

# Soil fertility and forage quality dynamics in old lands of the Umzimvubu Catchment

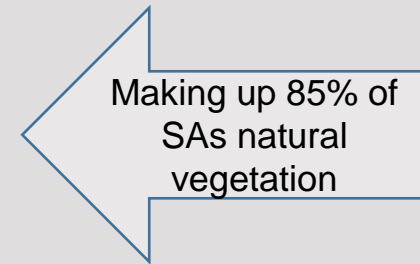
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# Introduction

- South African land
  - 15% cropping potential
  - 40% receives < 375mm MAP
  - 45% unsuitable for crop farming
- Abandonment in communal regions
  - Urbanisation
  - Climate change
  - Capital



Making up 85% of  
SAs natural  
vegetation

- Implications for Veld
  - Soil loss
  - Reduced basal cover
  - Alien species encroachment
  - Forage quality + quantity declines
- Role in livestock production
  - Improve veld management
  - Supplementary forage
  - Improve herd productivity



# Research objectives

- Effect of previous cultivation on:
  - Soil fertility
  - Forage quality
  - Cattle production



# Methodology

- Study site
  - Emzongwana, Matatiele
  - East Griqualand Grassland
  - *E. plana*, *H. hirta* and *S. africanus* dominant
  - Summer rest
  - Seasonal wetlands

# Matatiele in SA



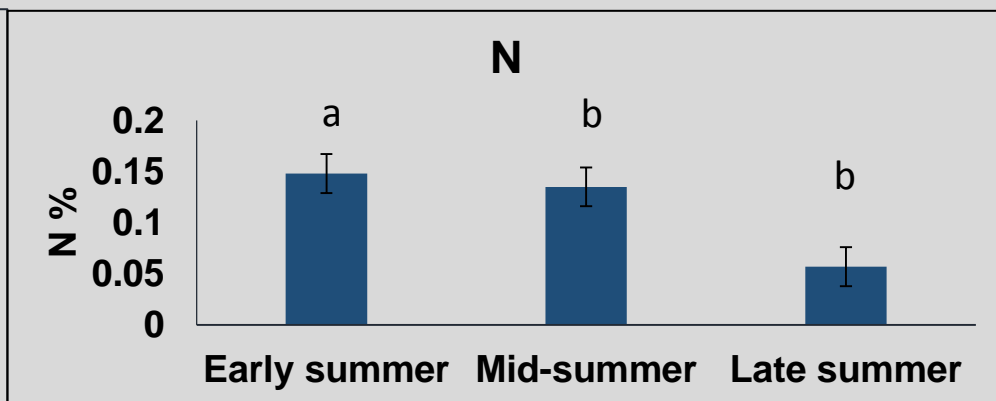
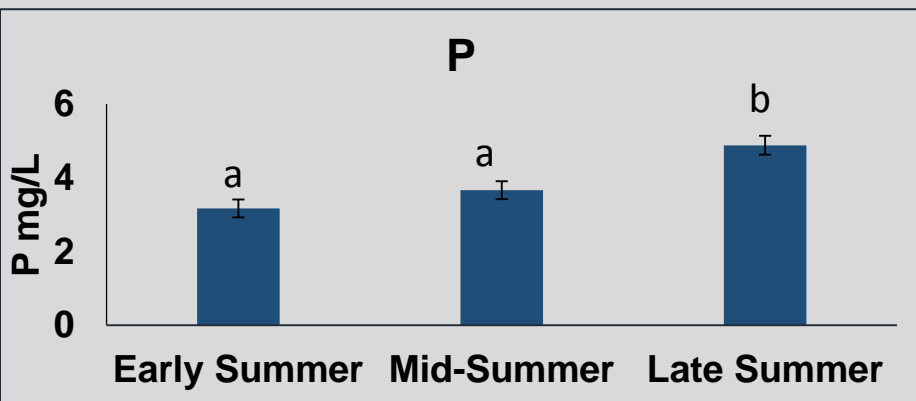
MATATIELE

- Data collection (6 x 100m line transects)
  - Soils
    - Collected (25m intervals)
    - Analyzed for fertility
      - P, K, N, Org. C, Ca, Mg, Acid Sat., pH
  - Grass
    - Clipped 10cm above ground (2m intervals)
    - Analyzed for Quality
      - Acid Detergent Fiber (ADF)
      - Neutral Detergent Fiber (NDF)
      - Crude Protein (CP)
      - Ca, Mg, K, Na, P

