



# Effects of experimental climate manipulations on soil and vegetation dynamics in the South African succulent karoo biome

**Musil C.F.**

**(Project leader)**



**Matimati I.**

**(MSc student – Vegetation)**



**Nyaga J.**

**(MSc student – Soils)**



**Climate Change & Bio-Adaptation Division  
South African National Biodiversity Institute**

**Co-supervisors: Lincoln Raitt, UWC  
Edward February, UCT**



**BIOLOG**

"Biodiversity of Africa - Observation and Sustainable Management for our Future!"  
International Congress, 29 September – 3 October 2008, at Spier, RSA

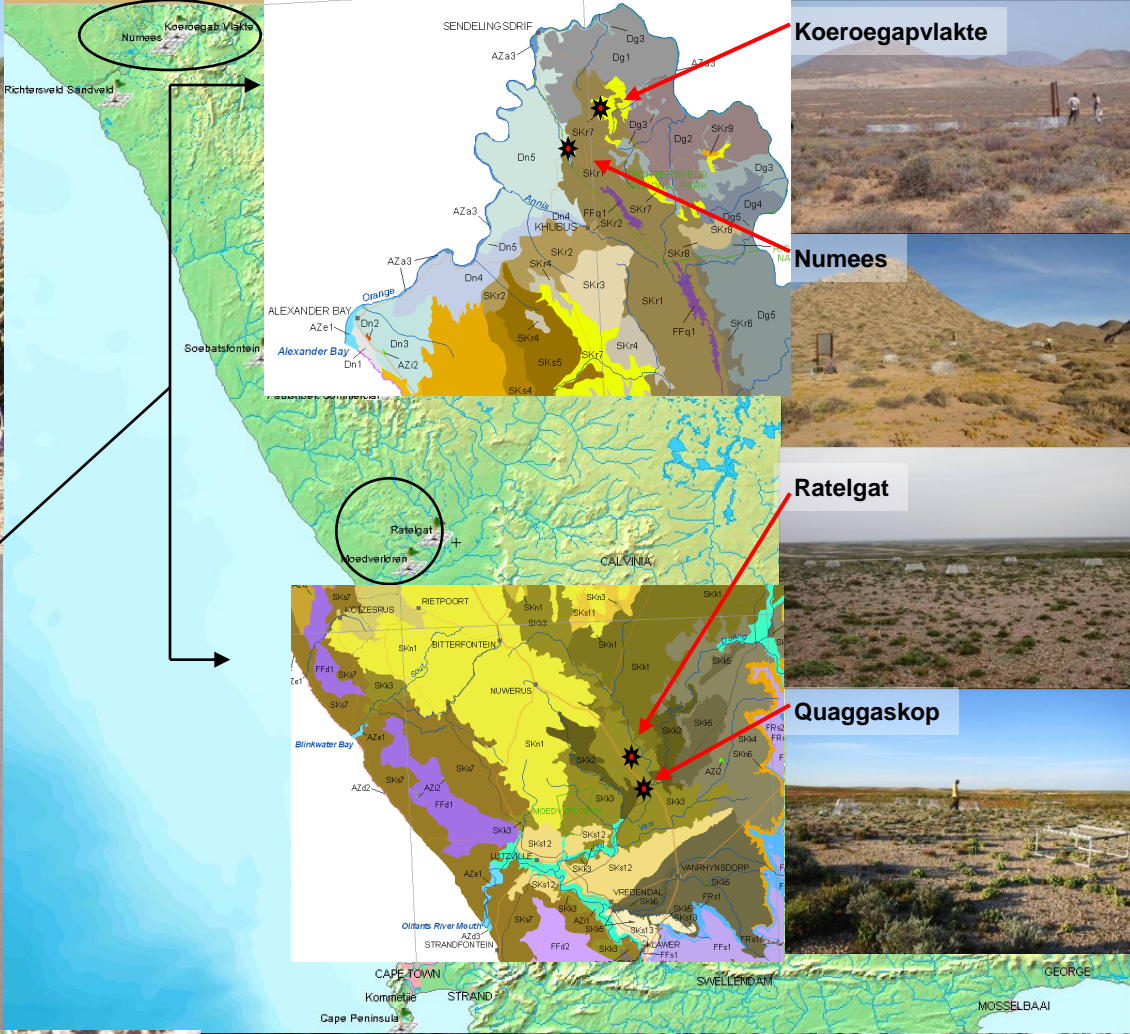
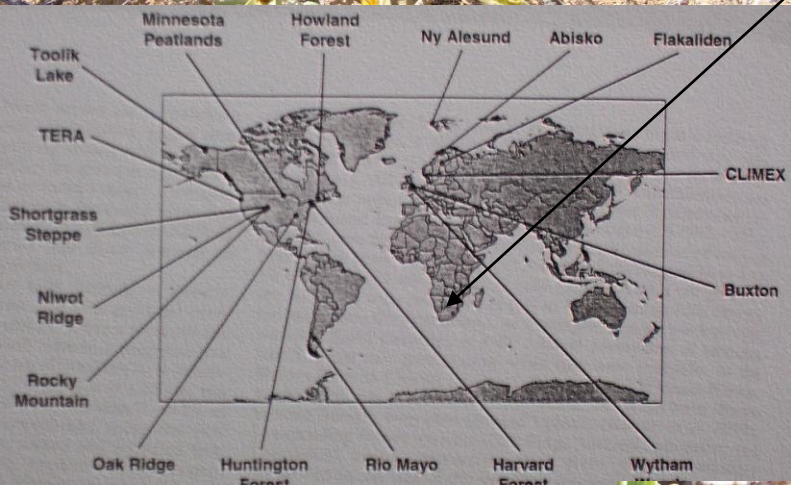


