



Faculty of Agriculture, Food  
and Natural Resources  
The University of Sydney



# Selecting cotton types for hotter temperatures

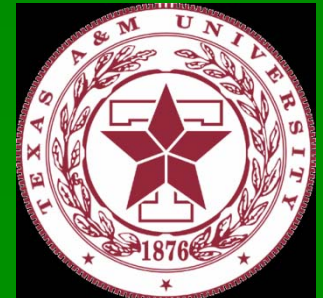
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Dr Michael Bange, CSIRO Plant Industry

Dr Tom Cothren, Texas A&M University

Dr Lindsay Campbell, The University of Sydney



# Cotton in Australia

| Site      | Mean No Days $\geq 35^{\circ}\text{C}$ | Mean No Days $\geq 40^{\circ}\text{C}$ |
|-----------|--|--|
| Emerald   | 66.2                                   | 5.5                                    |
| St George | 53.4                                   | 4.8                                    |
| Bourke    | 77.1                                   | 21.7                                   |
| Narrabri  | 42.4                                   | 2.8                                    |



# The Problem

- Screening for thermotolerance in the field is largely incidental
- No rapid and reliable screening methods for thermotolerance

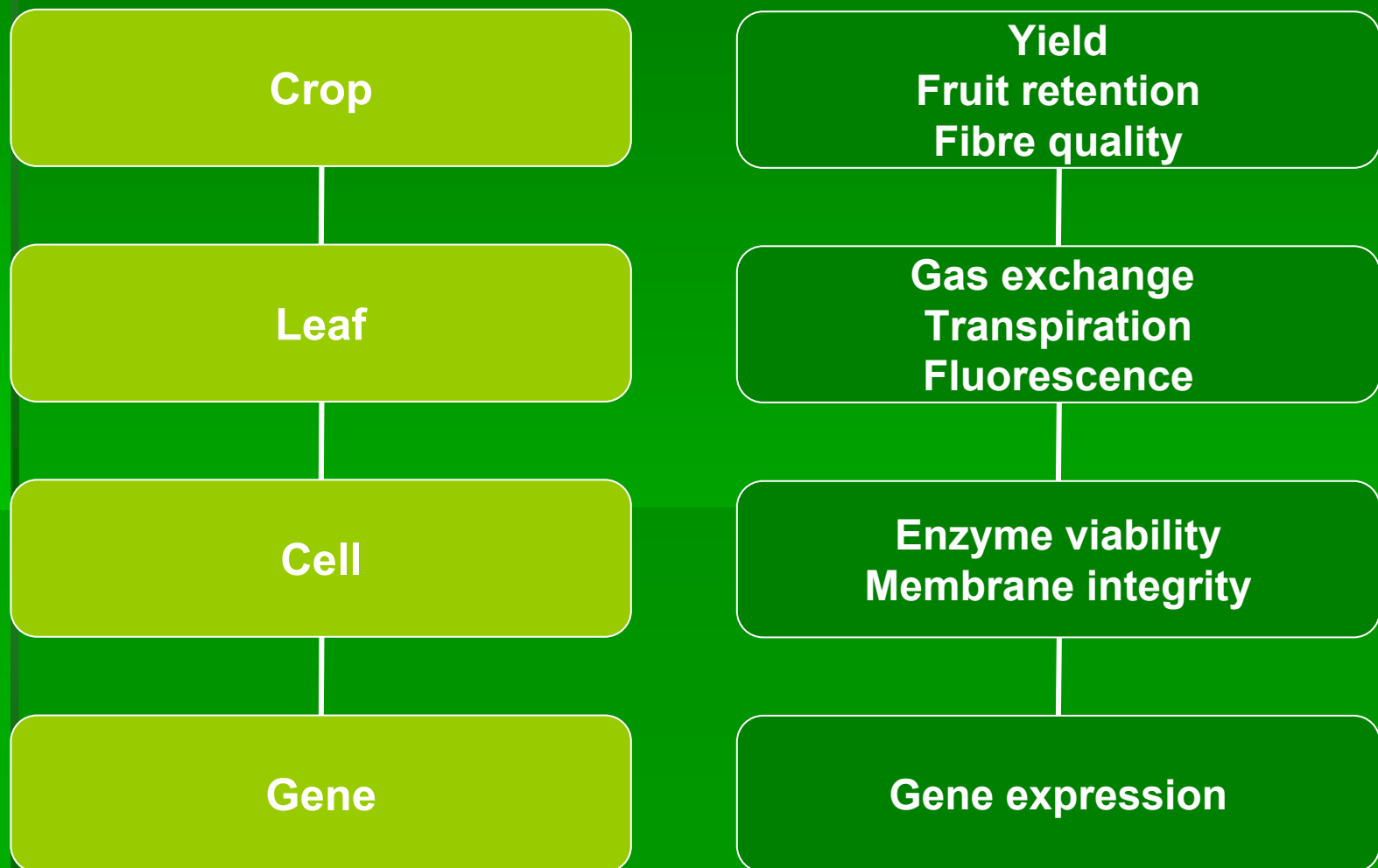


# Aim

- **Develop a rapid, reliable method of screening cotton cultivars for thermotolerance**
- **To quantify cultivar differences in thermotolerance**



