

Application of Precision Agriculture to Sugar Cane

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Presentation Overview

- ◌ Introduction to Sugar Cane Agriculture
- ◌ Yield Mapping
- ◌ Directed Soil Sampling
- ◌ Variable Rate Application
- ◌ Economic Analysis
- ◌ Conclusions



Introduction to Sugar Cane Agriculture

- \$2 billion Australian Industry
- Average yield of 80t/ha
- at \$30/t equals \$2400/ha
- high input crop
 - up to 800kg/ha of bulk fertiliser per annum
- High value/high input crop
 - might argue is a good candidate for PA



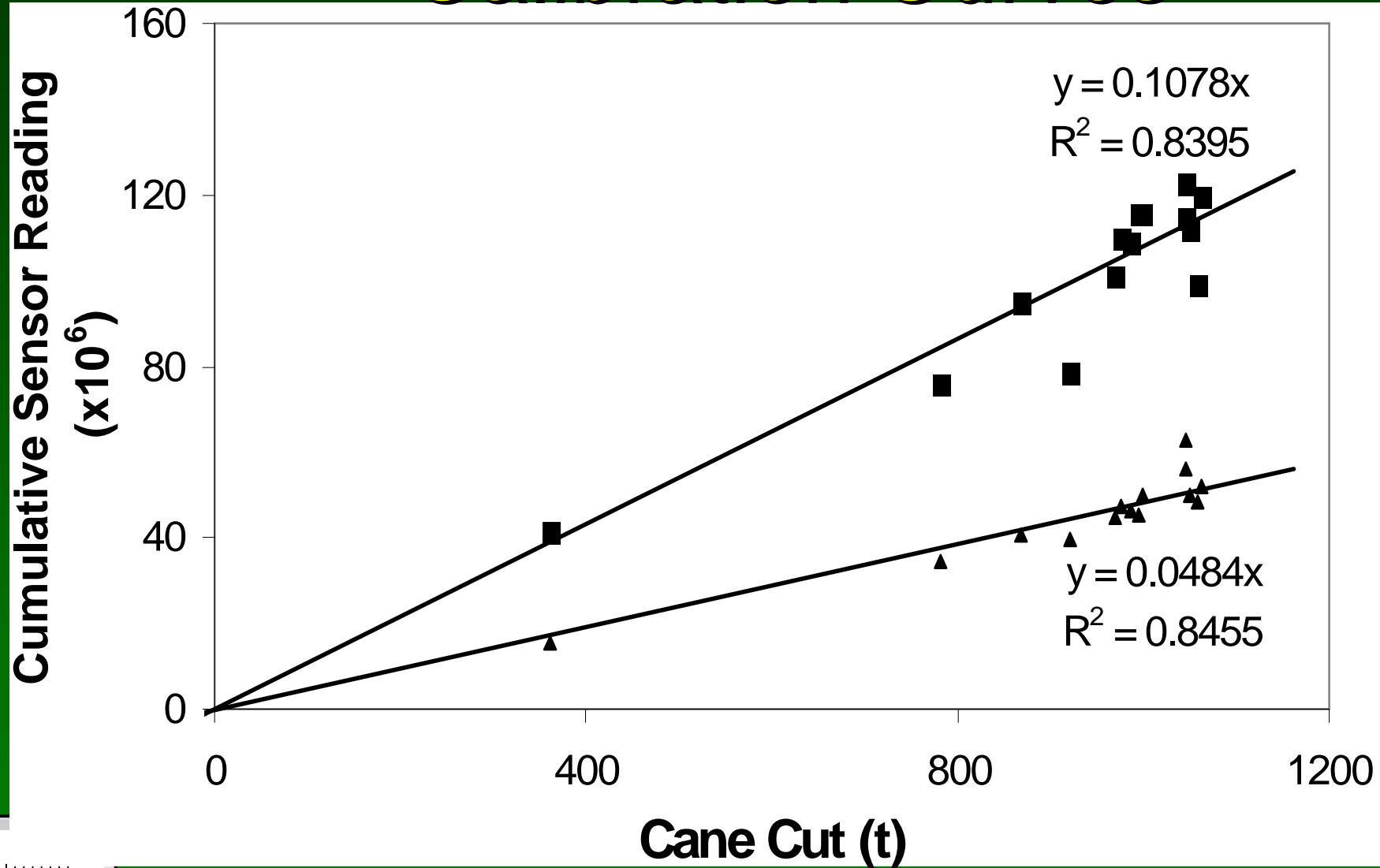


Development of a Yield Monitor

- No sugar cane yield monitor existed
