

# Small Scale Heterogeneity In Savanna Grasslands

Cleo Gosling  
 Han Olf  
 Joris Cromsigt



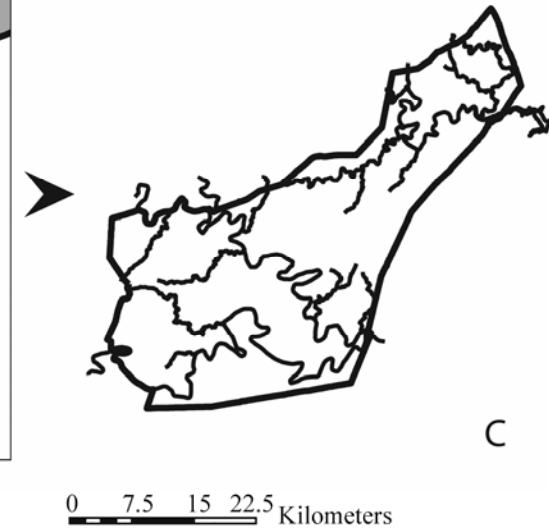
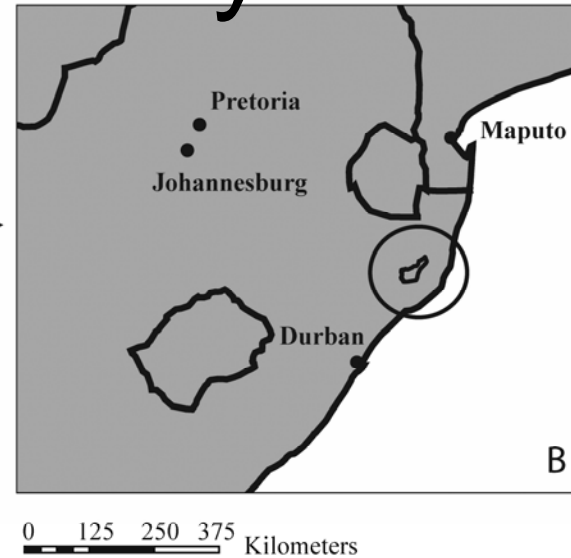
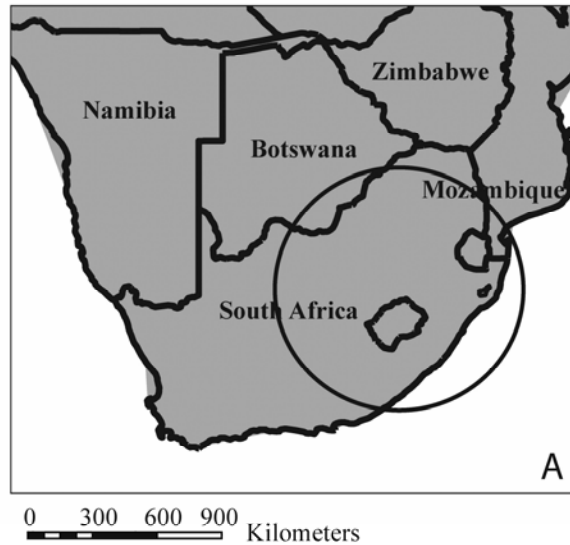
# Introduction

- Heterogeneity or resource patchiness is a global theme in modern ecology.
- Heterogeneity = patches of variable vegetation

## Questions

- What are the causes of small scale patchiness?
- Do biotic agents create heterogeneity?

# Study Site



- Hluhluwe iMfolozi
- Diverse system
- High herbivore biomass densities
- High small scale heterogeneity
- Small area, how is such diversity and abundance sustained?

# Study Subjects

- Termites
  - Abundant and widespread
  - High biomass
  - Ecosystem engineers
- White rhino
  - Megaherbivores
  - High biomass
  - Keystone species



# Study Subjects

- Creation of nutrient hotspots
- Hotspots of comparable sizes (diameter: mounds 1–5m, middens 1–7m)
- Active and persistent over similar time scales