Federal Ministry  
of Education  
and Research

**Brownanthus**



11.11.2016



**Koeroegapvlakte**



**Numees**



**Ratelgat**



**Quaggaskop**



**Ruschia**



**Oophytum**



**Monilaria**



**Conophytum**



**Agryoderma**



**Dactylopsis**



**Fog Harvester Type 1**



**Fog Harvester Type 2**



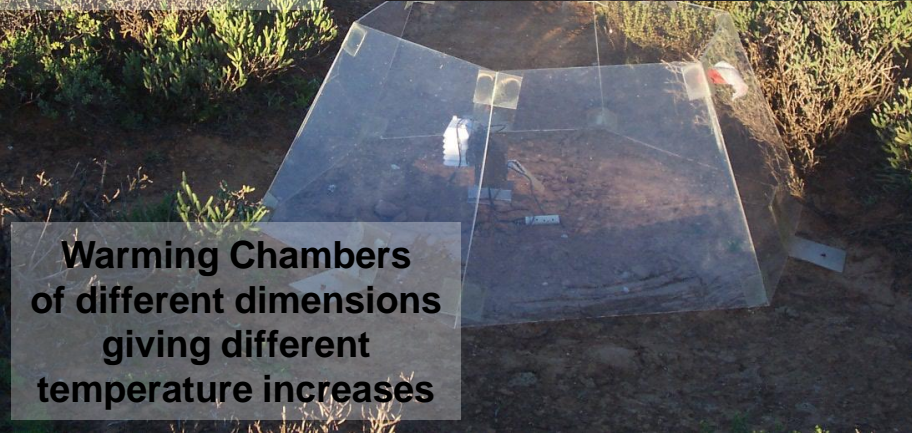
**Micro-lysimeter**



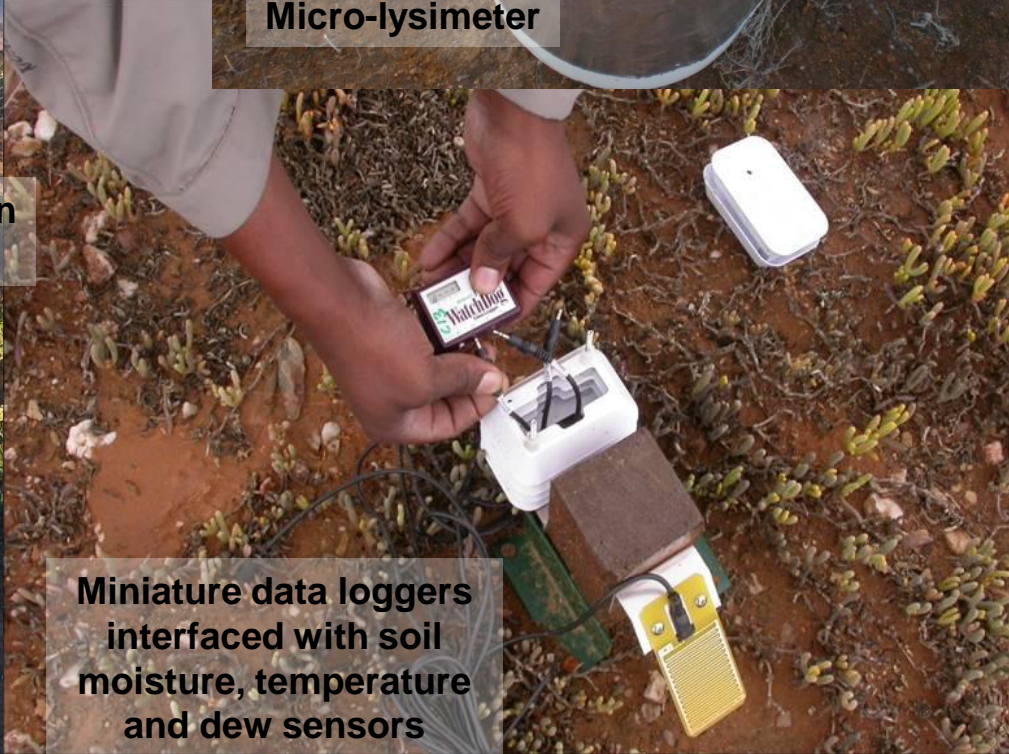
**Ambient Control**



**Fog/Dew Exclusion Chamber**



**Warming Chambers of different dimensions giving different temperature increases**



**Miniature data loggers interfaced with soil moisture, temperature and dew sensors**



High resolution digital images



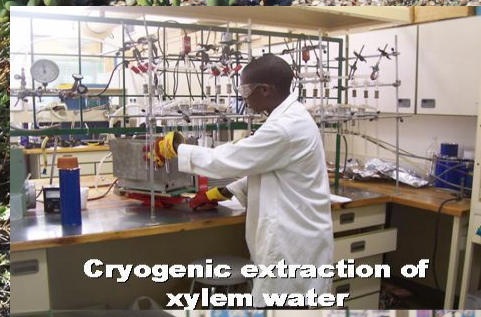
Soil respiration measurement with Infrared gas analyser



Plant photochemical efficiency measurement



Stem microvariation sensors interfaced with logging unit



Cryogenic extraction of xylem water



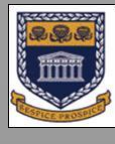
Preparation of samples for  $\delta^{18}\text{O}$  &  $\delta^2\text{H}$  mass spectrometry