- Working on the problem for 3 years
- Focusing on the mass flow measurement
- Examined 4 potential measurement techniques
- Patented yield mapping systems operating this season



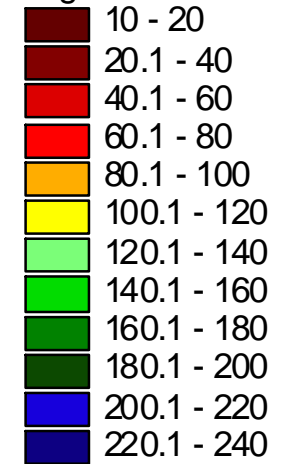
Calibration Curves



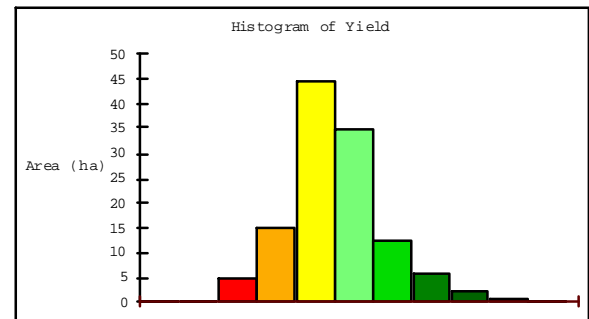
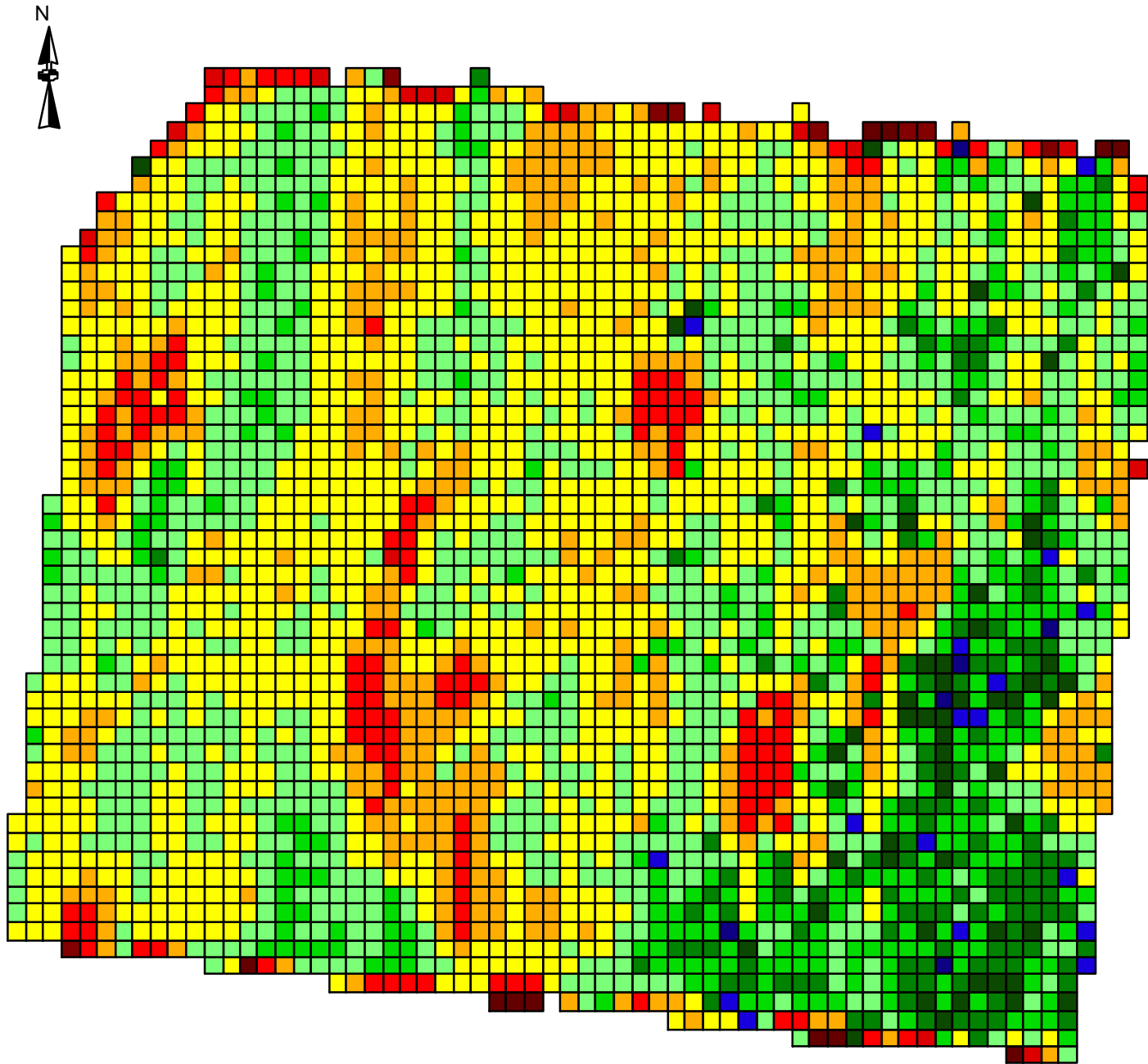
Yield Map