**Odontotermes**



**Macrotermes**



**Trinervetermes**



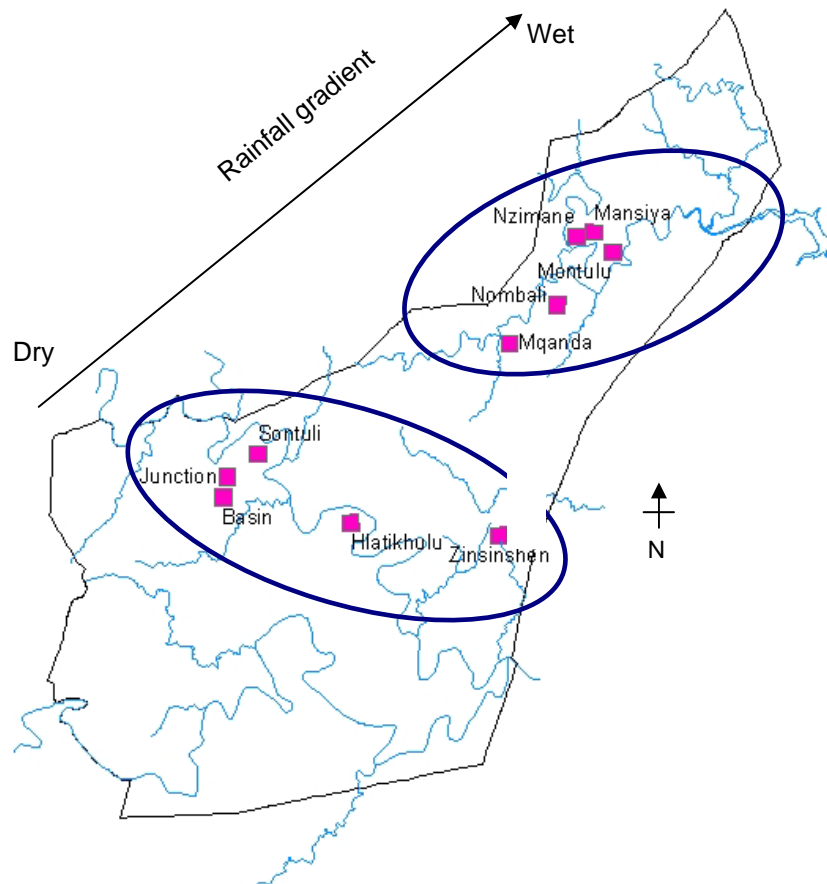
**Rhino midden**



# Methods

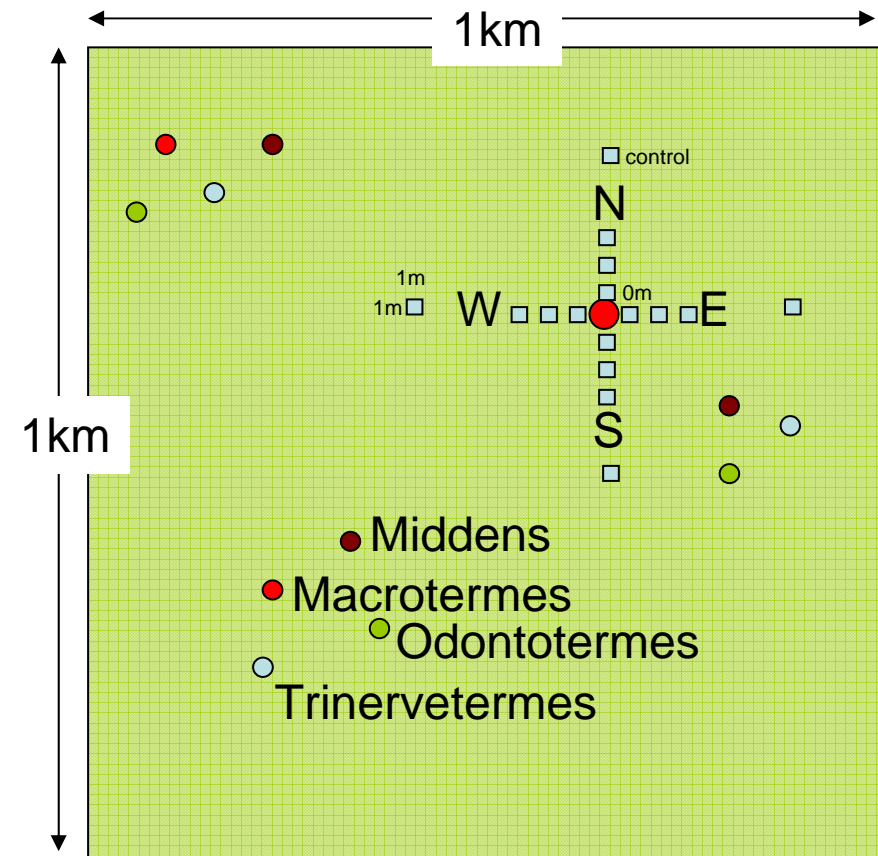