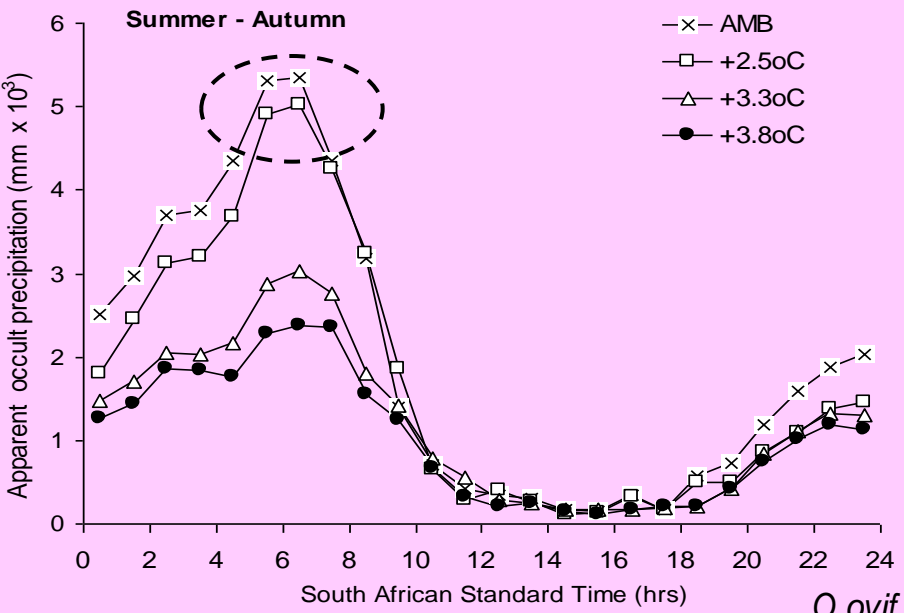


Preparation of samples for  $\delta^2\text{H}$  mass spectrometry

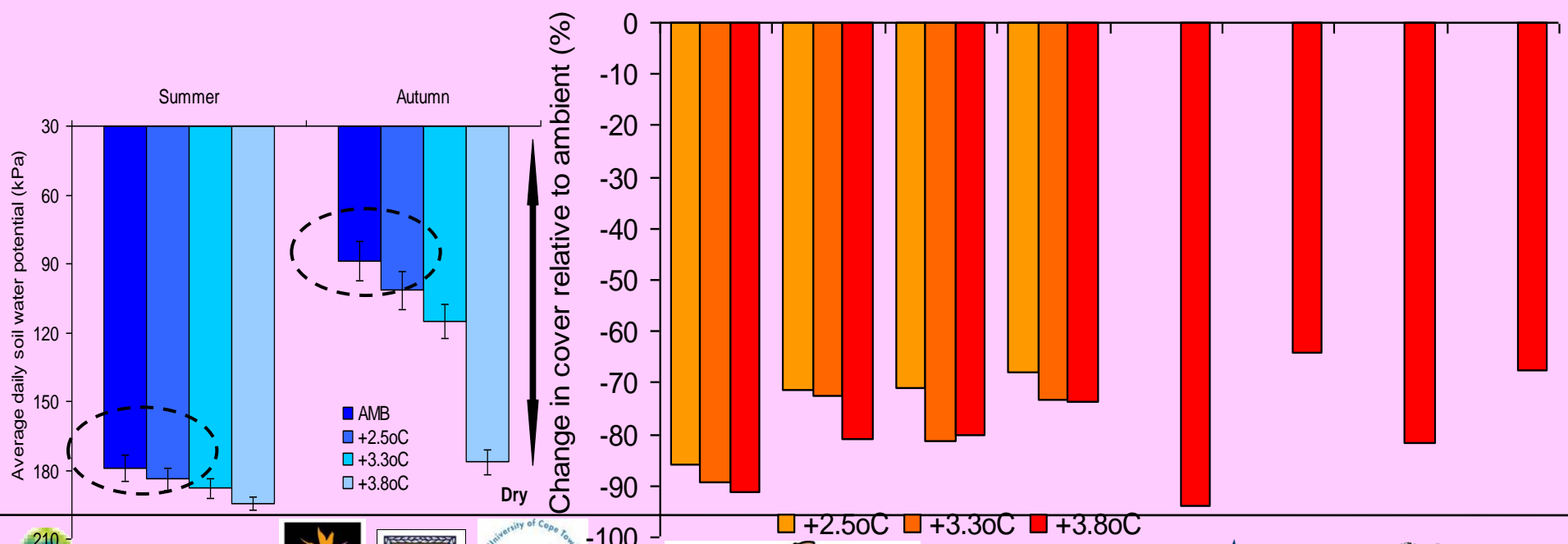


Mass Spectrometer for  $\delta^2\text{H}$  and  $\delta^{18}\text{O}$





*O.ovif*   *A. pear*   *C. spiss*   *D. digit*   *C. minu*   *C. fram*   *D. dive*   *R. burm*





*Aggyroderma pearsonii*

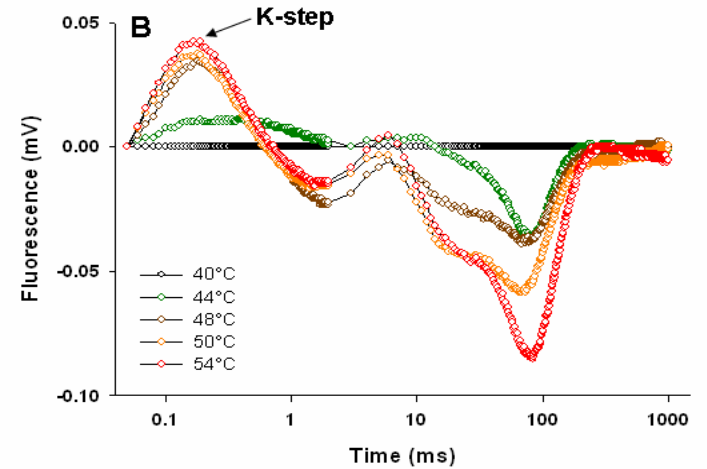
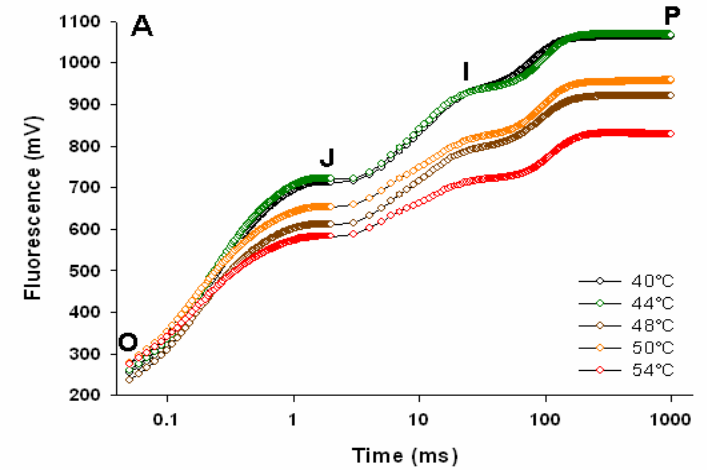
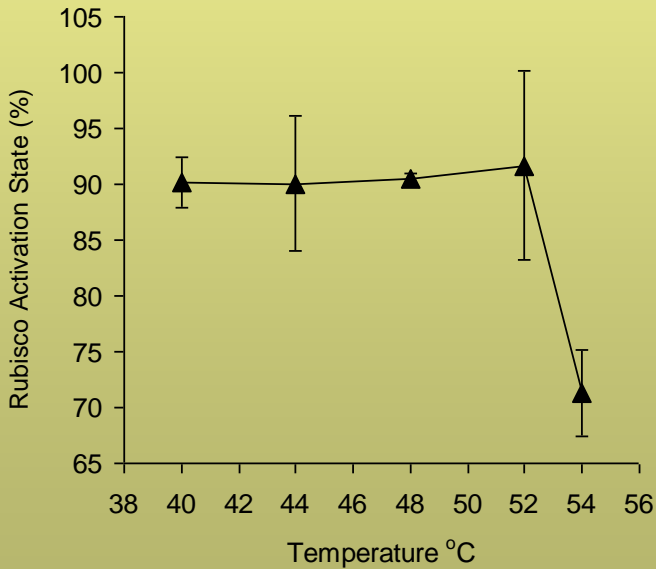
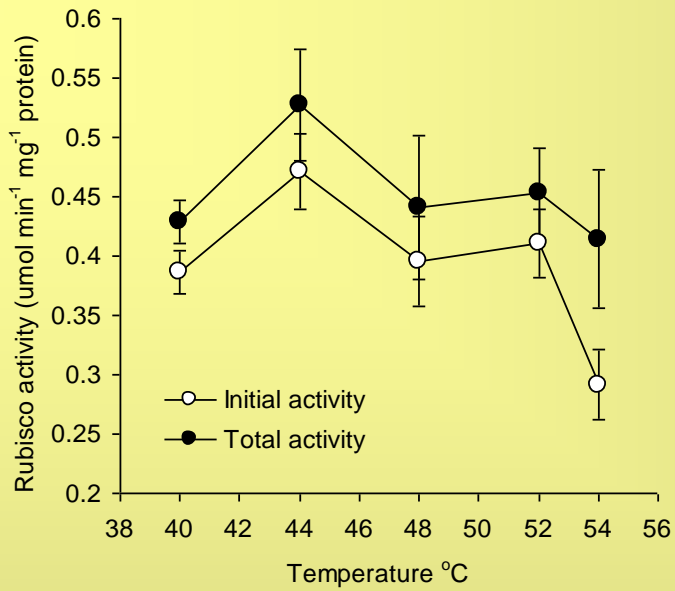
*Dactyloopsis digitata*