# Measurements and Assays

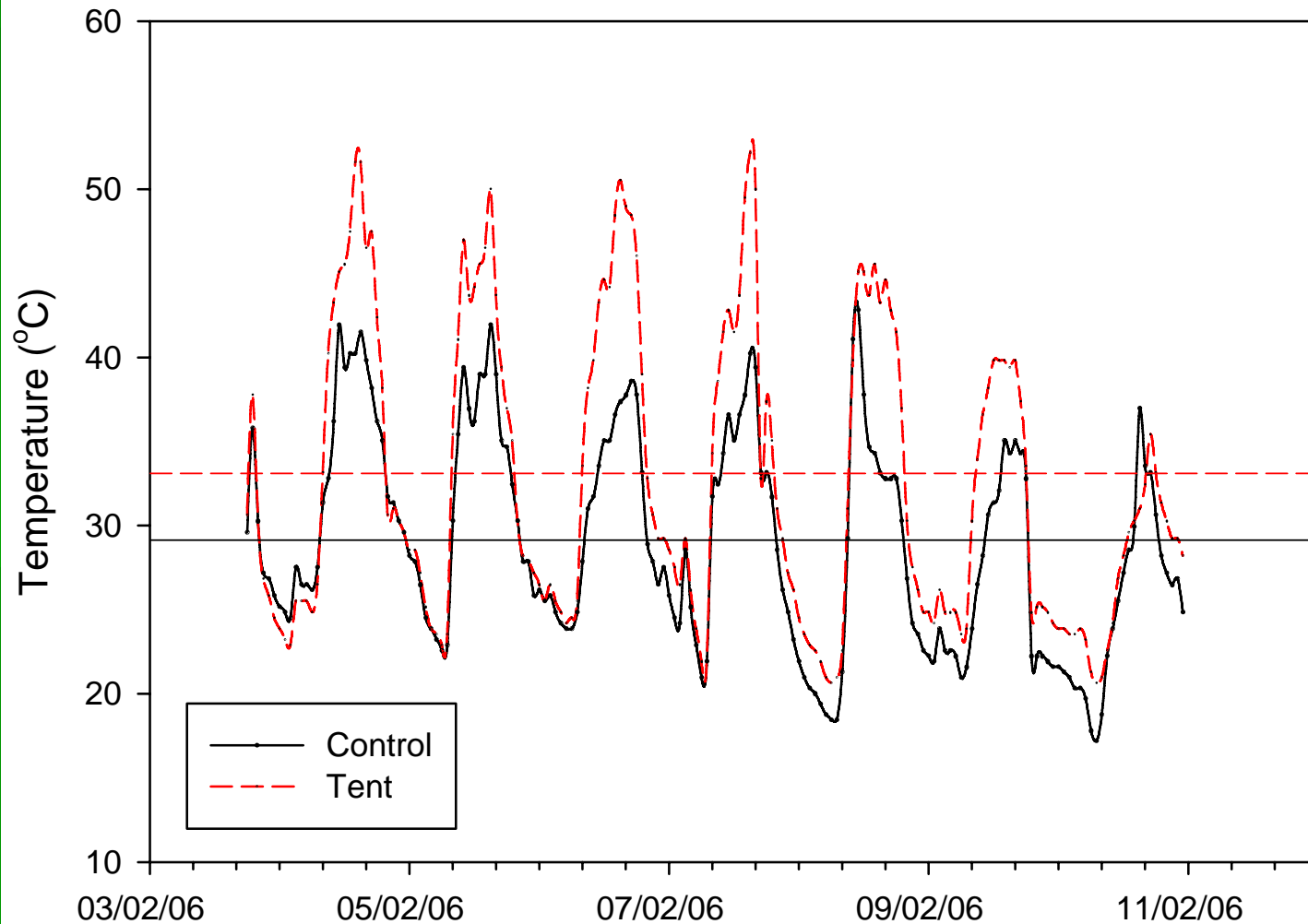


# Field Tents

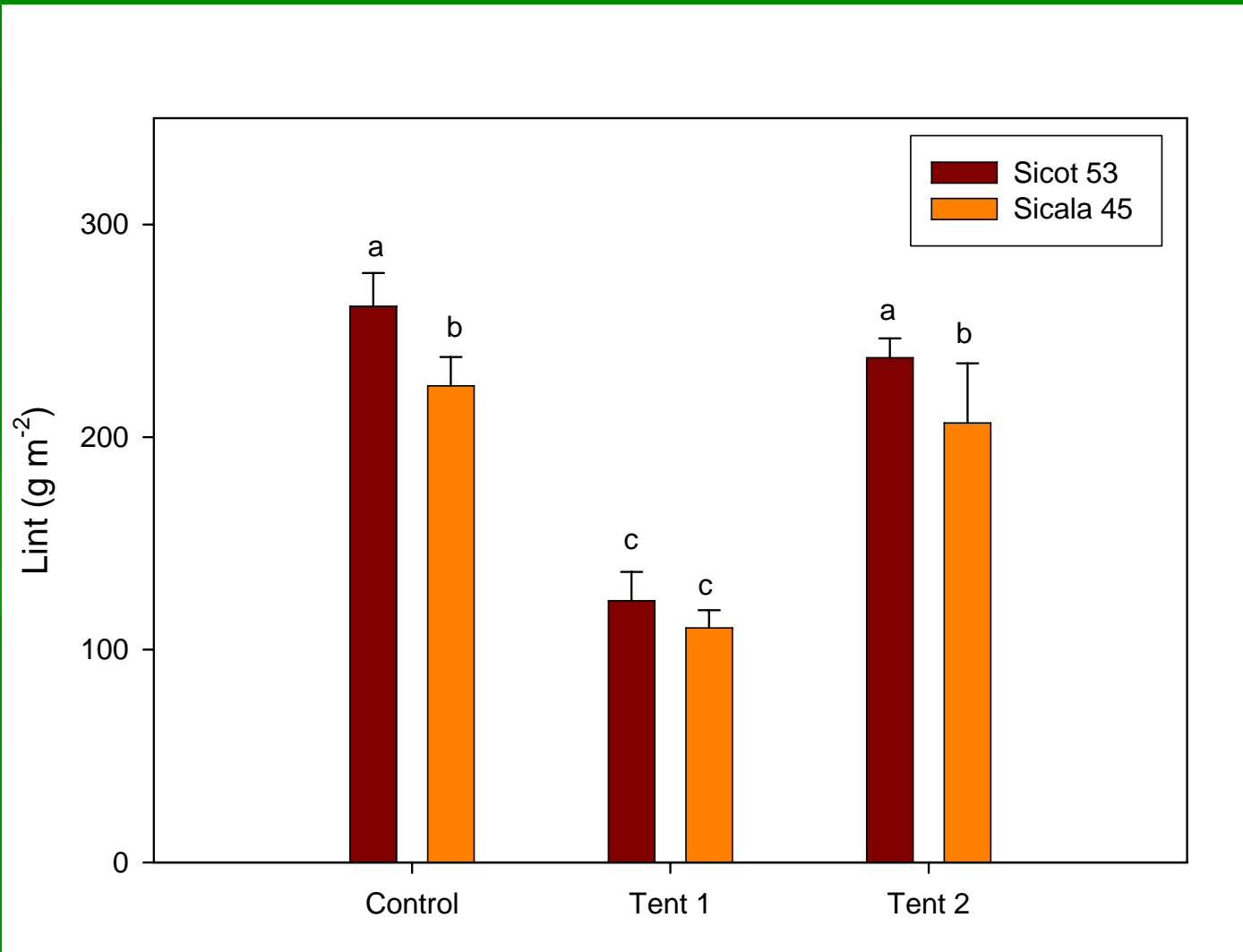


# Narrabri Temperatures

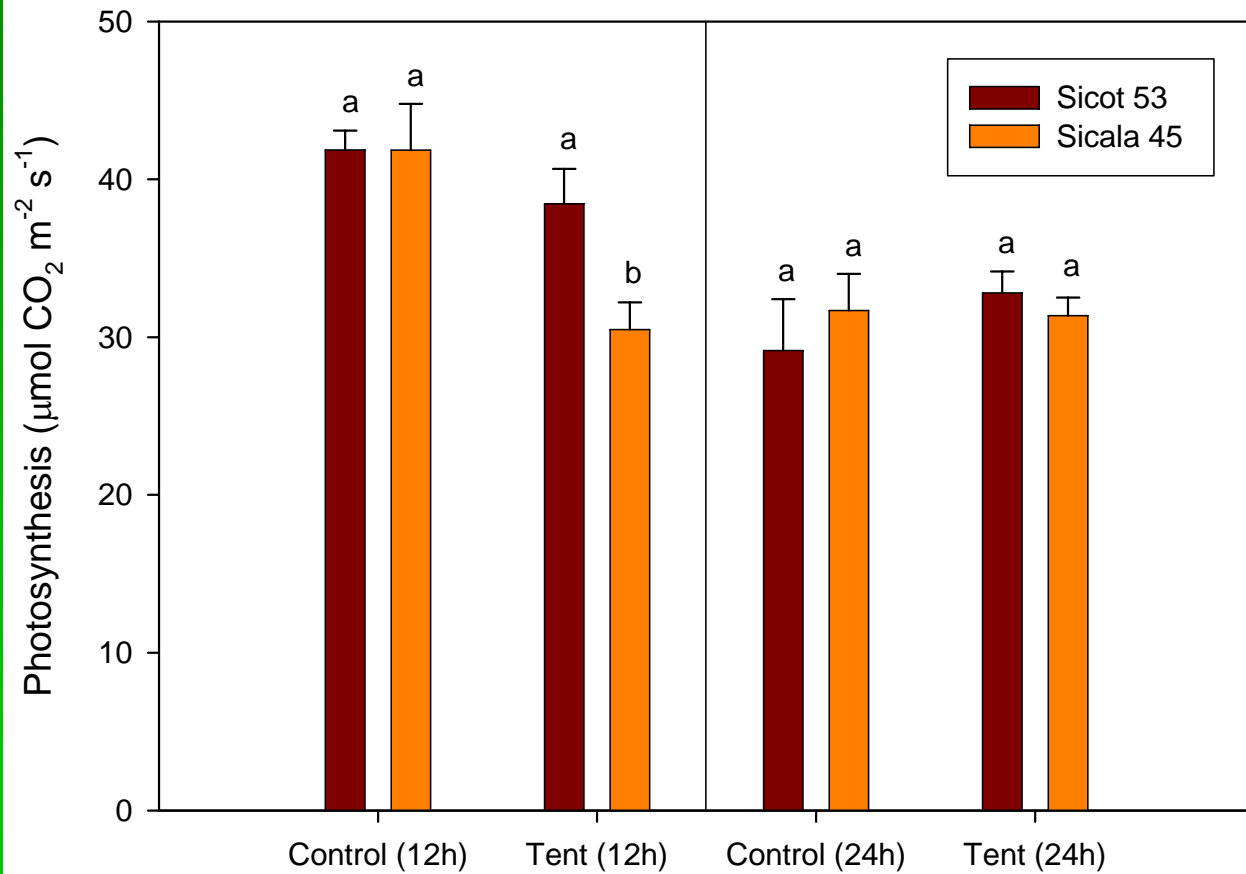
