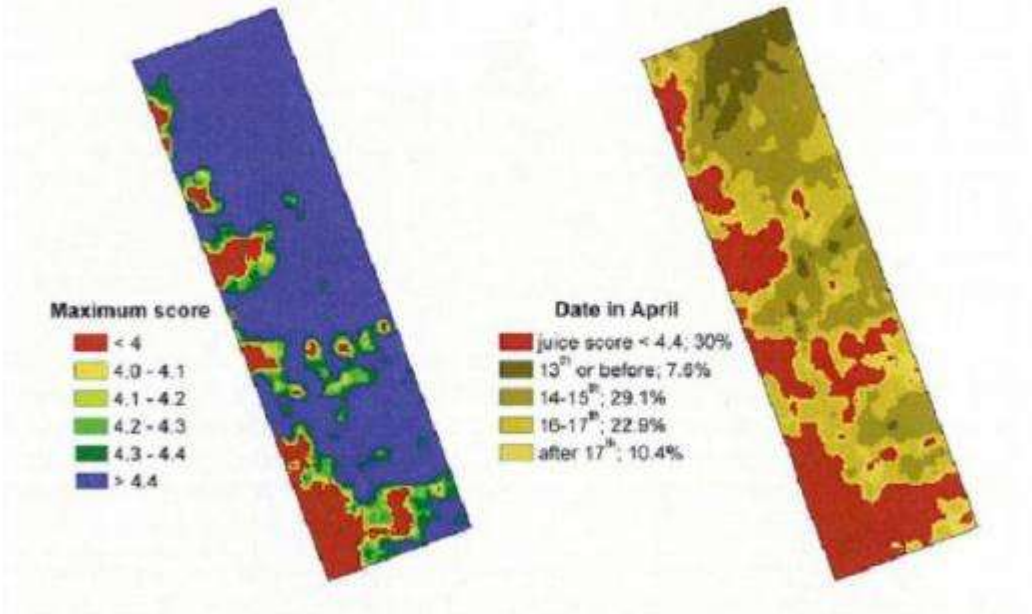

Figure 5. Maximum juice score (left) attained in a 5.9 ha block of Sauvignon Blanc, and (right) the date on which a score of 4.4 is attained.

Trought, Praat and Bramley

RTK planting then weeding within cm of planted rows

Vine trimming, Pruning, Robotics?

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AgriChemical Management

- Correct application
- Proof of Placement

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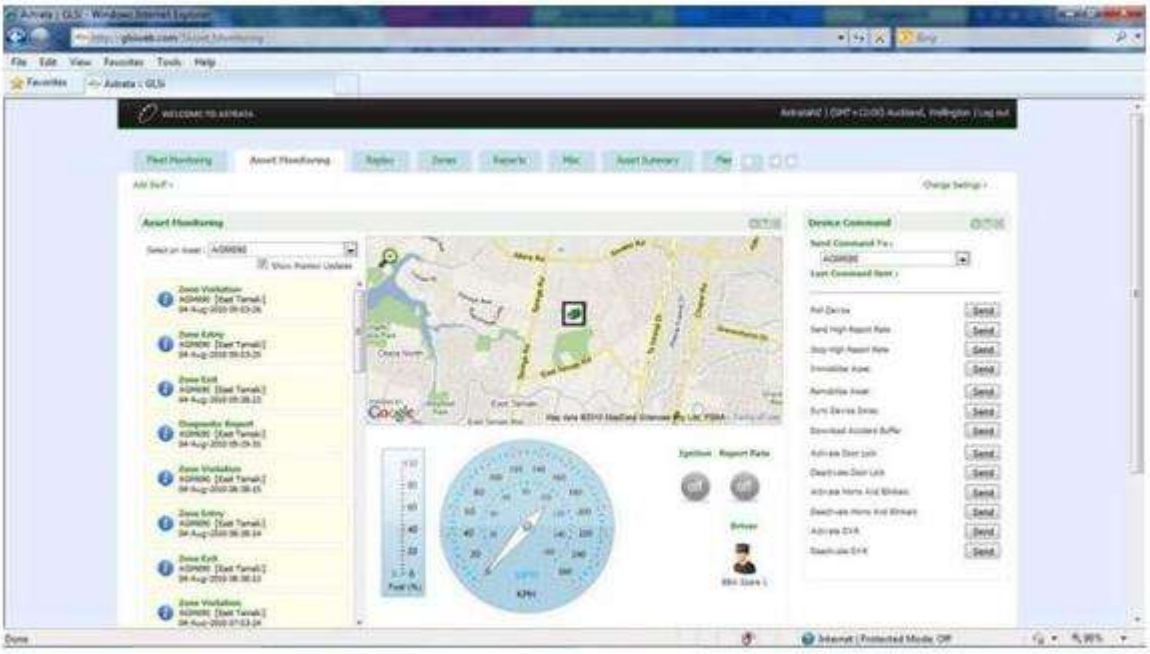
Asset Tracking and Management