Field 7a 1996
DAVCO FARMING
Burdekin

Sugar Cane Yield (t/ha)



Total Yield: 14287.6 t
Average Yield: 122.6 t/ha

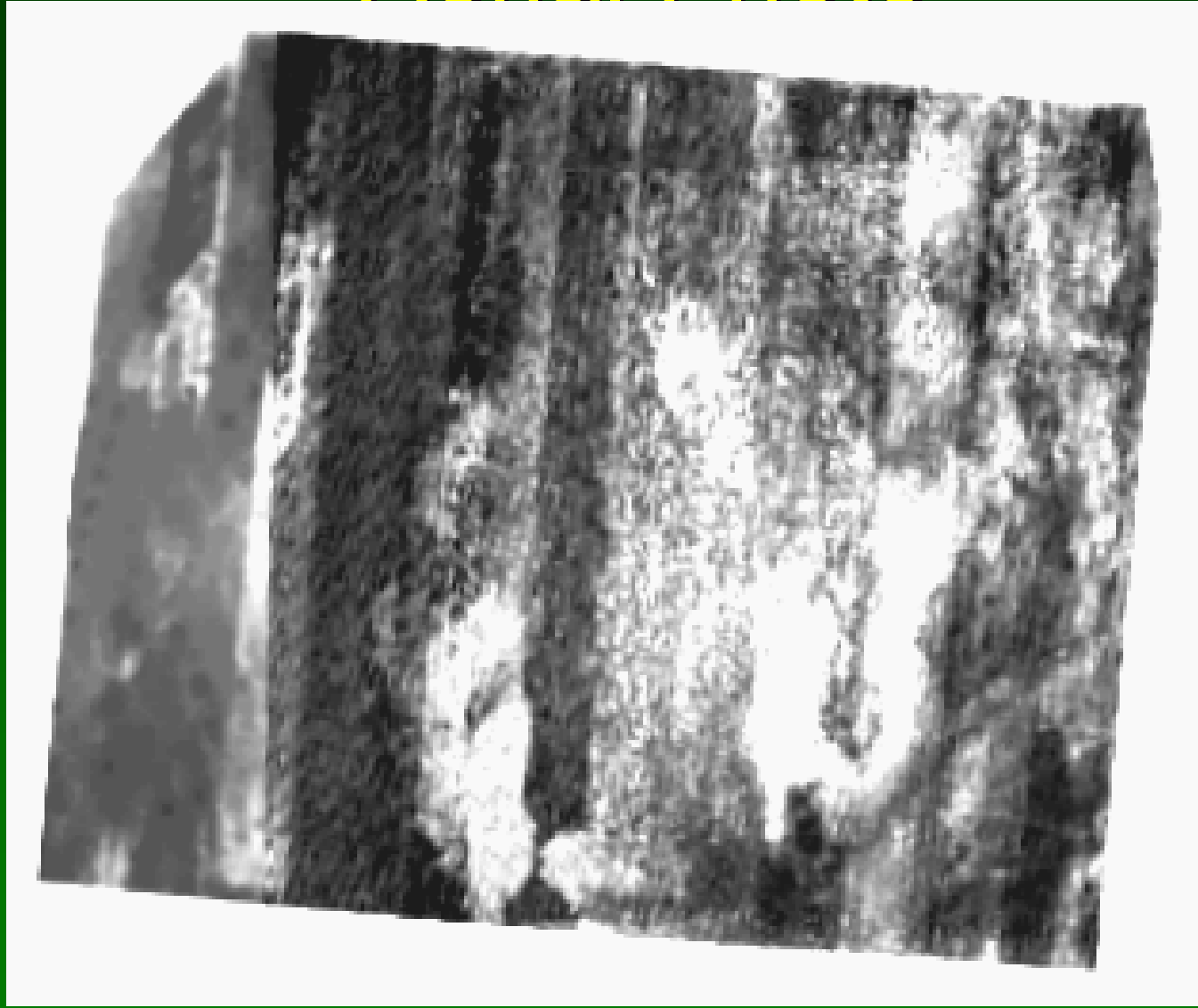


100 0 100 200 300 400 500 600 700 800 900 1000 Meters

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16/10/1996



Aerial Photo



Directed Soil Sampling

- Soil sampling guided by the Yield Map
 - 12 sites
 - sampled at two depths (0-25cm,25-50cm)
- INCITEC provided the soil analysis