## Hluhluwe iMfolozi

- Rainfall gradient
- 10 Block locations



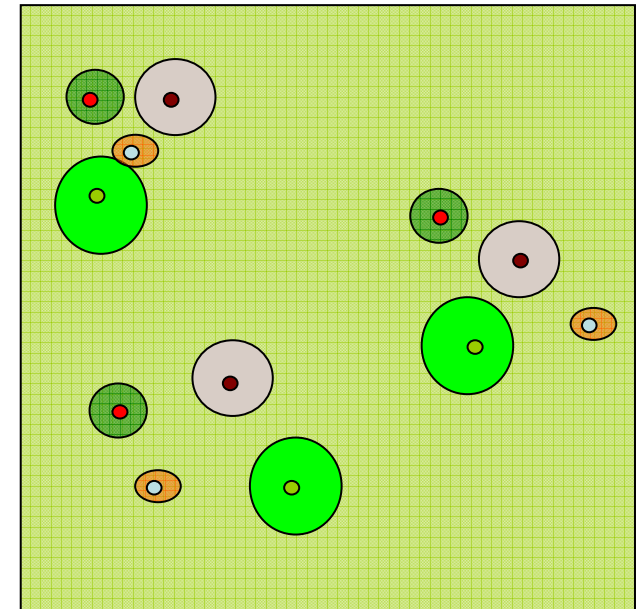
## Block Scheme

- 4 features
- 3 replicates



