

# Changes in plant available nitrogen with changes in available water in a mesic savanna

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# Introduction-Nitrogen cycle

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- ❑ The rate of nitrogen cycling determines the biological productivity
  - ❑ Nitrogen is the nutrient that is often limiting to plant growth,
  - ❑ Differences in mineralization rates of nitrogen can have significant effects on plant productivity
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# Introduction-Nitrogen cycle

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- Nitrogen moves through the system via different pathways and in different forms
  - most soils contain nitrogen in organic forms which are inaccessible to plants
  - Microbes breakdown organic nitrogen into inorganic nitrogen - mineralisation
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# Factors affecting mineralisation

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## Factors

- Soil moisture: rainfall increases n-min
  - Temperature: N-min increase with increase in temperature
  - Soil type: coarse textured soils have a more active microbial pop. Than fine soils
  - Substrate chemistry
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# Broad objective

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- The project focuses on the effects of rainfall and competition on nutrient availability, nutrient stores and plant growth
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# Questions

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1. How are N mineralization rates influenced by rainfall?
  2. How are N mineralization rates influenced by competition?
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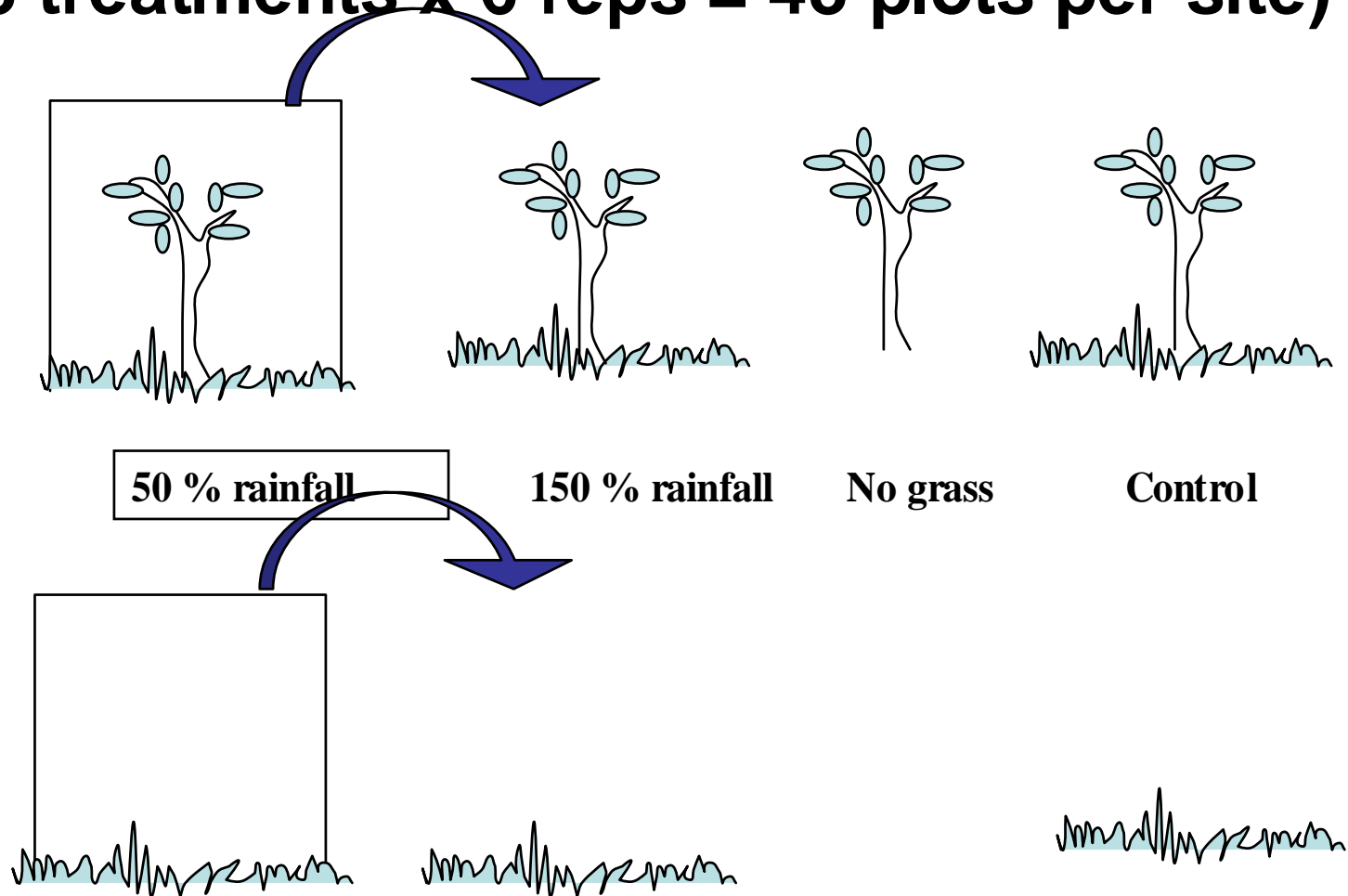
# Study area