NCEA

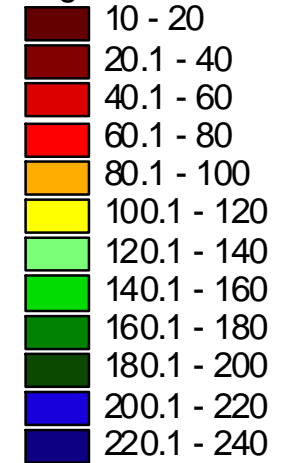


USQ

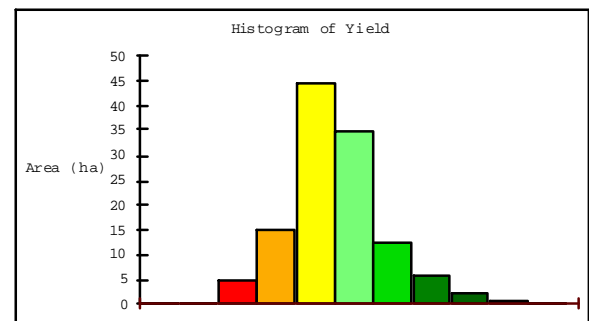
Yield Map

Field 7a 1996
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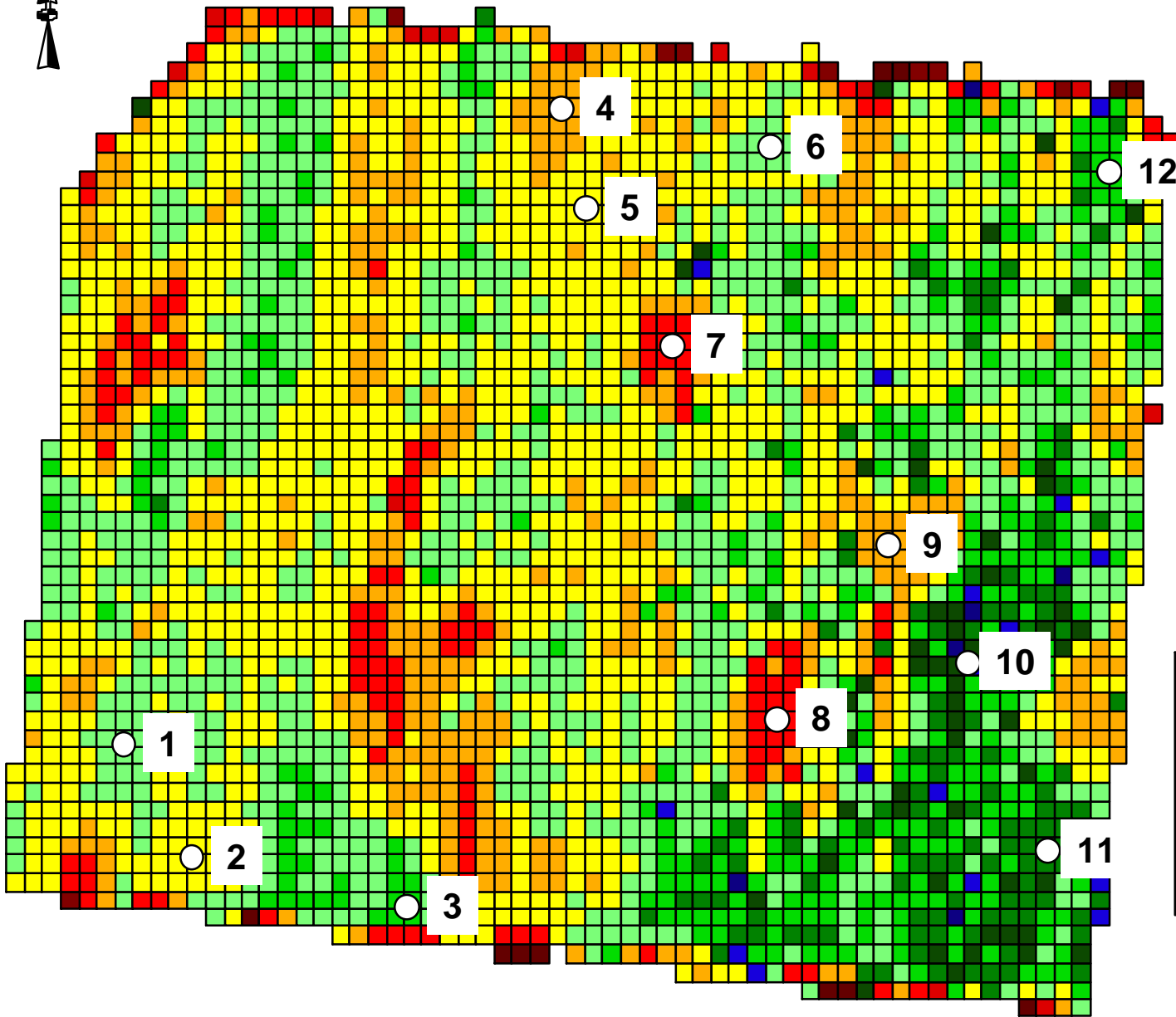
Sugar Cane Yield (t/ha)