Experiment 1



# Yield



# Photosynthesis



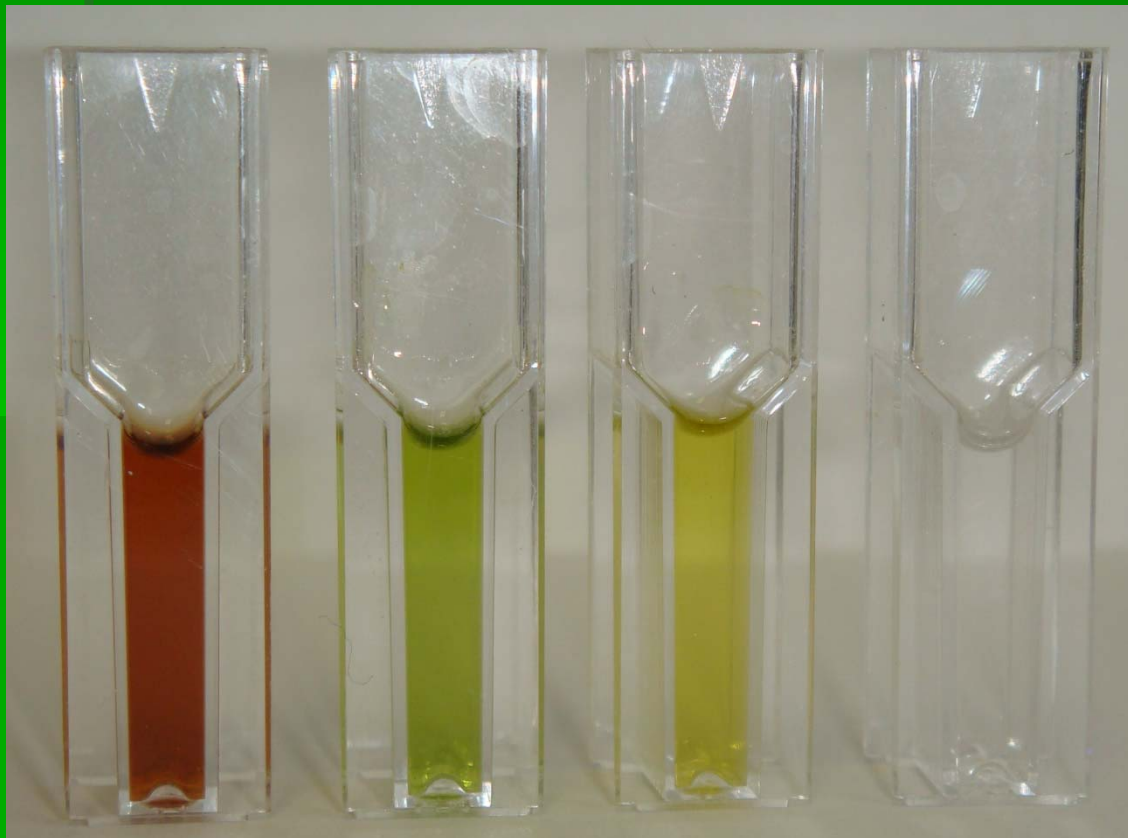
# Enzyme Viability Assay

25°C

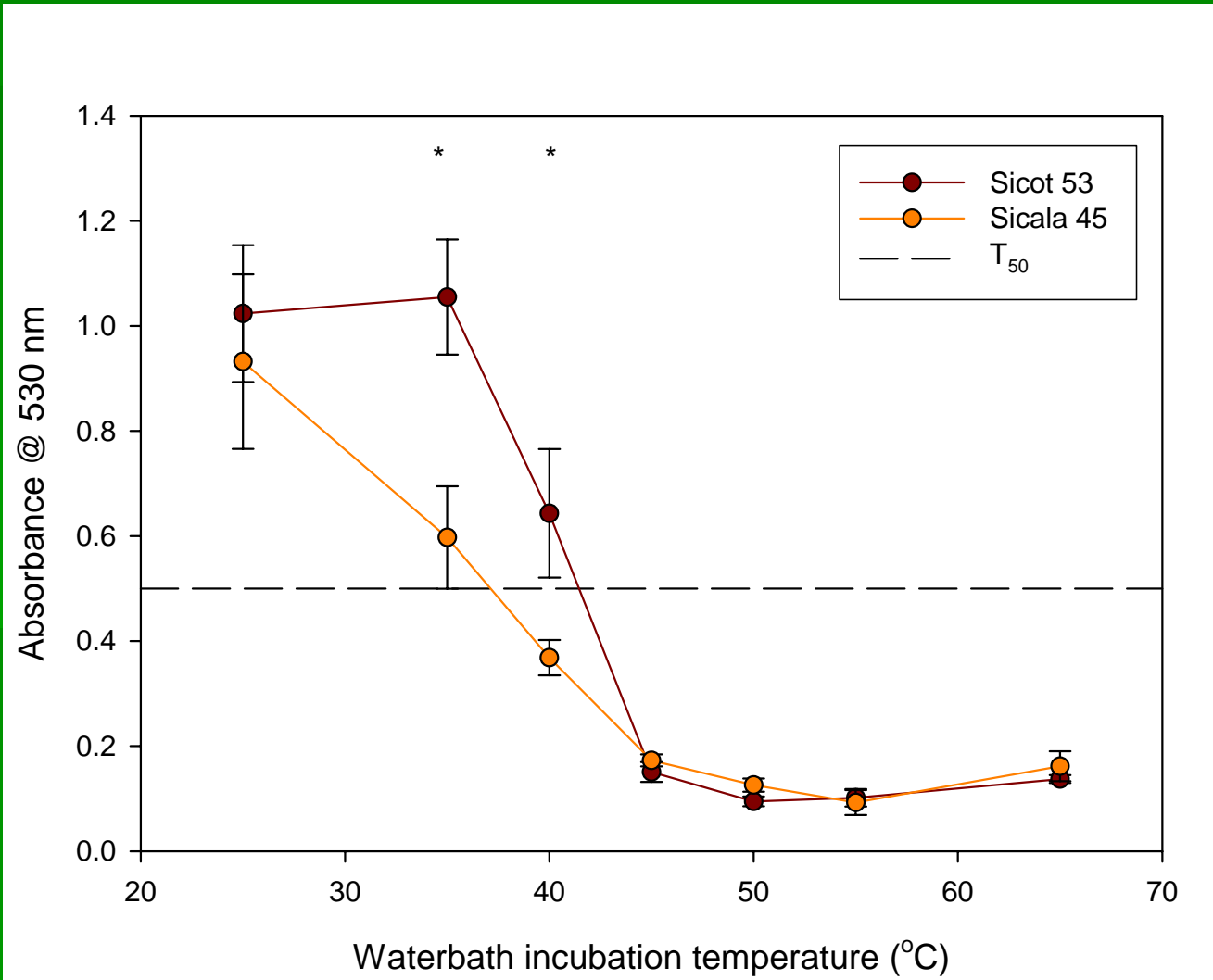
45°C