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- ❑ Pretoriuskop – KNP
  - ❑ Soil: The dominant soil is the nutrient poor coarse sandy soil on the granite.
  - ❑ Average rainfall: 700 mm/a
  - ❑ Vegetation: dominant tree *Terminalia sericea*, dominant grass *Hyperthelia dissoluta*
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# Experimental design

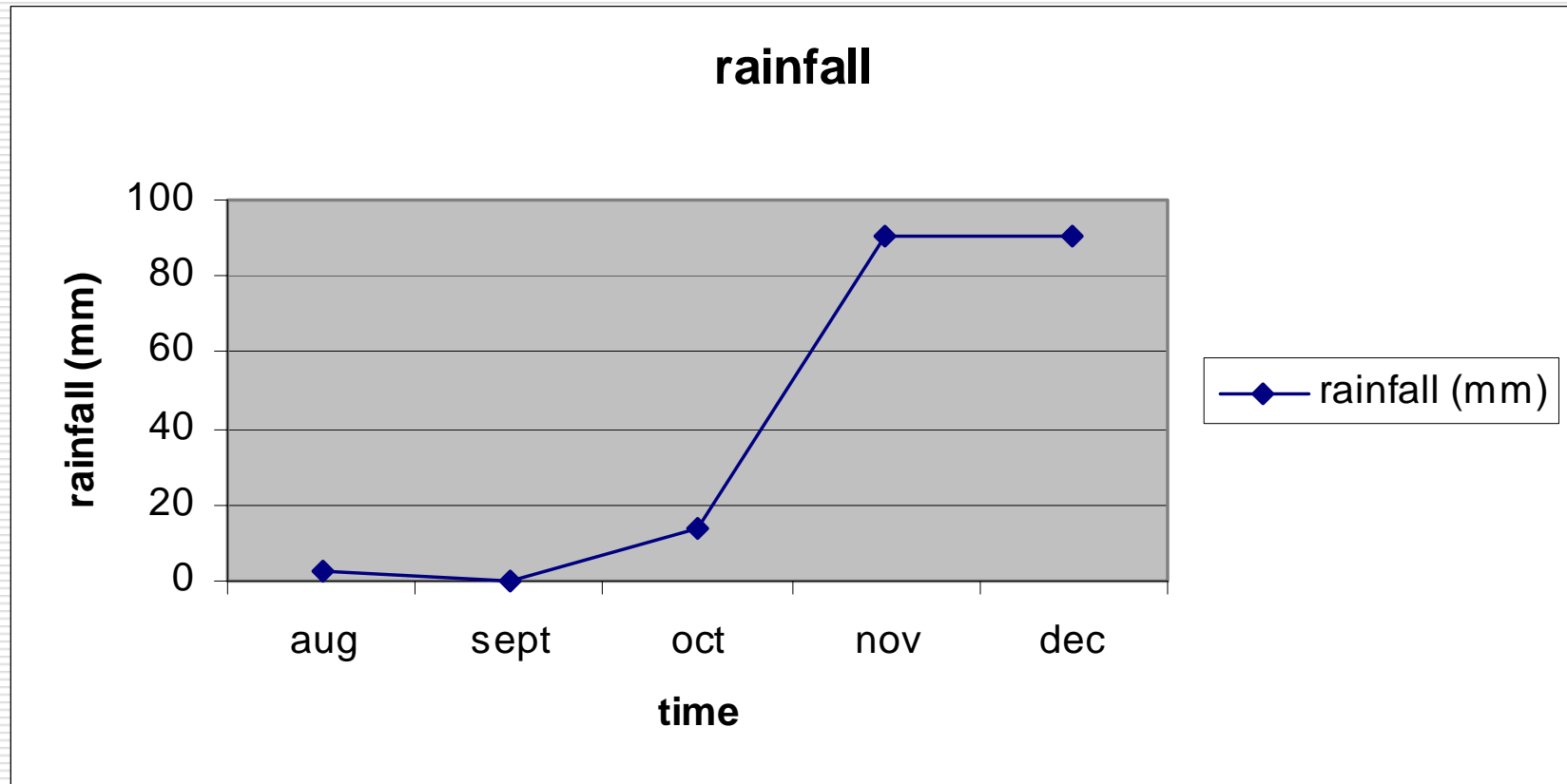
(8 treatments x 6 reps = 48 plots per site)