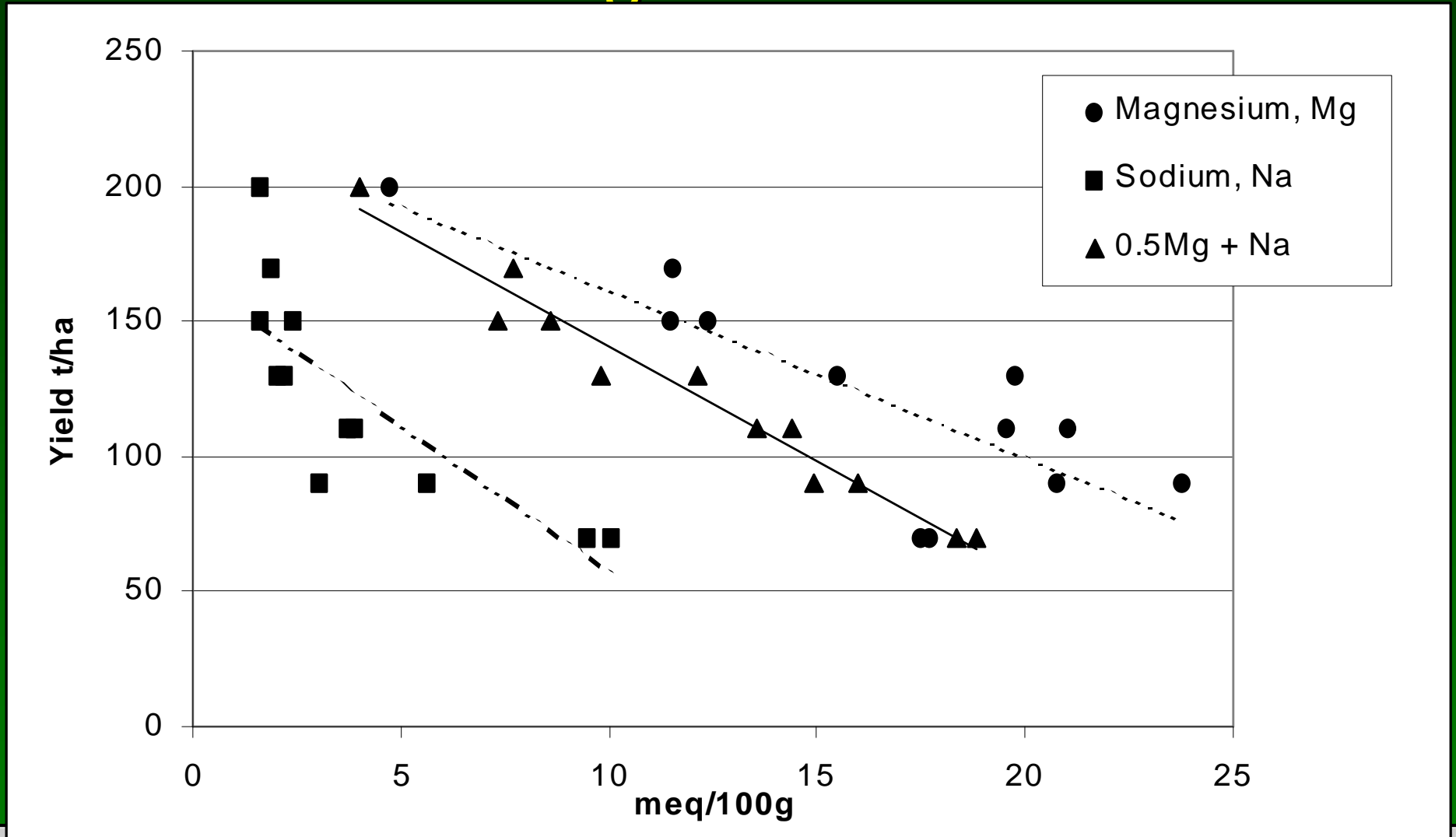
Total Yield: 14287.6 t
 Average Yield: 122.6 t/ha