Initial State

After 12-months at +3.8°C



*Cephalophyllum spissum*



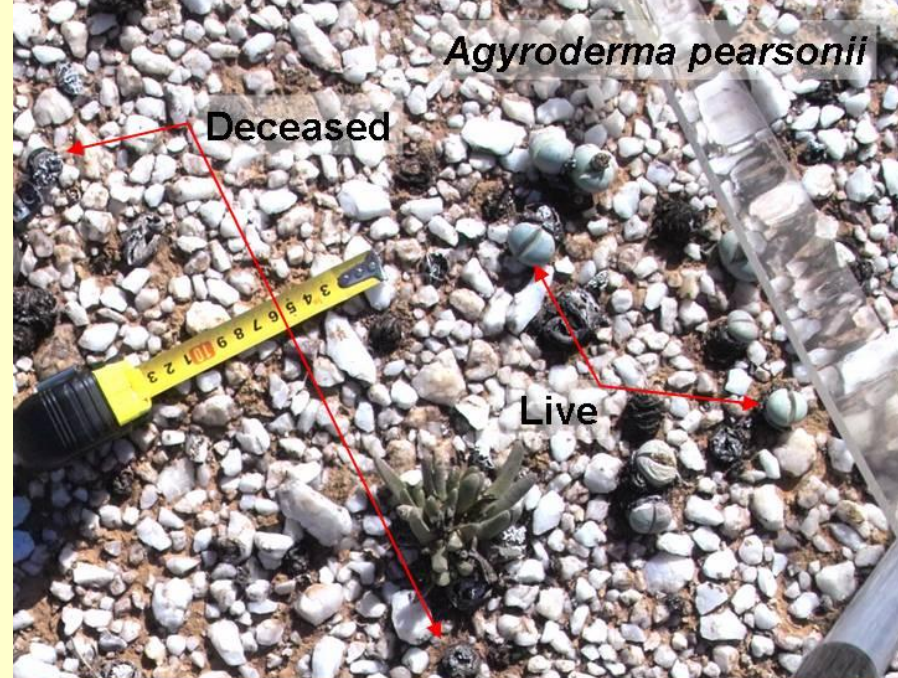
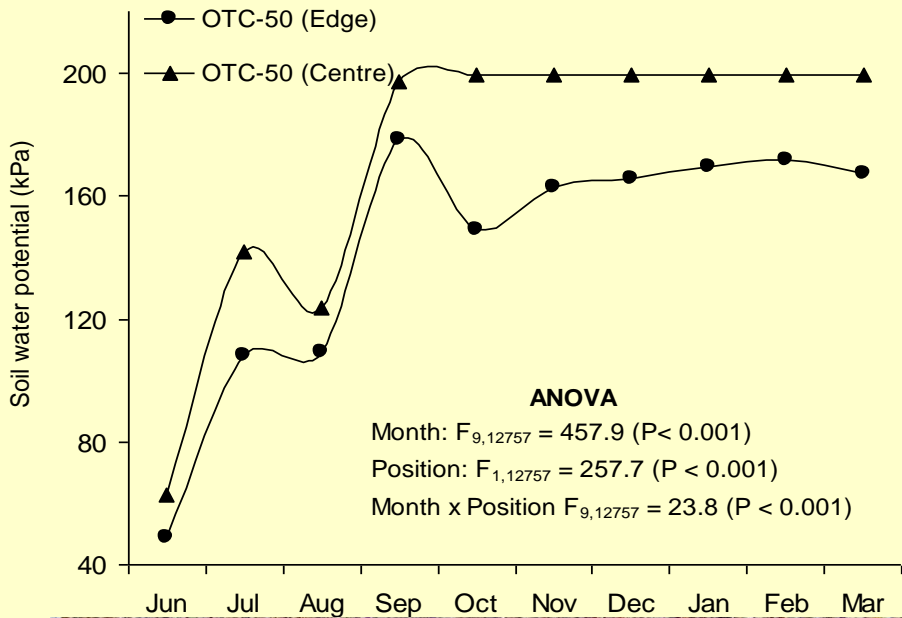
Decrease in catalytic efficiency of Rubisco at 54°C preceded by decline in PSII efficiency. Appearance of K-step indicative of uncoupling of oxygen evolving complex and electron transport reactions between pheophytin and primary electron acceptor Q<sub>A</sub>