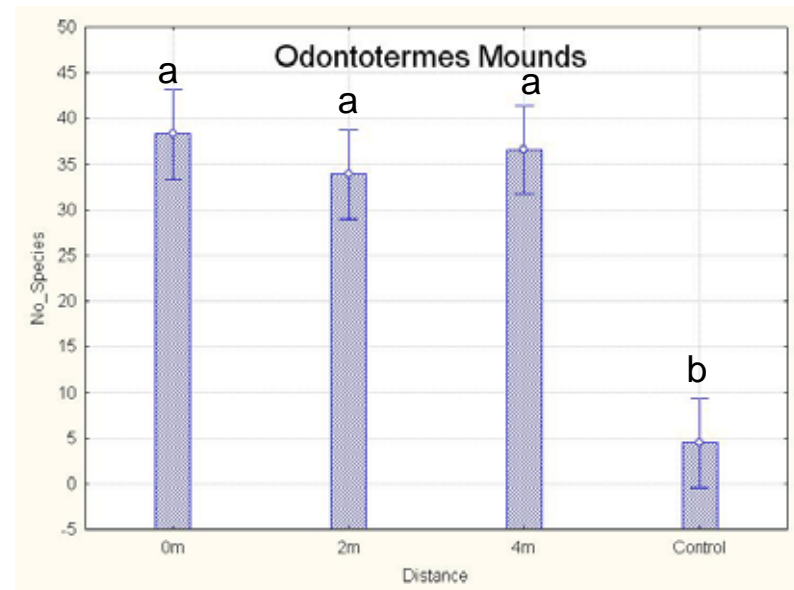
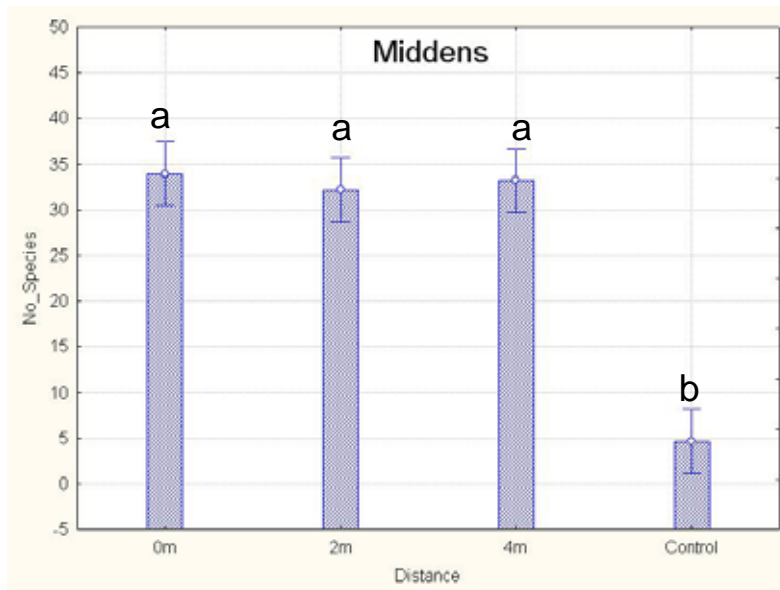
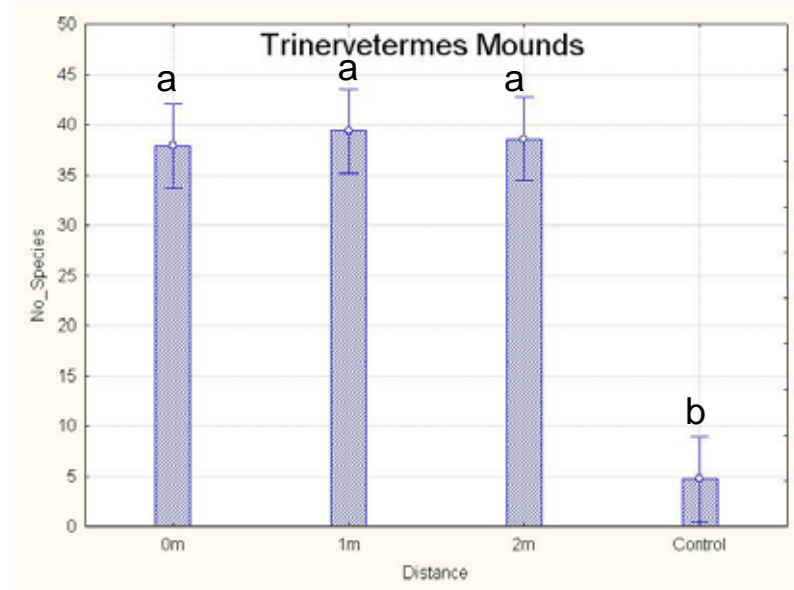
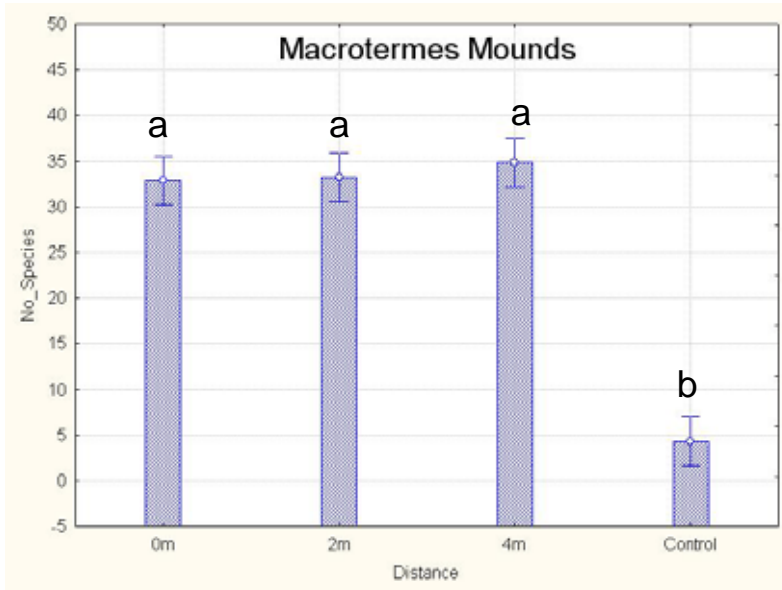
# Methods

