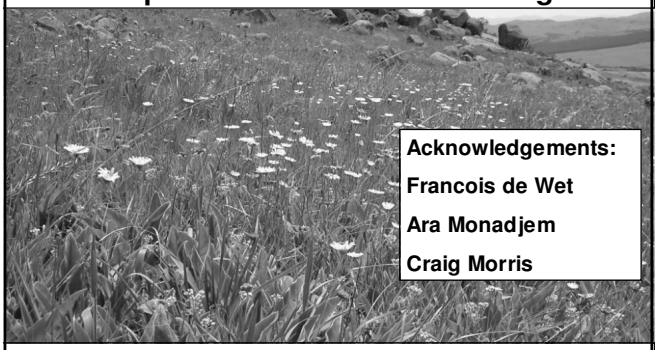
Herbs, Grasses and diversity within grassland areas in plantations in the Eastern Highveld



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Peta Hardy – Sappi Forests
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Two data -sets

Sappi-Usutu

Swaziland

Mid 1990s

Herb species data

- Geology
- Altitude

Sappi Forests

Mpumalanga

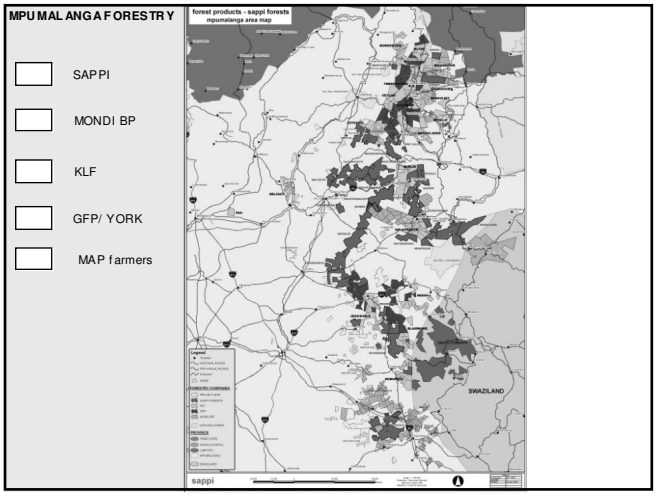
2003-2008

Herb species data

Grass species data

Linked to a degradation gradient

- Geology
- Altitude



Why look at grasslands?

- Grassland areas on forestry estates have traditionally been managed for fire protection – little known about their diversity
- All grassland areas on forestry estates are planted up?
- Not true..

Sappi Landholdings							
Mpumalanga Region	Total Area (ha)	Planted (ha)	Other (ha)	% of Total	Example: Mpumalanga Region (ha)		
	215 010	126 000	80 446	37	Grassland	28 081	
					Shrubland	3 477	
					Total	31 558	39.2%

Forest Certification Requirements – Ten Principles

- **Principle 6 : Environmental Impact**
- **Principle 8 : Monitoring and Assessment**
- **Principle 9: High conservation value Forests**

⇩

In Sappi – not limited to forests but important *conservation areas,* including grasslands

What makes one grassland area more important than another?

- Size – bigger, more likely to be managed
- Lack of disturbance
- Lack of weeds
- Presence of Red Data species

Important Grasslands in Mpumalanga sappi

• Rooihoogte	3	403 ha
• Lothair	5	1673 ha
• Hlelo	2	154 ha
• Ndubazi	5	1300 ha
• Twello	5	1621 ha
• Sudwala	2	952 ha
• Camelot	6	1442 ha
• Inkwazi	1	69 ha
• Venus	1	102 ha