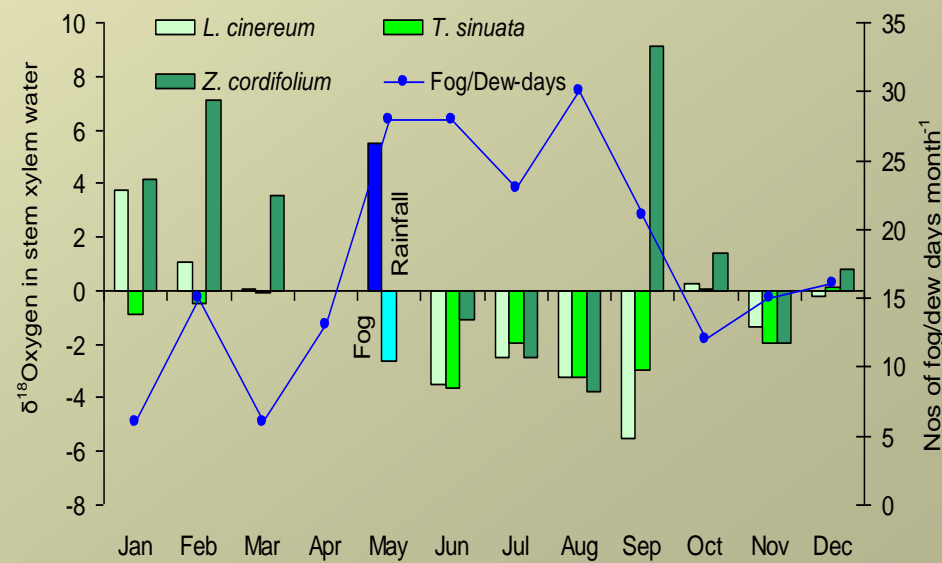
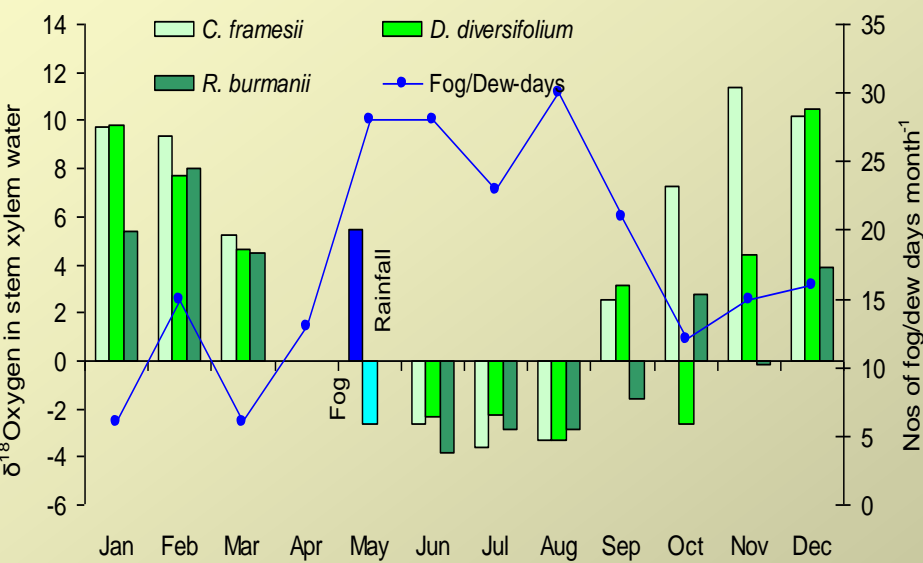
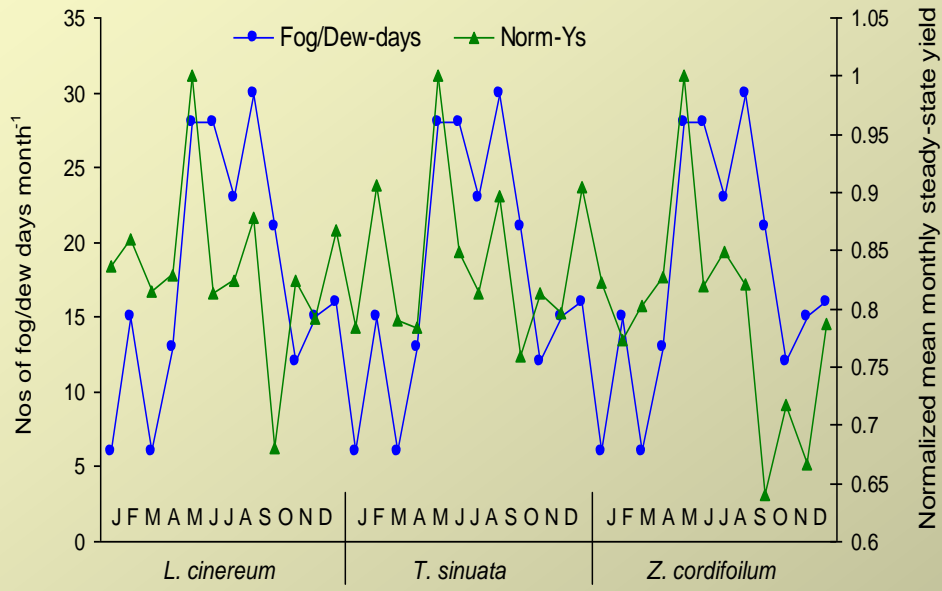
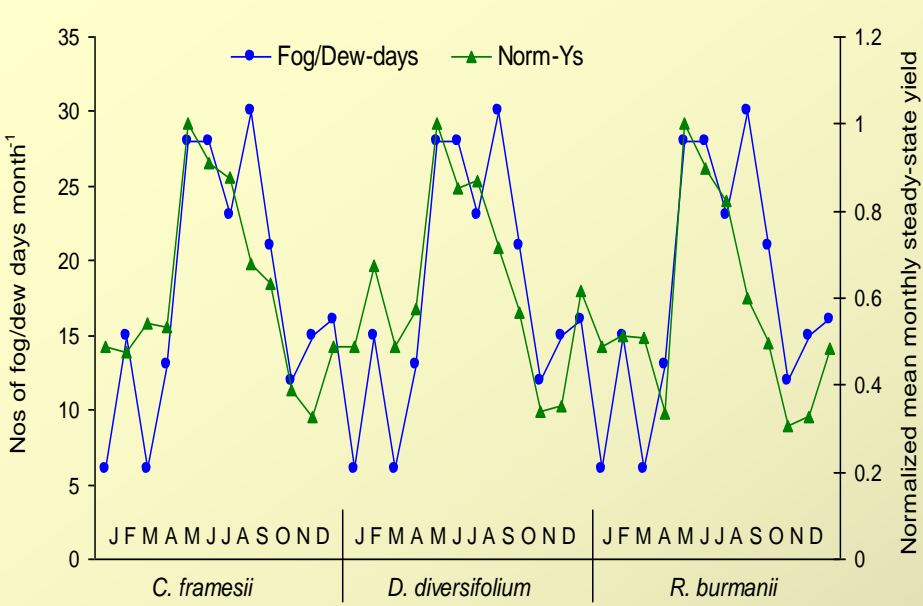
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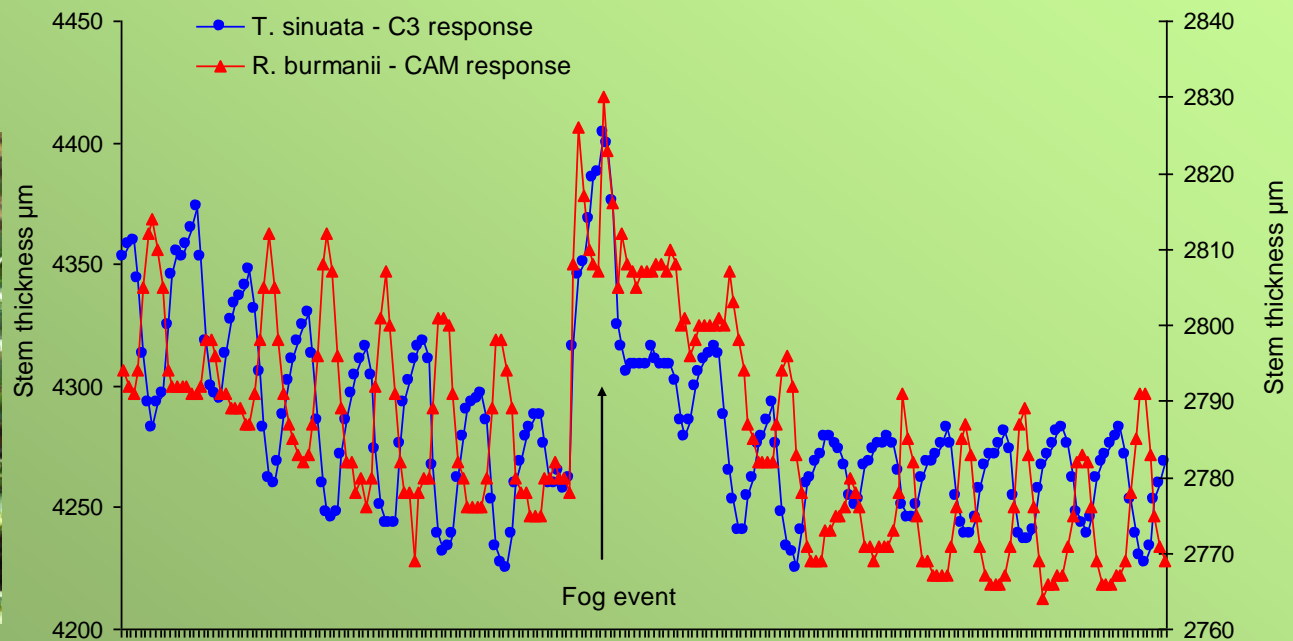


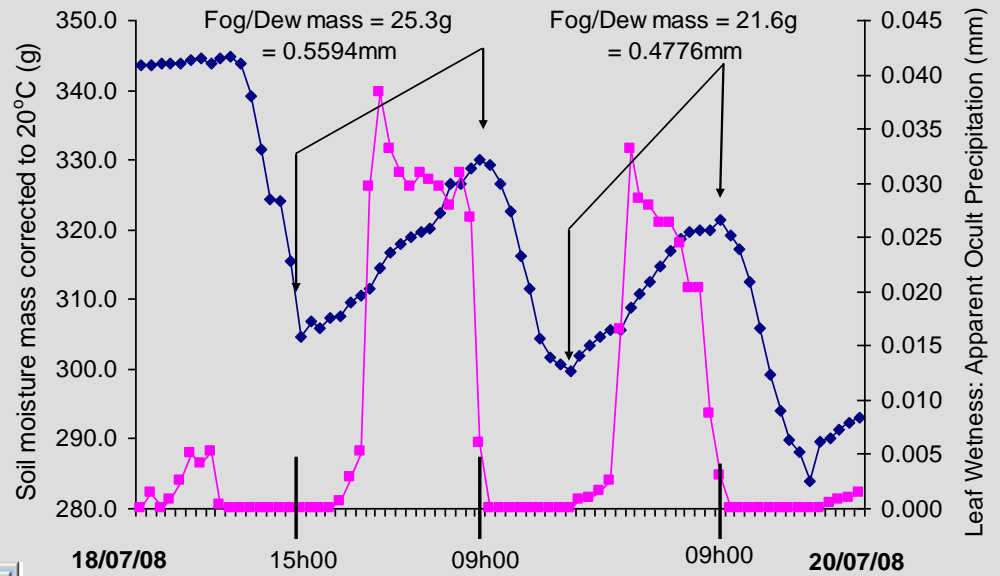
Federal Ministry of Education and Research