- Vegetation measurements
  - species composition
  - structure
- If rhino and termites create heterogeneity expect to see patches of vegetation surrounding the features that vary from the background vegetation.



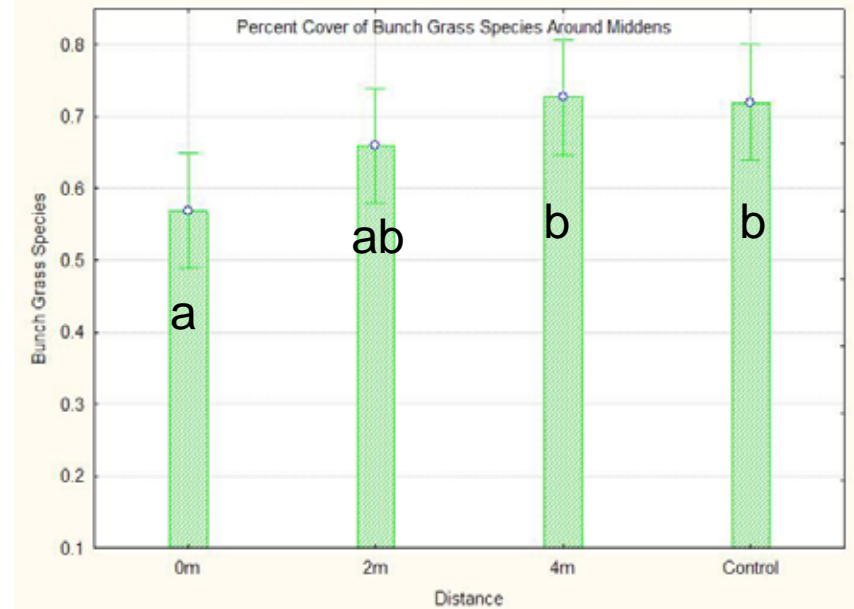
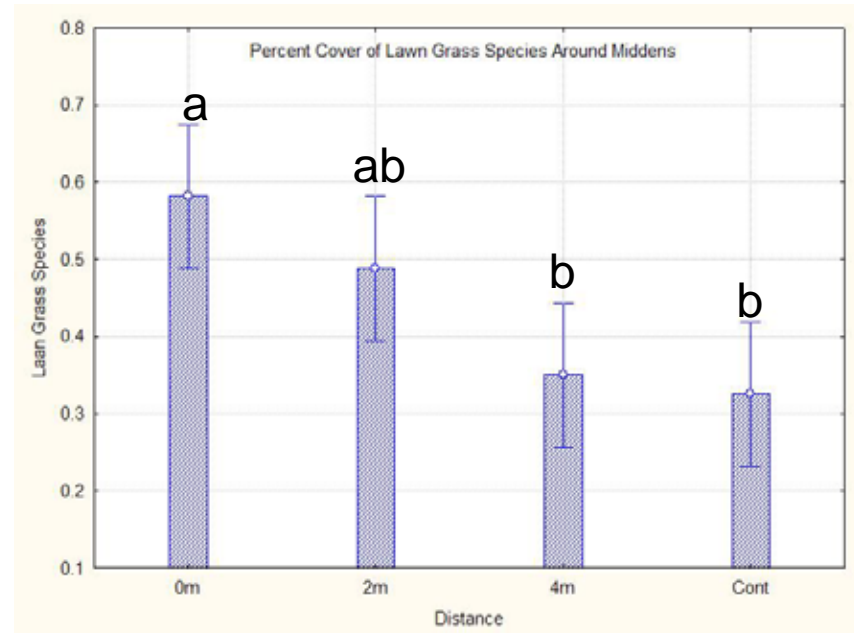
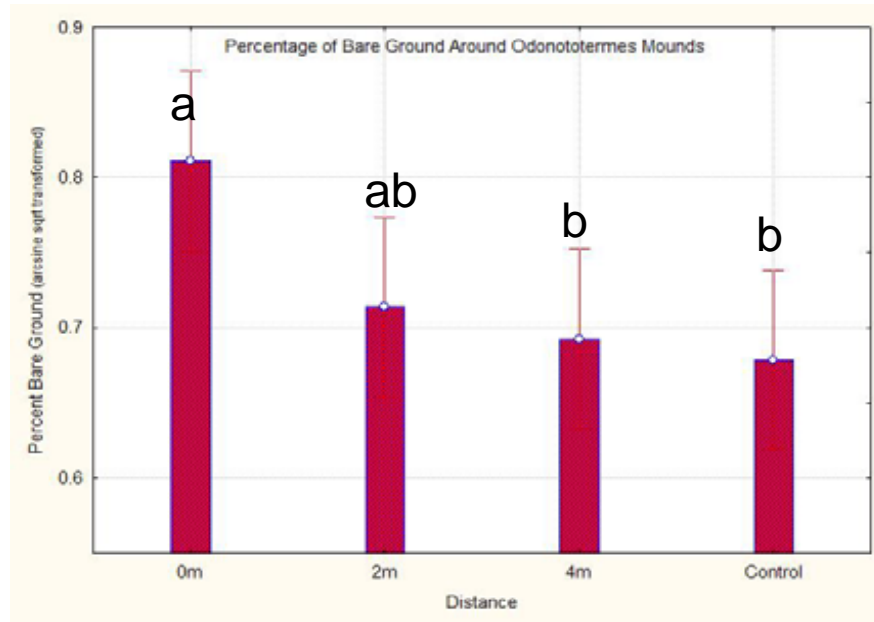
# Results