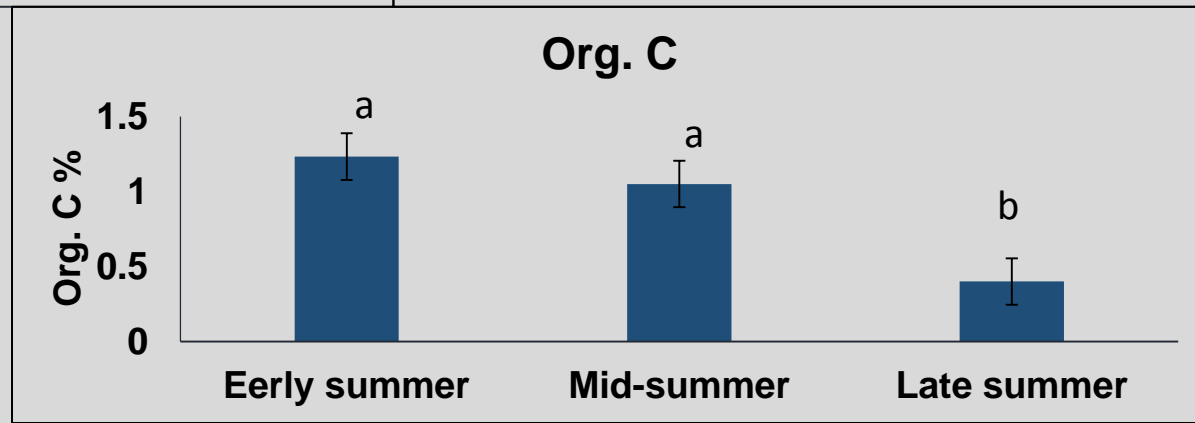
- Analysis
  - SPSS
    - MANOVA
    - Post Hoc test (Tukey) to separate means
- Quality in relation to nutrient requirements
  - Min. requirements were adapted from Tainton (1999) after Keal (1982)
  - Potential veld quality was derived from Tainton after Bredon *et al.* (1987)



# Results (Soil fertility)



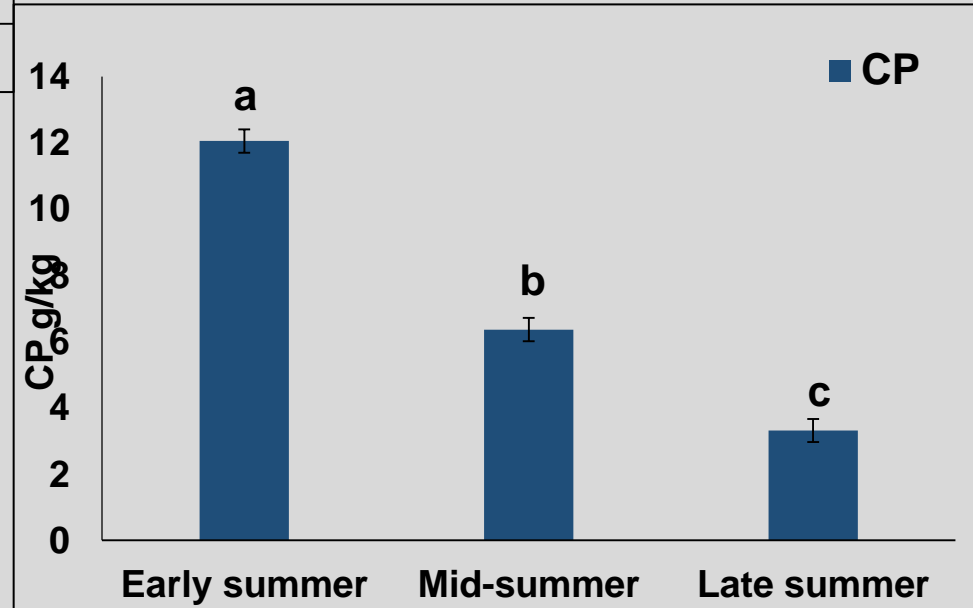
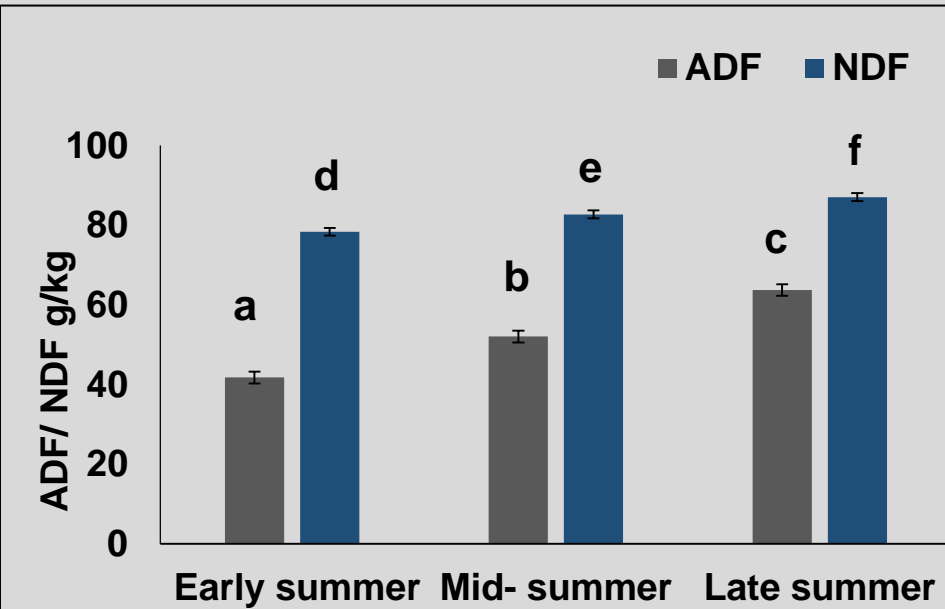
- K (high)  $P > 0.05$
- Mg (high)  $P > 0.05$
- Ca (high)  $P > 0.05$
- pH (acidic)  $P > 0.05$
- Acid Sat (low)  $P > 0.05$