*Rademan, L.*

# Results - rainfall

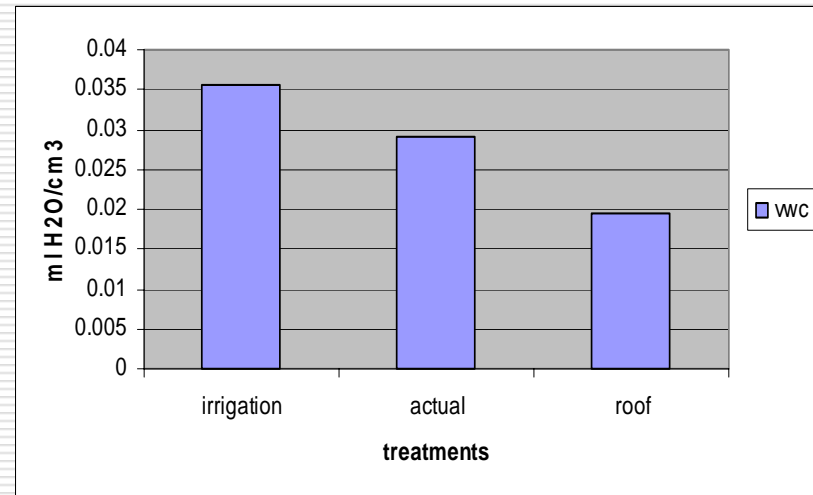
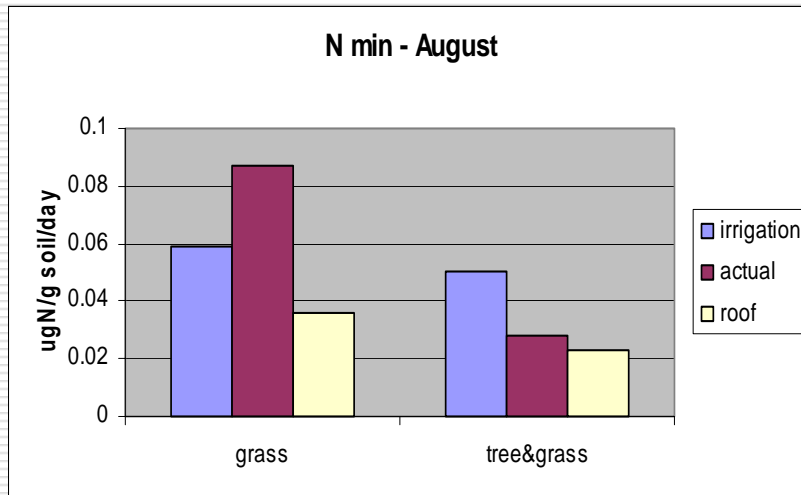
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# Results–N min. in water treatments