Number of Plant Species



Distance from Feature

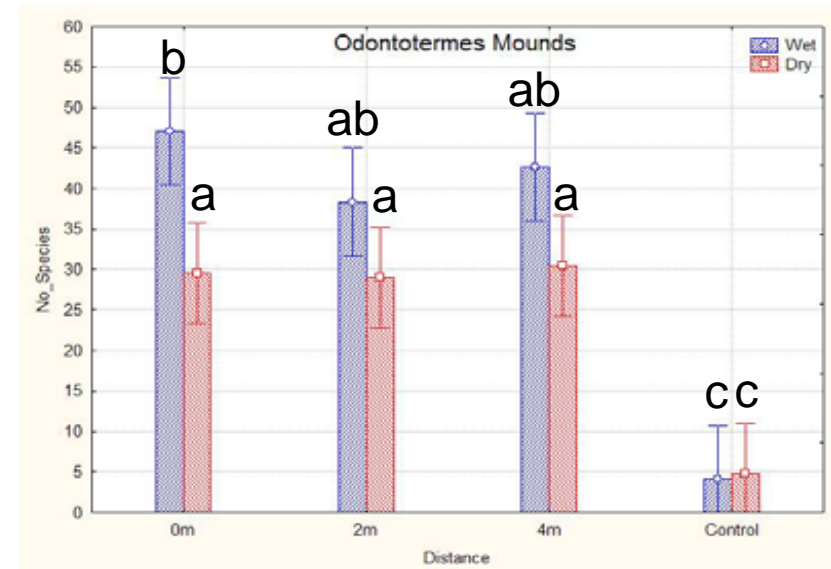
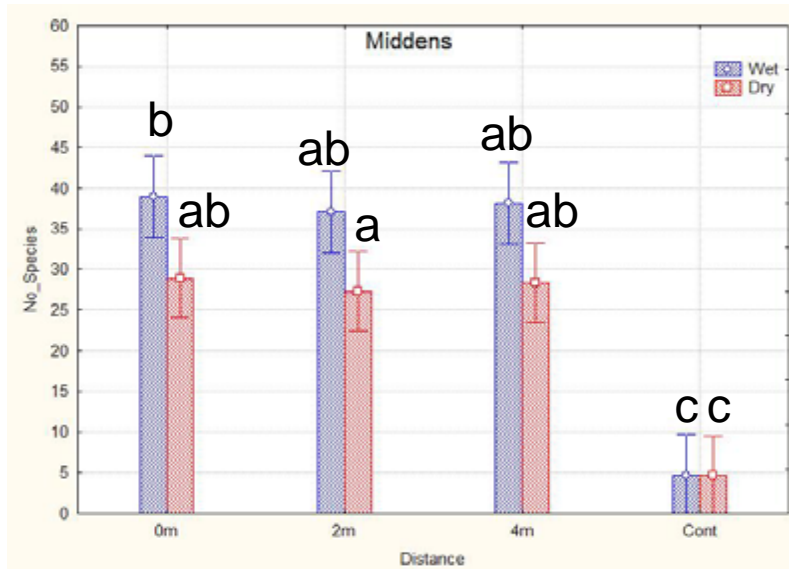
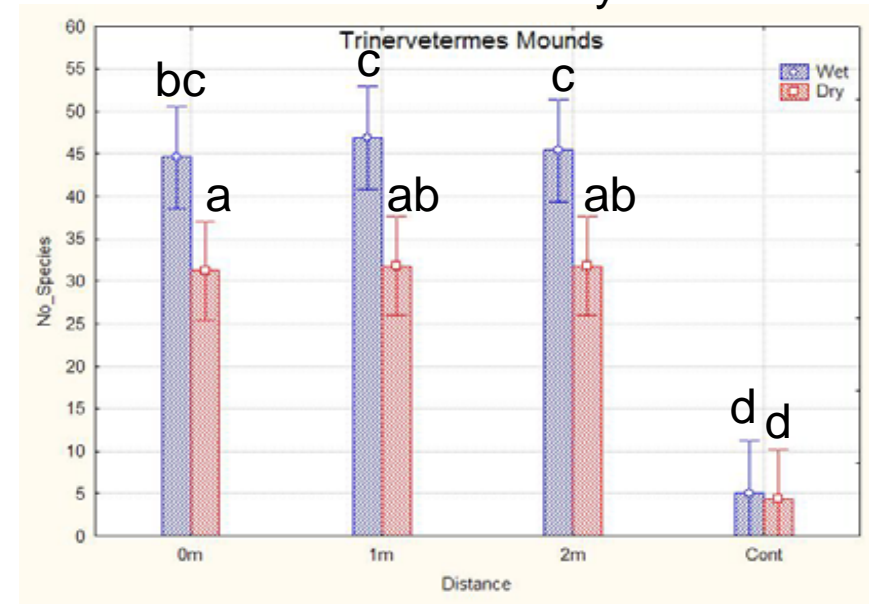
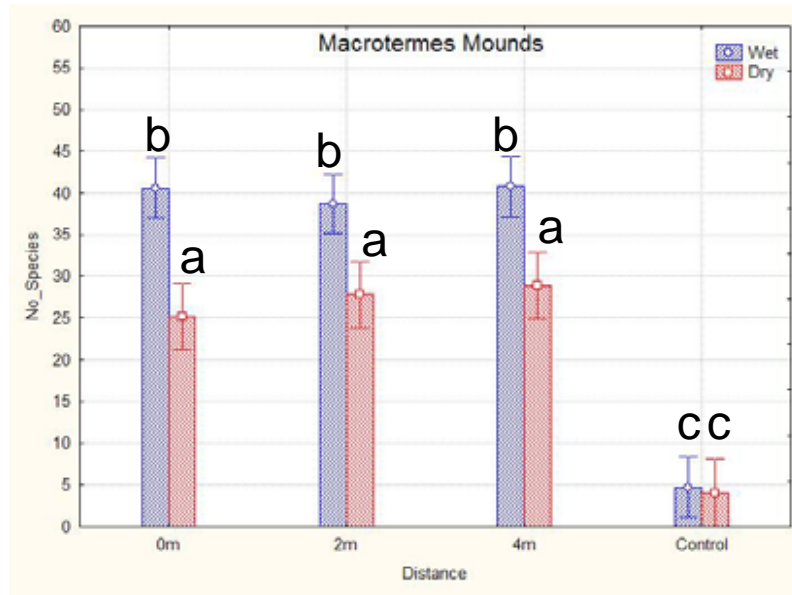
# Results