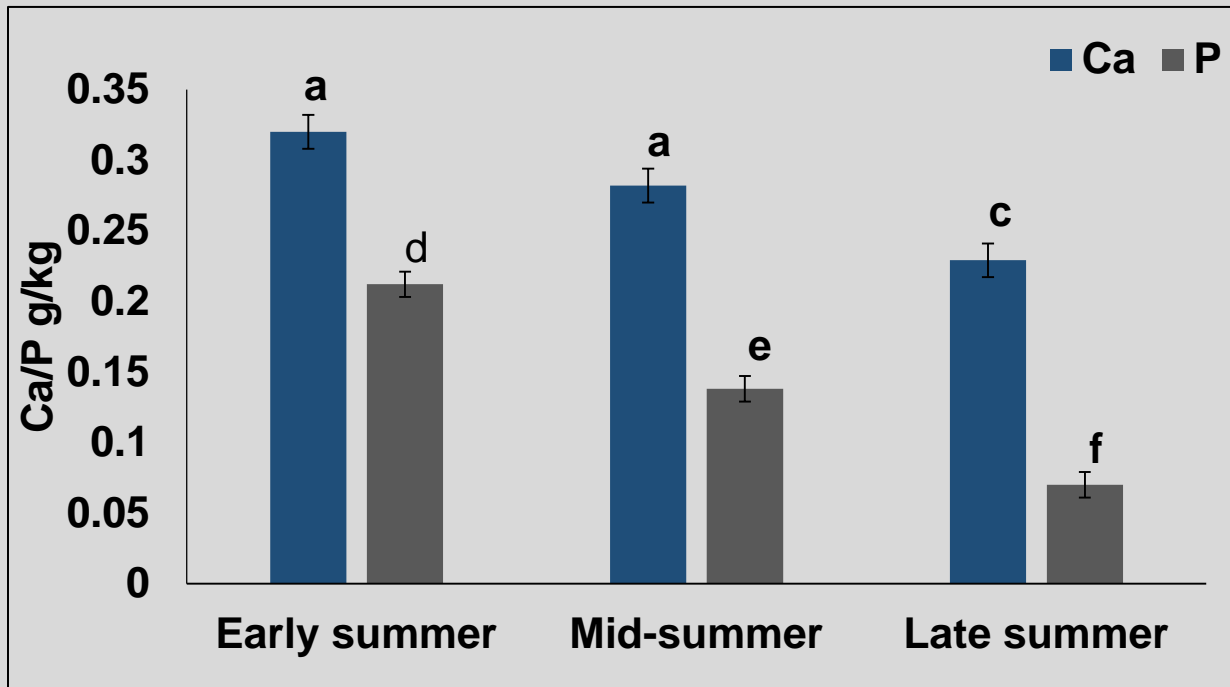


# Discussion

- Low soil N, P and Org.C
  - Top soil loss
  - High soil acidity
  - Insufficient fertilization (during cultivation)
  - Low vegetation cover
  - Low soil biology

# Results (Forage quality)





K, Mg, Na  
Followed Ca trend

# Discussion

- ADF and NDF
  - Dominant *spp.*
    - Hard leaves
    - Low leaf: stem ratio
    - Rapid maturing *spp.*
- CP, Ca and P
  - Low soil N and P
  - Low soil pH
  - Undesirable *spp.*

# Livestock perspective

Minimum nutrient requirements of beef cattle and potential quality for *Hyparrhenia/Themeda* Mixed Veld (derived from Tainton, 1999)

	Intake (kg/day)	CP (g)	Ca (g)	P (g)
Growth (250)	5.6	546	16.7	13.3
Veld quality	5.6	434	10.6	8.96
Old lands	5.6	121.7	4.6	2.4
Pregnant (525)	9.95	562.5	16.5	15.5
Veld quality	9.95	771.13	18.9	15.9
Old lands	9.95	216.2	8.26	4.2
Lactating (525)	10.9	839	28.5	27.5
Veld quality	10.9	844.8	20.7	17.4
Old lands	10.9	236.9	9.05	4.6

# Conclusions

- Soil fertility
  - N, P and Org.C low
  - N and Org. C declines as season progresses
  - P increases
- Forage quality
  - ADF and NDF increase
  - CP, Ca and P decrease
- Recommended use
  - Grazed early to mid summer
  - Rested late summer

# Acknowledgements



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  - Colleagues