By Graeme Cox
 16/10/1996



Yield Vs Magnesium + Sodium

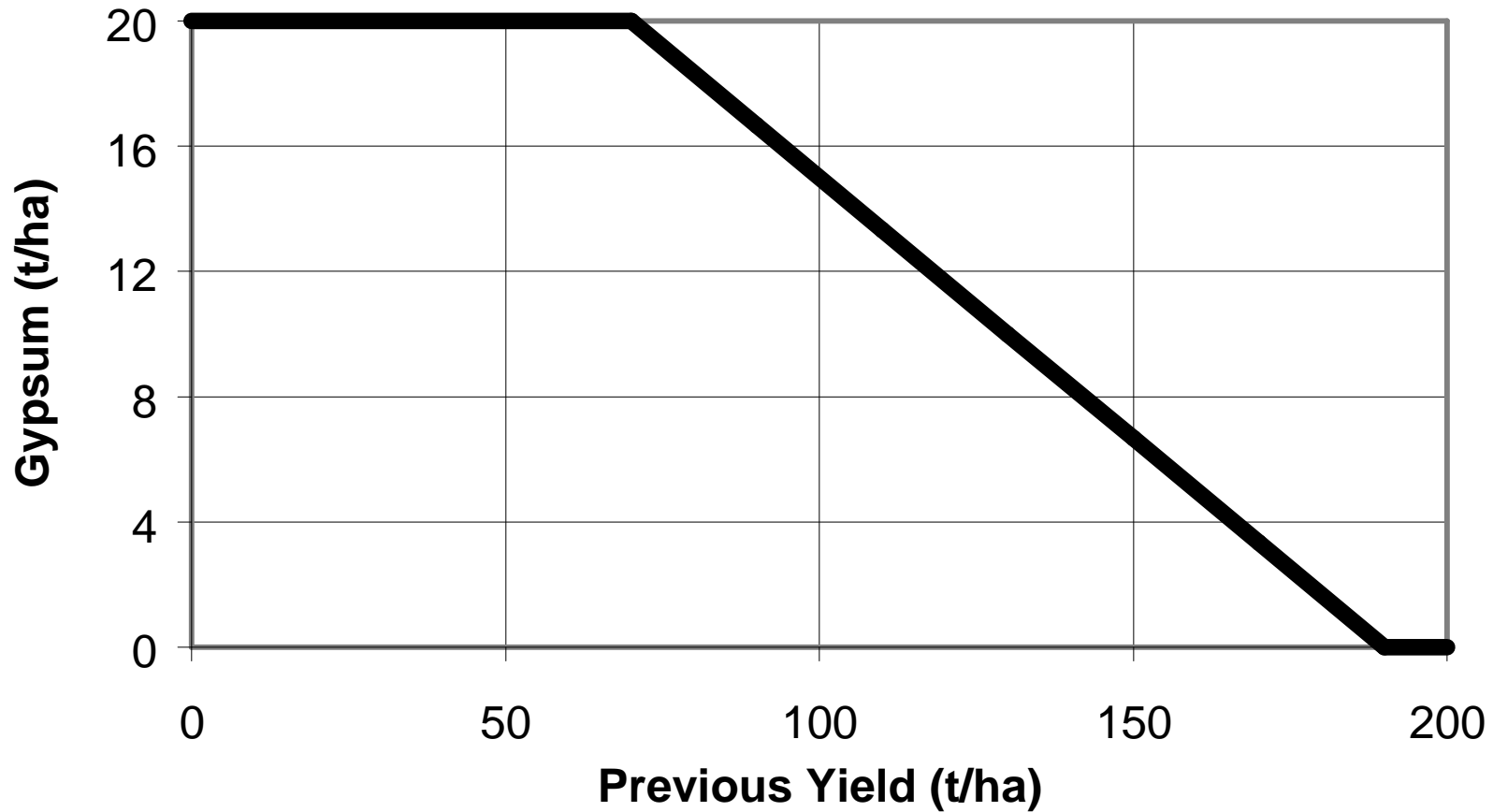


Soil Analysis Results

- Explain 64% of the yield variation with Sodium levels
- Explain 68% of the yield variation with Magnesium levels
- Explain 96% of the yield variation with Combination (0.5 Mg + Na)