**Logger Setup**

Settings Connect Download Erase Sensor\_setup

**Current Date and Time Settings**

Year: [ ] Month: [ ] Day: [ ] Hour: [ ] Minutes: [ ] Seconds: [ ]

Refresh Set Time

LoadCell 1 [ ]  
 Temperature [ ]  
 Battery Voltage [ ]

**Logging Period**

Hours: [ ] Minutes: [ ] Seconds: [ ] Set Period

Day: [ ] Hours: [ ] Minutes: [ ] Set Trigger

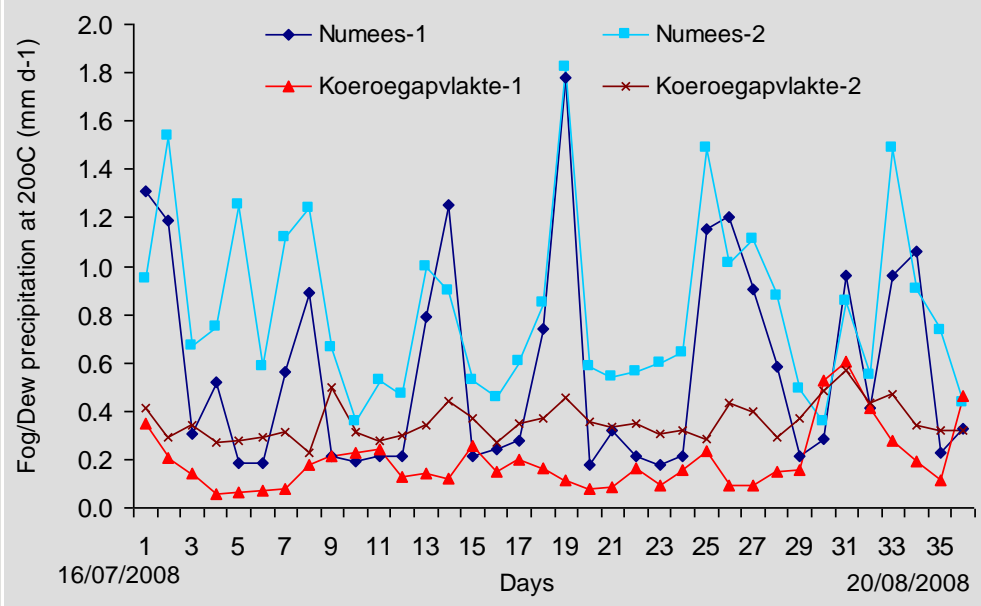
Start Time Enable

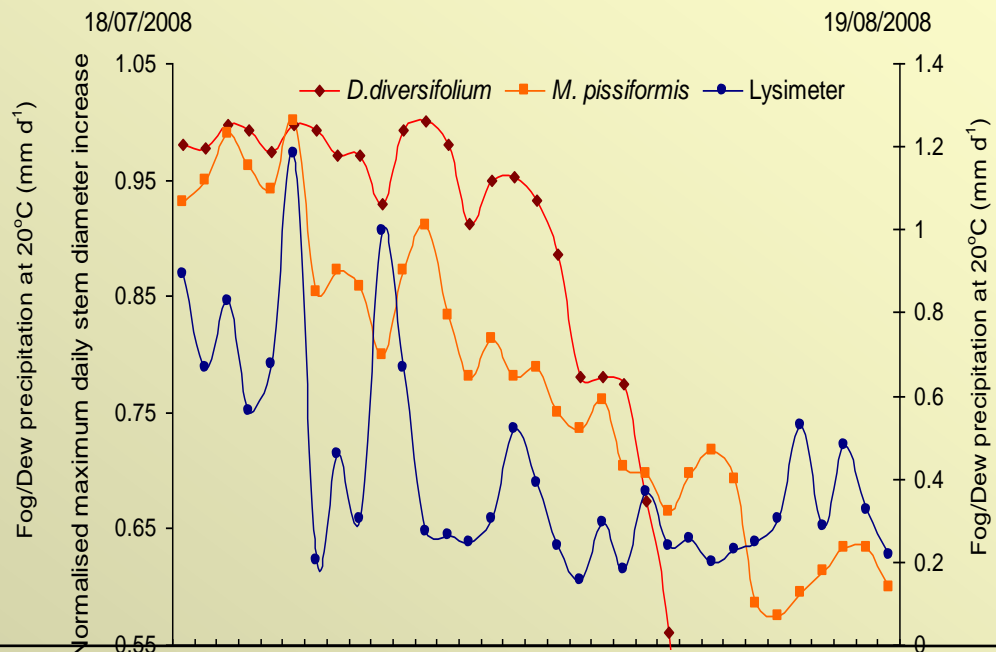
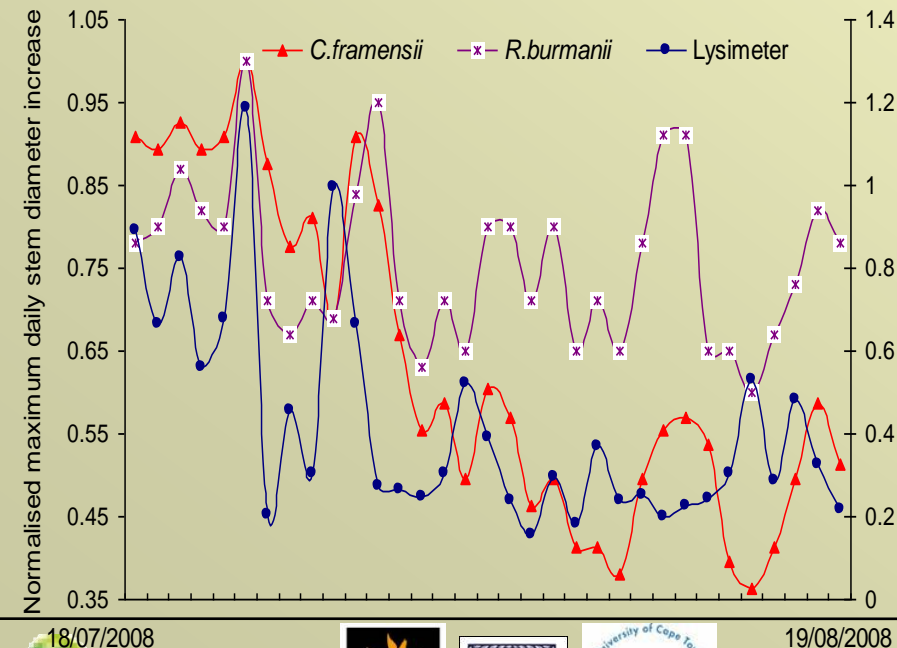
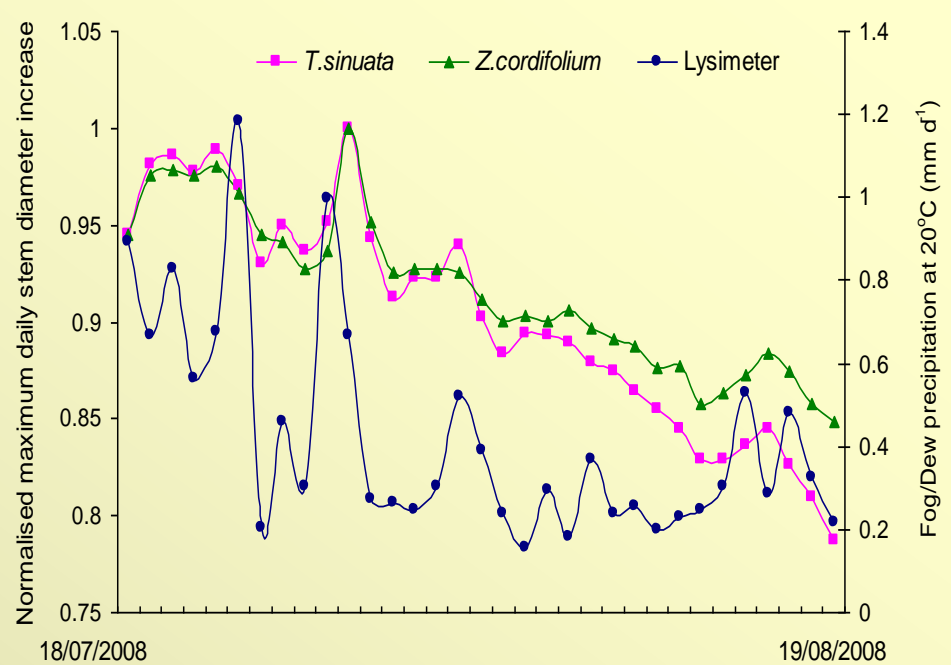
**Memory Usage**