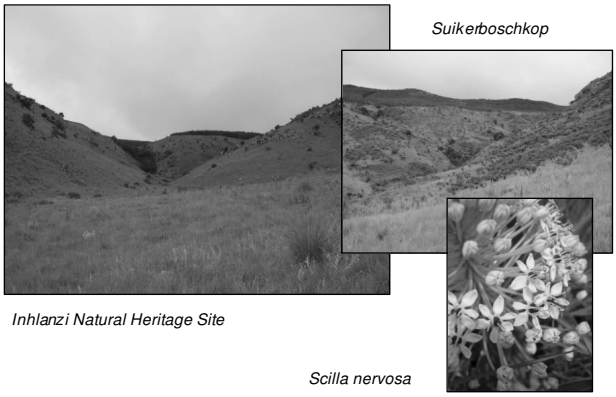
30 sites for Veld Condition Assessment

Lothair
Highveld

Avoca

Loch Leven

Badplaas Highveld

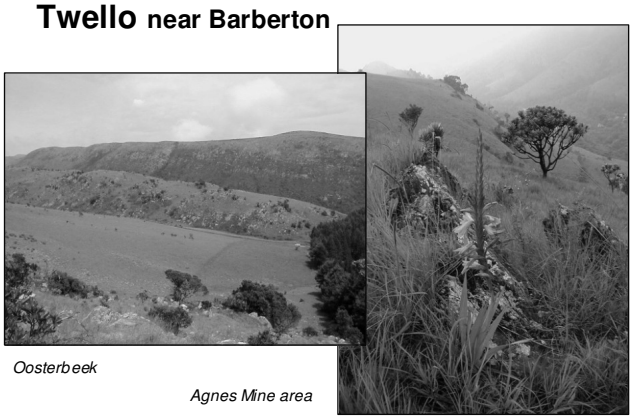


Suikerboschkop

Inhlanzi Natural Heritage Site

Scilla nervosa

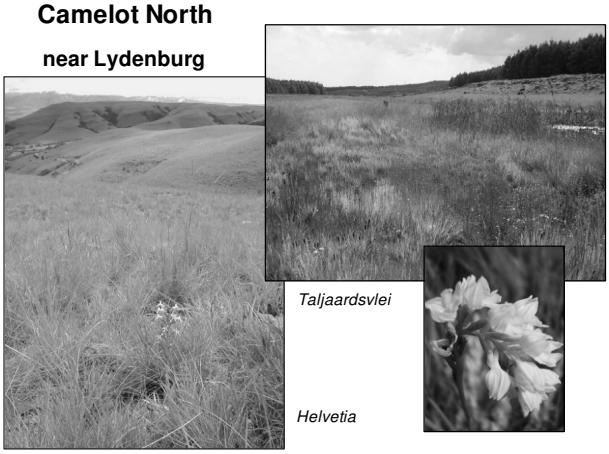
Twello near Barberton



Oosterbeek

Agnes Mine area

Camelot North
near Lydenburg



Taljaardsvlei

Helvetia

Camelot South
near Waterval Boven

Sappi Usutu - important grasslands

16 firebreaks totalling 850 ha

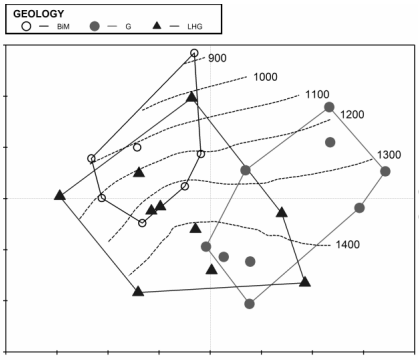
Methodology:

Herb data collection	Grass data collection
•Species lists p/a •One hour data collection •Approx 100m x 100 m area •Plot-less sampling	• 100 point line transect method • Nearest grass species to rod • Quantitative data at species level • Fuel load assessment

Data analysis:

- Non-metric Multidimensional Scaling (NMS)
- Analysis of Similarity
- Regression Analysis

Usutu – Herb species composition



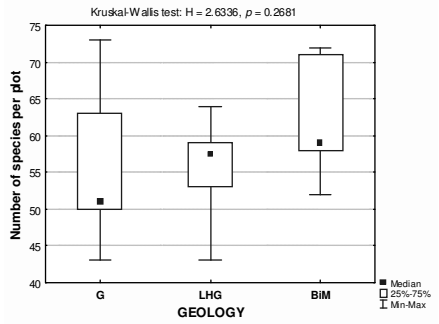
Geology (ANOSIM)
r = 0.189
p =0.003
Altitude (Axis 2)
r = -0.769
p <0.0001

G vs LHG: r=0.195 p= 0.008
G vs BiM: r= 0.404 p = 0.001
LHG vs BiM: r = -0.004 p = 0.484

Gabbros at high altitudes; Gneisses at lower altitudes

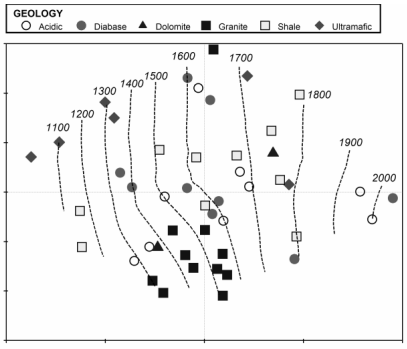
Significant differences between sites on Gabbros and Granites and Gabbros and Gneisses (BiM) BUT no significant differences between Granites and Gneisses.

However…. Considering Usutu Species Richness



Variability *within* sites on the same geology is great so cannot say with confidence that there are differences between geologies.