Variable Rate Gypsum Application



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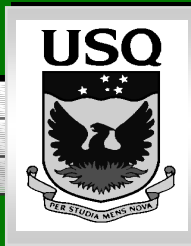
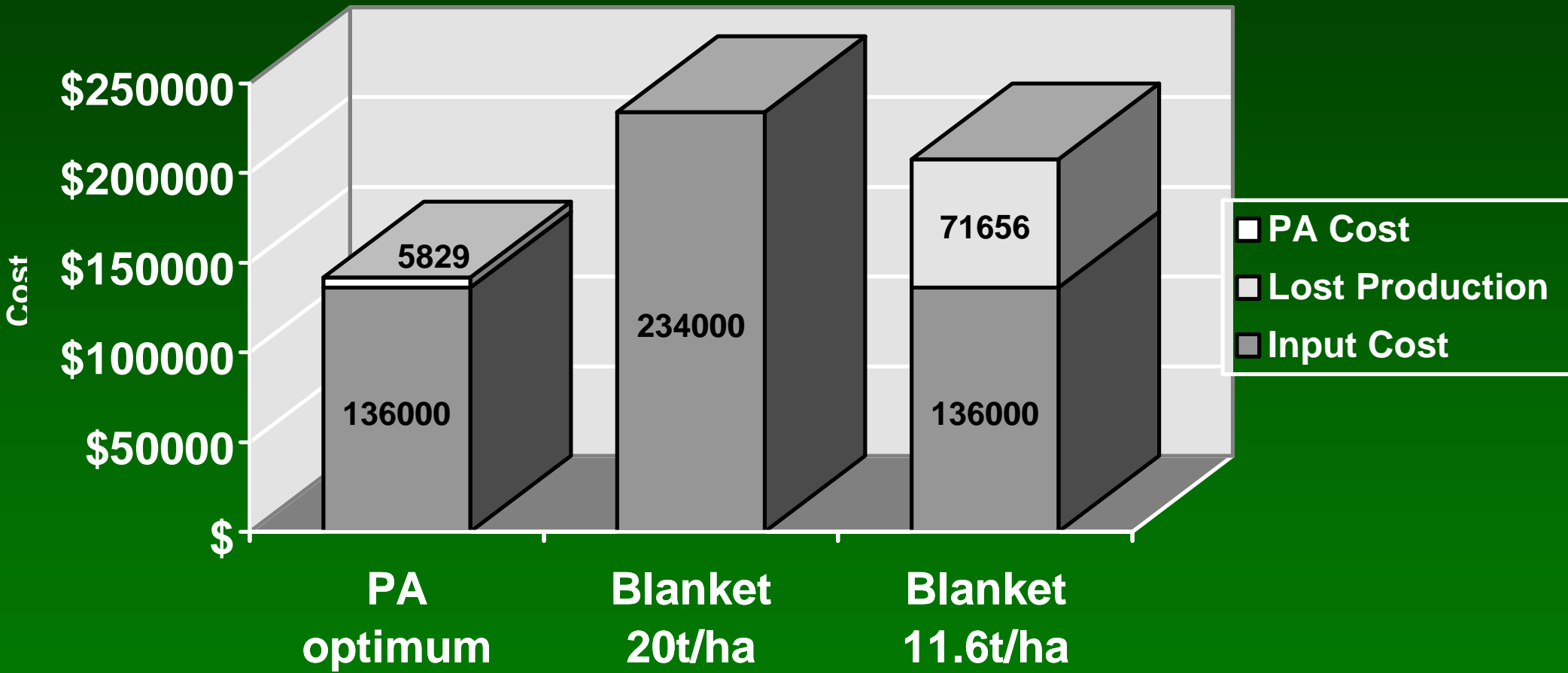
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Economic analysis

- ◌ Compared Blanket application Vs Variable rate application
- ◌ Most important factors
 - Cost of input
 - Value of Crop
 - Variability
- ◌ If all are high then pay back for PA is greatest



Cost/Benefit



Conclusion

- Successfully developed a yield mapping system for sugar cane.
- Directed Soil Sampling has shown a strong correlation between the yield maps and soil sodicity
- Variable rate gypsum application will be conducted
- Economic pay back is significant
- Gratefully Acknowledge PIVOT for support, INCITEC for the soil analysis, DAVCO Farming for hardware (1996) and Red Hen Systems for hardware (1997).



Support from Pivot Ltd.

- ◌ Funding of field calibration trials of sensor
- ◌ Funding of necessary experimental equipment
- ◌ Funding of technical support for trials
- ◌ Organisation and support of complete system trials in 1998