Truck, tanks, weather stations… control, alarms - you decide

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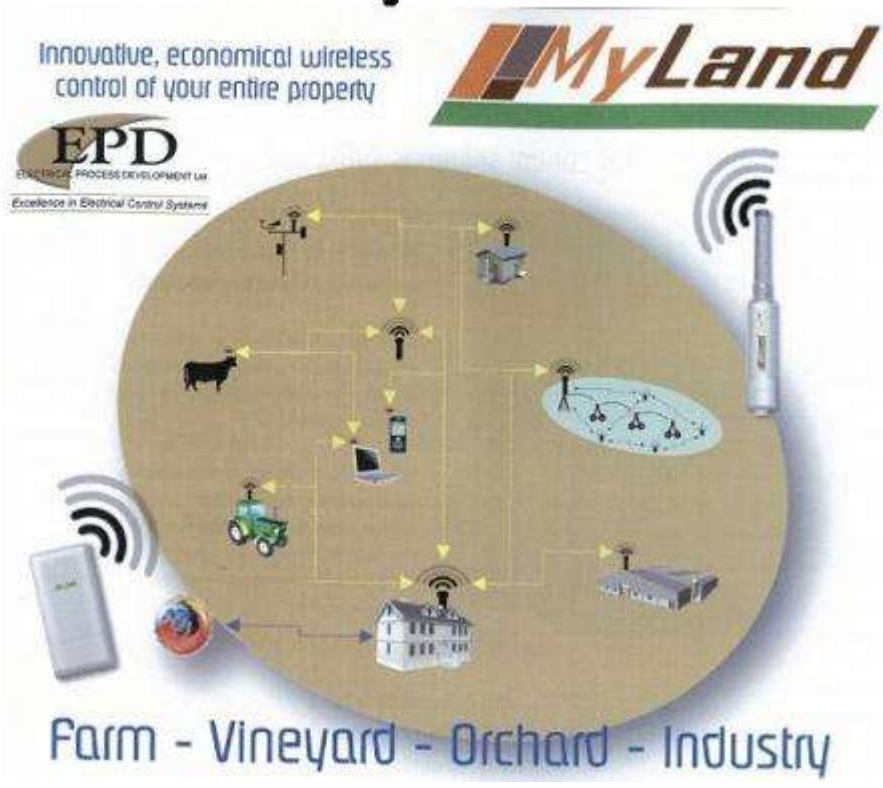
Wireless Vineyards?



Opportunities for Wine Growers

- Make sure you are aware of precision tools
- Understand their ability to add value
- Beware of “agri-porn”, it may not give real value
- Contact wine growers who are already involved
- Take part in the Site Specific Vineyard project
- Form a precision viticulture discussion group
- Develop a session at LandWISE Conference 2012

The Case Study Vineyards

- Villa Maria, Omahu Road
- Mission Estate, Mere Road
- Kokako Vineyards, Ohiti Road

Project Event Plan

Pruning and Thinning – 17 August 2011

- Villa Maria, Omahu Vineyard
- Zone marking, pruning decisions, example pruning

Leaf Plucking – Early November

- Early vigour sensing, canopy density, costing estimates

Crop Thinning – Mid December

- Zone based yield estimation, target yields, thinning strategy

Pre-Harvest – Late February

- Zone sampling analysis, Review of yield data

Post-Harvest Wrap up – Early May

- Zone yield information, juice analysis, winemaker feedback

Contacts for more information

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