## *dry season*

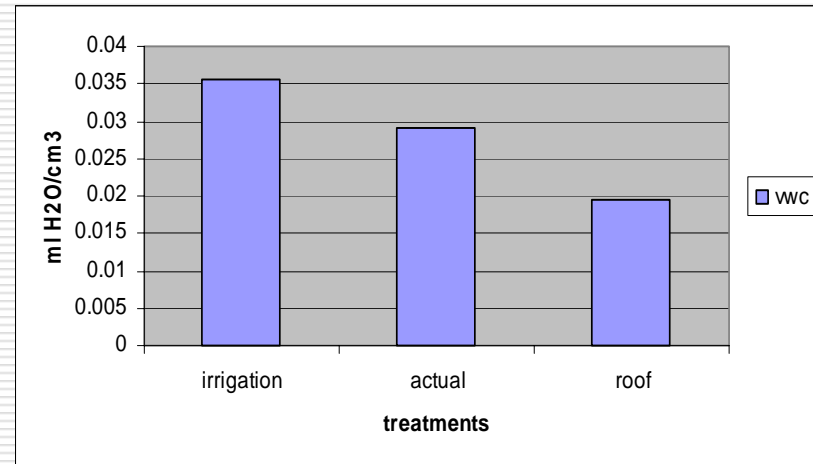
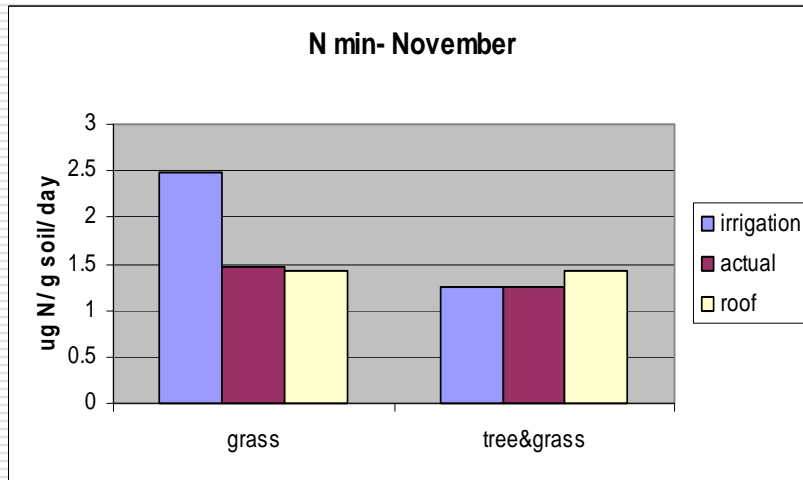
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# Results –N min.in water treatments

## *wet season*

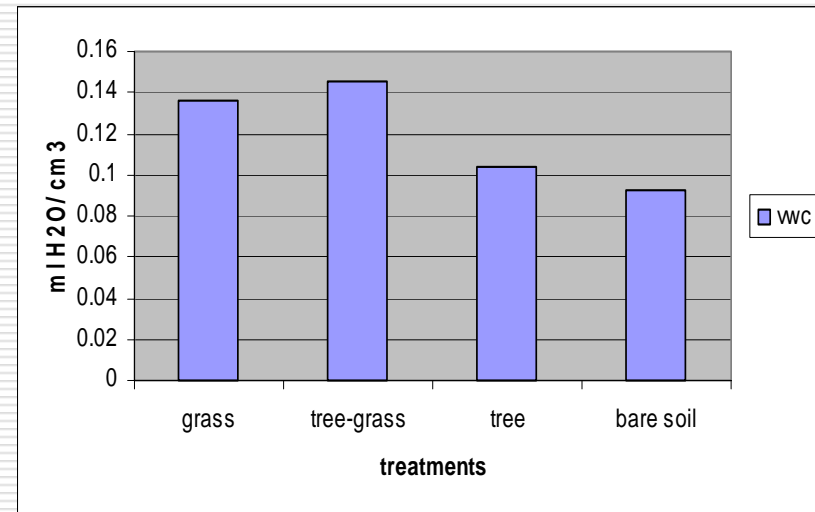
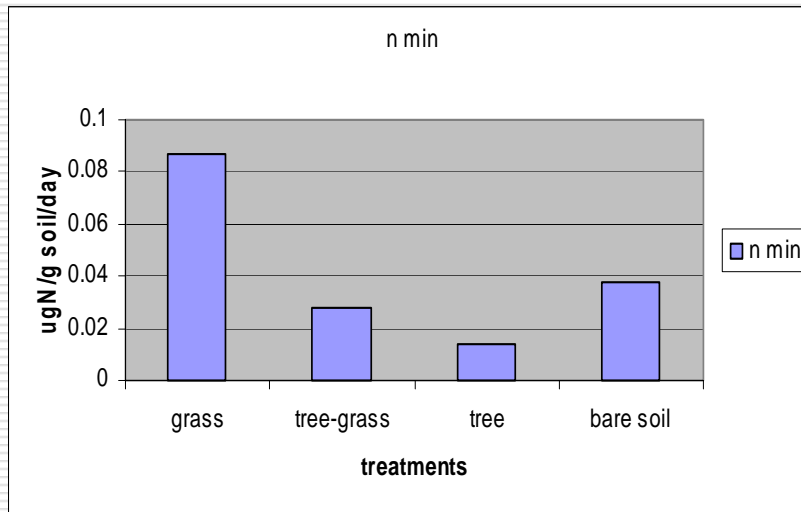
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# Competition treatments