Mpumalanga – Herb species composition

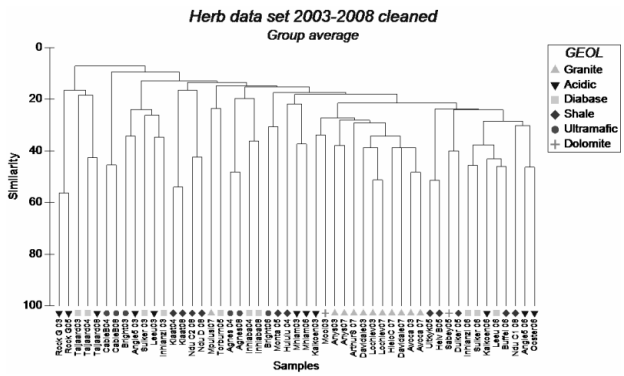


Geology (ANOSIM)
p =0.001
Altitude (Axis 1)
r = 0.894
p <0.0001

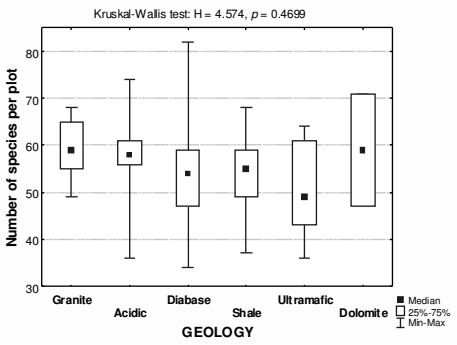
Granites differed from:
diabases,
dolomites,
acidic substrates (quartzites, sandstones),
ultramafics (serpentines, schists, pyroxenes)

Herb species composition on different geological substrates were significantly different from each other

Mpumalanga Herb Species composition

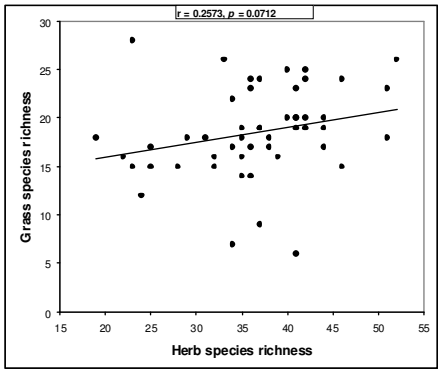


Mpumalanga – Total species richness



Similar trend to Usutu data set ie Variability *within* sites on the same geology is great so cannot say with confidence that there are differences between geologies.

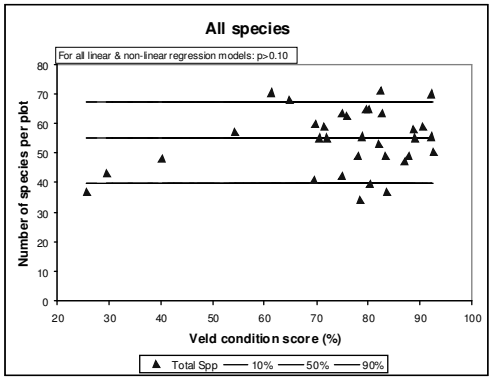
Mpumalanga Grass vs Herb species richness



R = 0.2573
P = 0.0712

No significant relationship between herb species richness and grass species richness at the same site

Mpumalanga total species vs Veld condition score

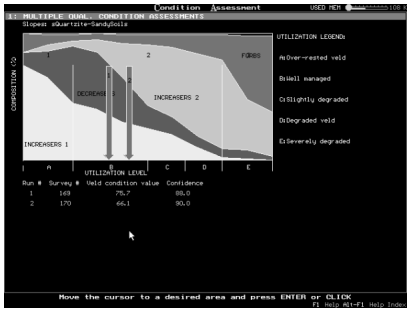


P > 0.10

No significant relationship between number of species and veld condition score

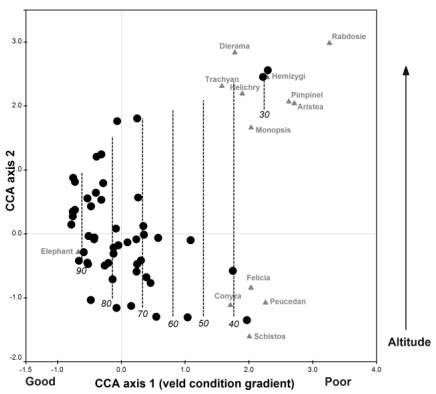
Determining the Veld Condition Score

- Score obtained from ISPD* analysis
- VC Score relates to a successional gradient along the X axis



* Integrated System for Plant Dynamics

Mpumalanga - Changes in herb species composition along a veld condition gradient



r = -0.8606
p = 0.001

There was a significant change in *herb composition* along a veld condition gradient and a strong correlation between herb composition and veld condition scores

Mpumalanga - Changes in herb species composition along a veld condition gradient

Herb composition was similar on most good sites but appeared to diverge as veld condition degraded. The divergence could also be related to altitude; herbs present in degraded sites differ between high and low altitudes.

To conclude:

- Both studies showed a clear relationship between underlying *geology*, *altitude* and *herb species composition*.
- There was no significant relationship between grass species richness and herb species richness at the same site
- There was no significant relationship between total species richness and Veld Condition scores
- Poor condition veld has a different suite of herb species than good condition veld and those that are present differ between high and low altitudes.

Thank you