90°C

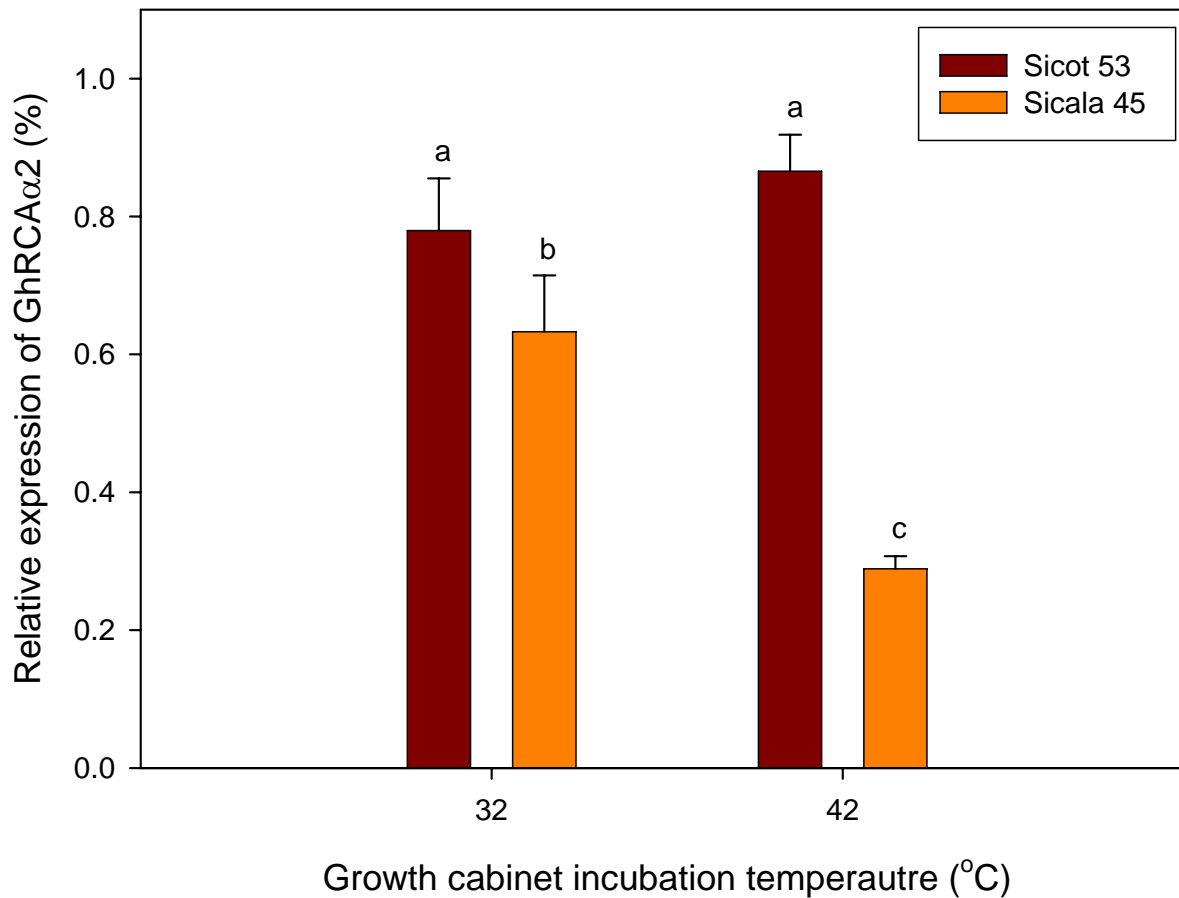
Ethanol



# Enzyme Viability Assay



# Gene Expression



- Protein biosynthesis
- ATP
- Heat shock proteins
- Genes with unknown function

# Further Research

- **Extensive cultivar screening**
- **Molecular marker technology for thermotolerance**
- **Range of abiotic stresses**



# Conclusions

- **Sicot 53 is consistently more thermotolerant than Sicala 45**
- **Yield and photosynthesis decreased under tents in the field**
- **Enzyme viability decreased under high temperature stress in the laboratory**
- **Gene expression decreased under high temperature stress in the growth cabinet**
- **Develop a viable method for rapid, effective screening of thermotolerance**