# Results

■ Wet sites  
■ Dry sites

Number of Plant Species



Distance from Feature

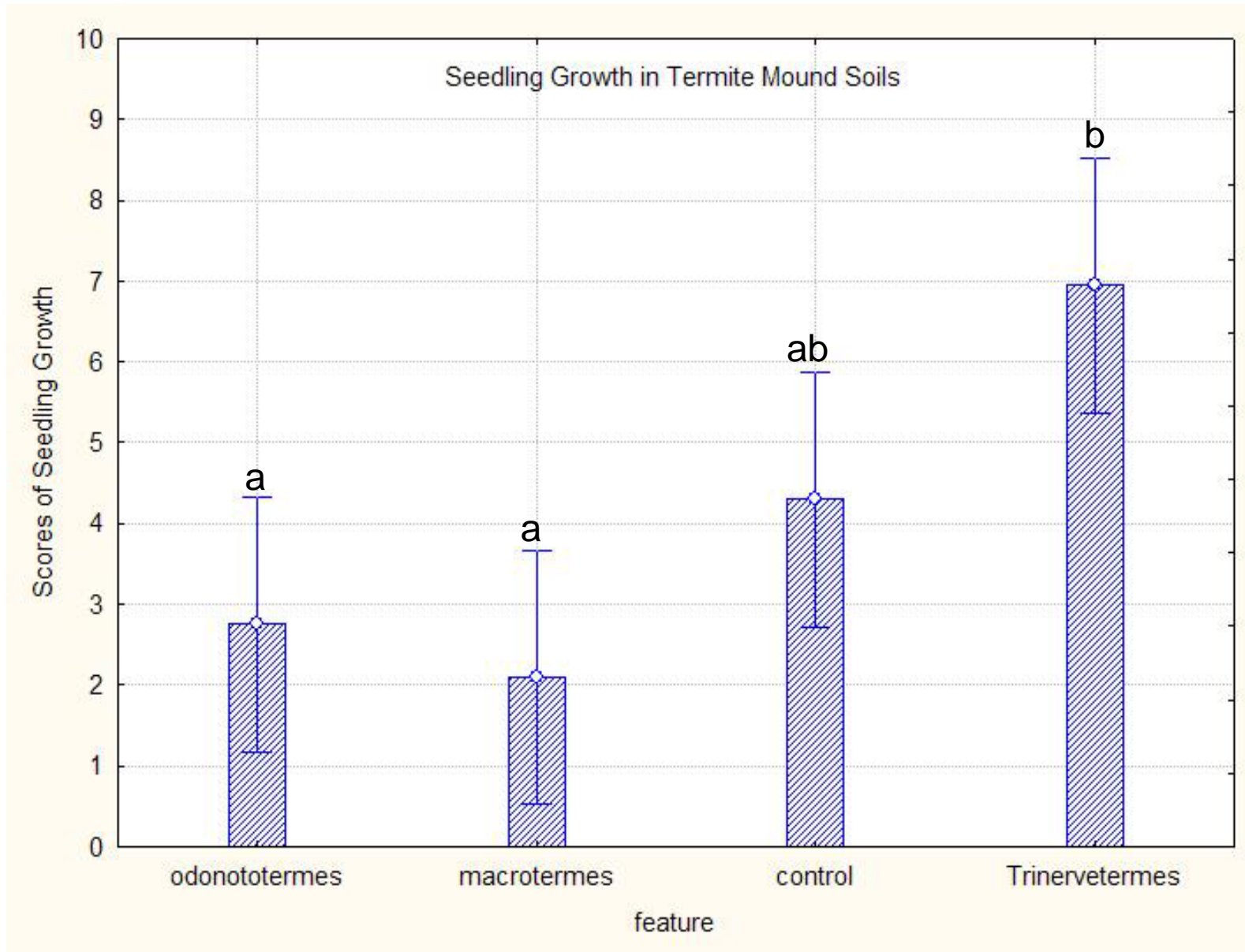
# Discussion

- Magnitude of impact is moisture dependant.  
Why?
- Mesic savannas less nutrient rich
- Grazing pressure
  - Higher primary productivity in wet areas
  - High herbivore densities in drier areas
  - More grazing pressure on/around hotspots
  - Dominant grasses kept at lower levels
  - Facilitation of more subordinate species.