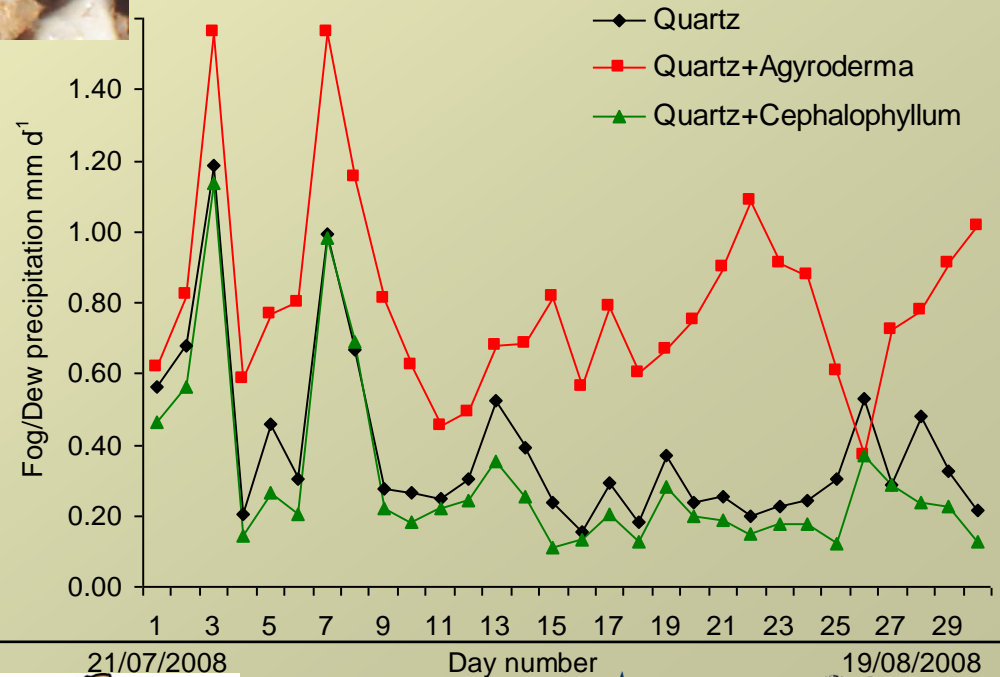
Flash Memory Address [ ]  
 Number Samples Recorded [ ]