## *dry season*

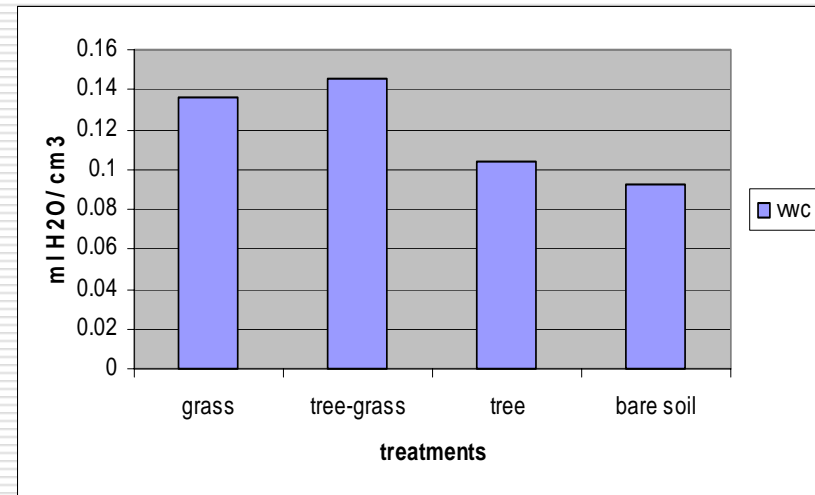
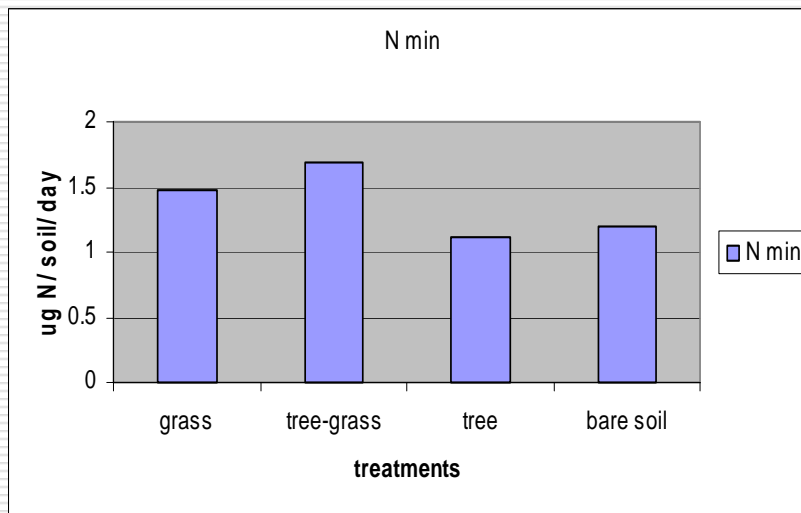
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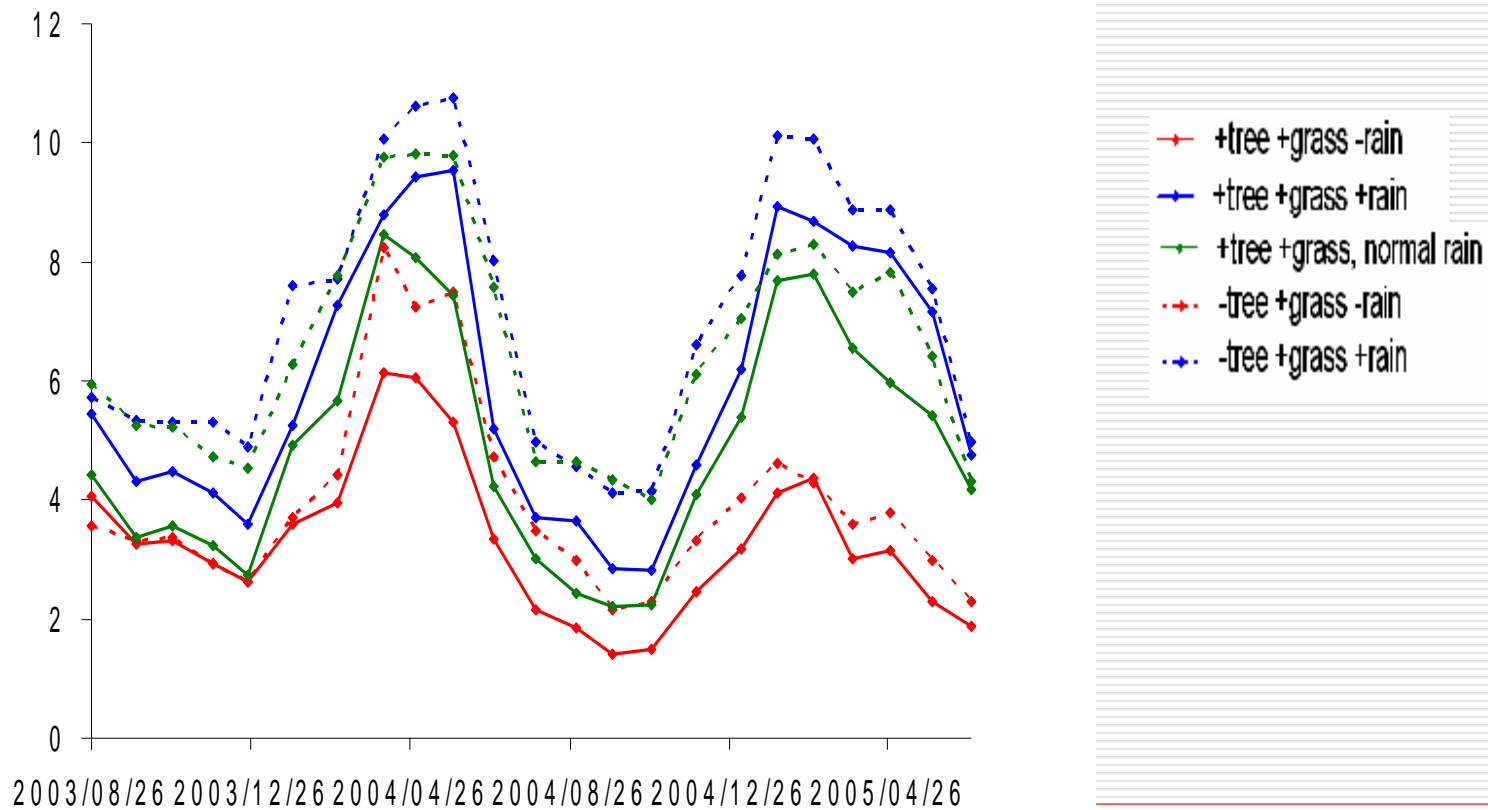
# Competition treatment

## *wet season*

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# Grass biomass over time



# Summary of results

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## Prevailing trends

### 1. Water treatments

- N min rate increases with increase in precipitation
- N min is the lowest in rainfall reduction treatments
- Treatments with a higher vwc has higher n min

### 2. Competition treatments

- N min is the lowest under tree treatments and bare soil, and highest in Grass and tree&grass treatments
  - Vwc is the lowest under tree treatments and bare soil, and highest in Grass and tree&grass treatments
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# Conclusion

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- Grass treatments have the highest vwc, highest N min. & highest grass biomass
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# Thank you

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Acknowledgements:

- Tree/Grass Programme
  - SANParks
  - Mellon Foundation
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