# Conclusions

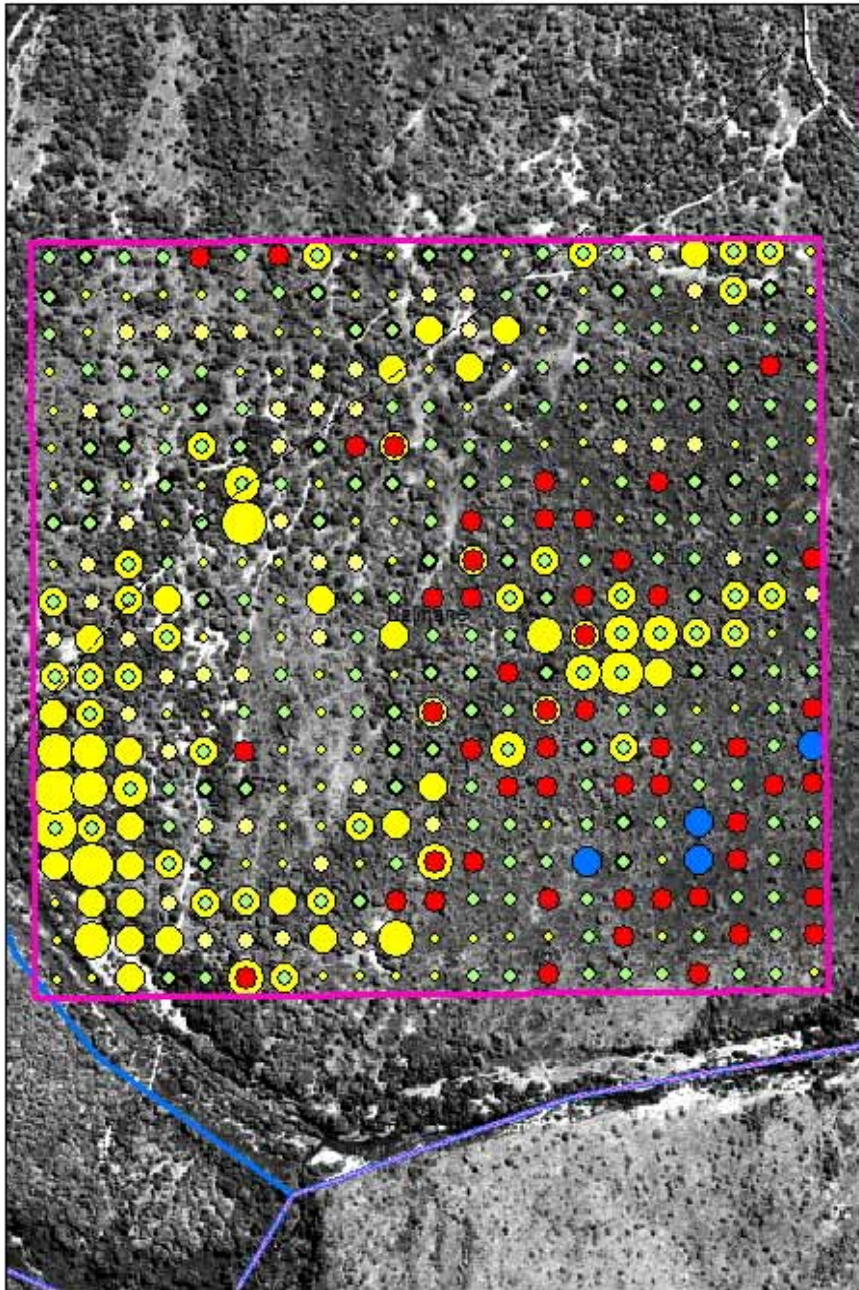
- Rhino & termite created hotspots enhance compositional diversity.
- Size of impact is rainfall dependant
- Magnitude of effects differ between termite genera
  
- BUT...

# Preliminary Greenhouse Experiment Results



# Acknowledgements

- University of Groningen
- Khanyie Mpanza, Han Olf, Joris Cromsigt, and Jan Graf
- eKZNWildlife and staff in Hluhluwe iMfolozi Park
- Everyone at Dung Beetle
- Everyone at COCON



## Block Mapping

- 50x50m grid cells

### Lawn Grass

- 0-20%
- 21-45%
- 46-70%

### Mounds

- Trinervetermes
- Macrotermes
- Odontotermes