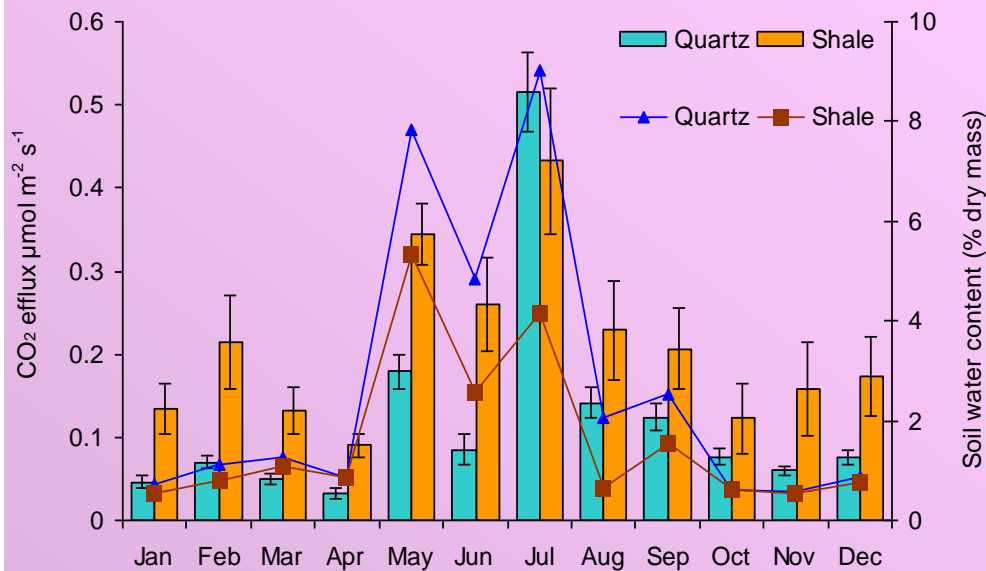
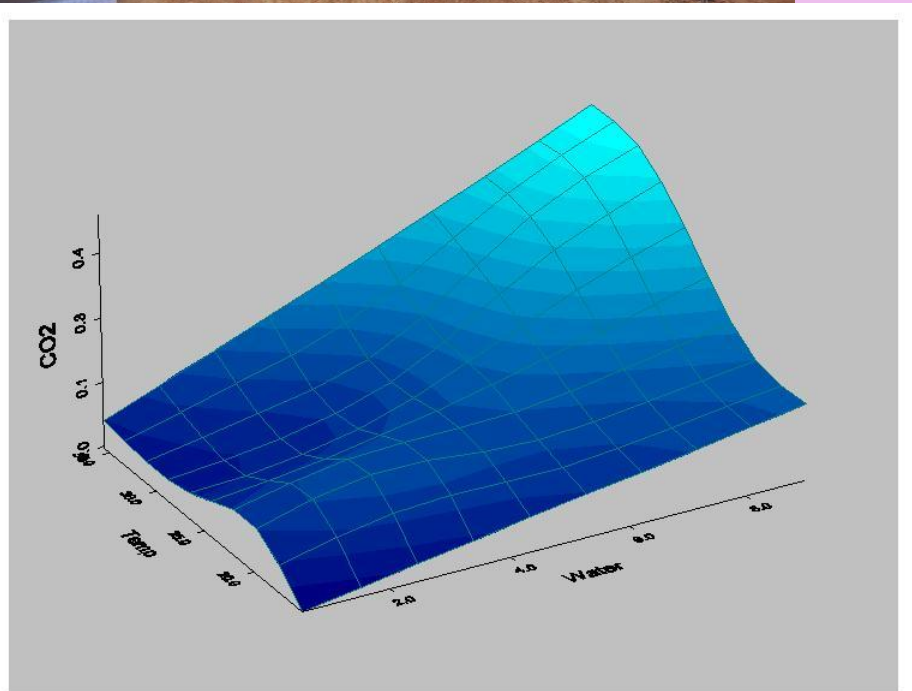
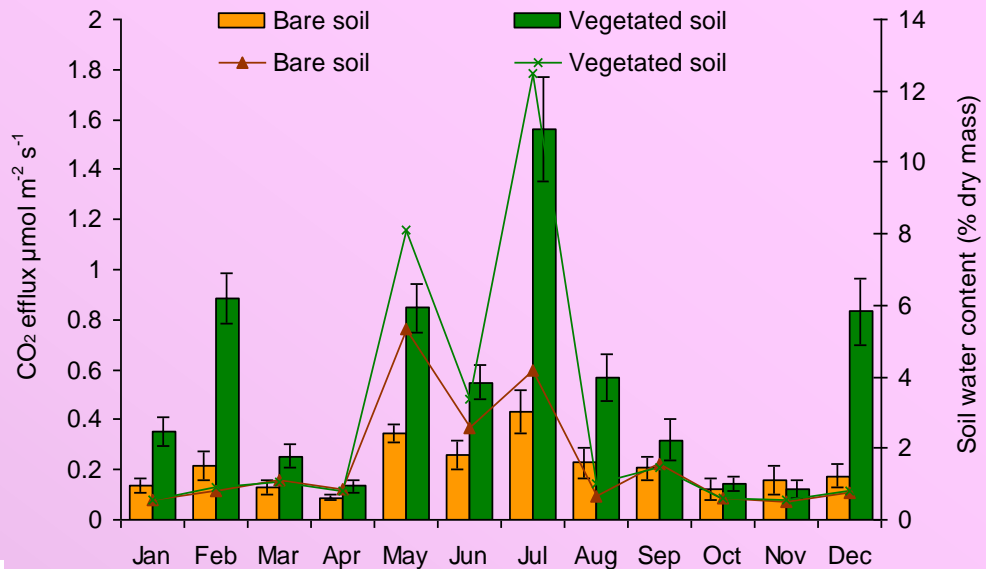
GET SAMPLE

Software Developed by Brian Mulder  
 For RESEARCH AND DEVELOPMENT contract between  
**SANBI and UNIVERSITY OF HAMBURG (BIOTA SOUTHERN AFRICA)**





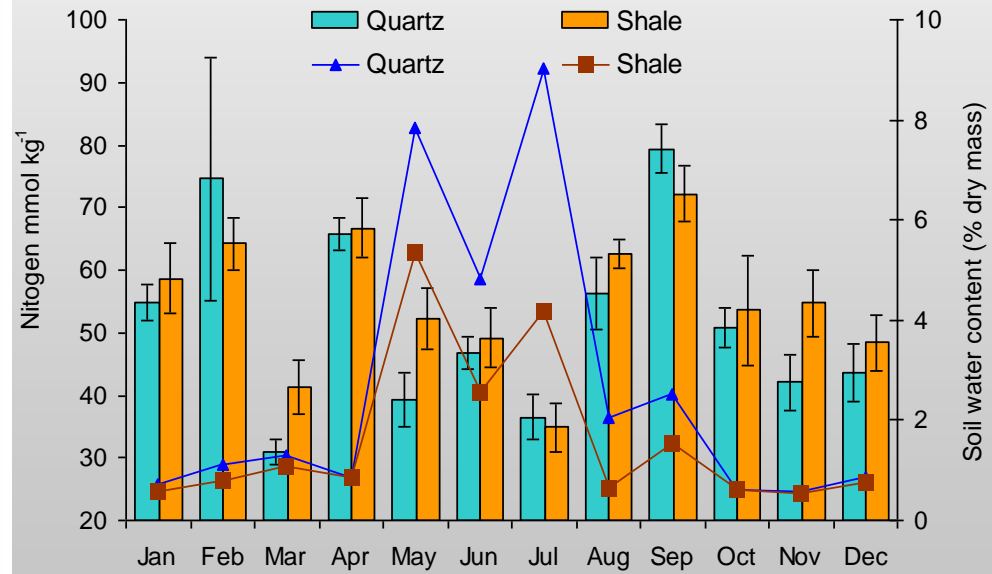
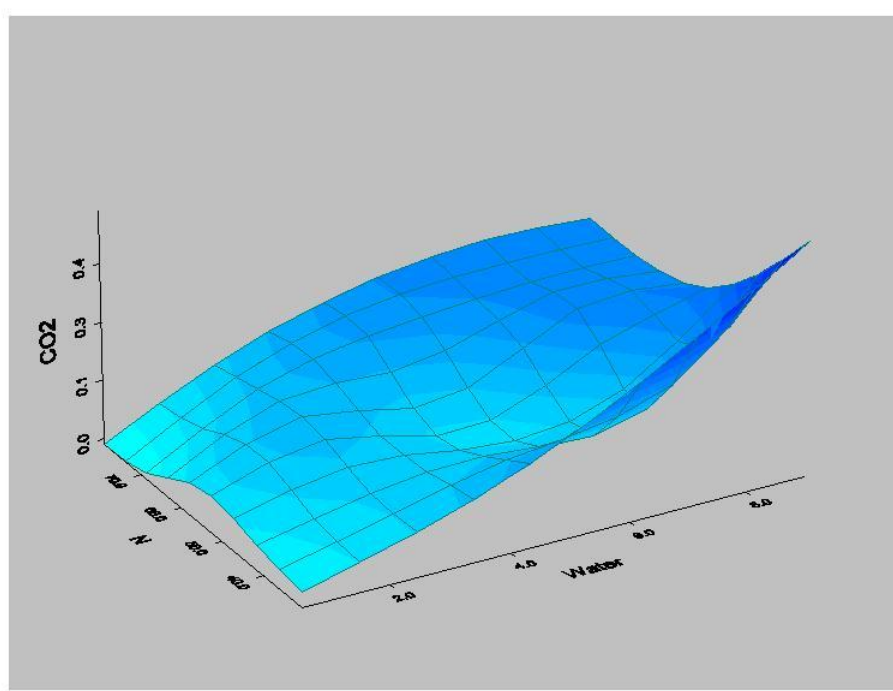
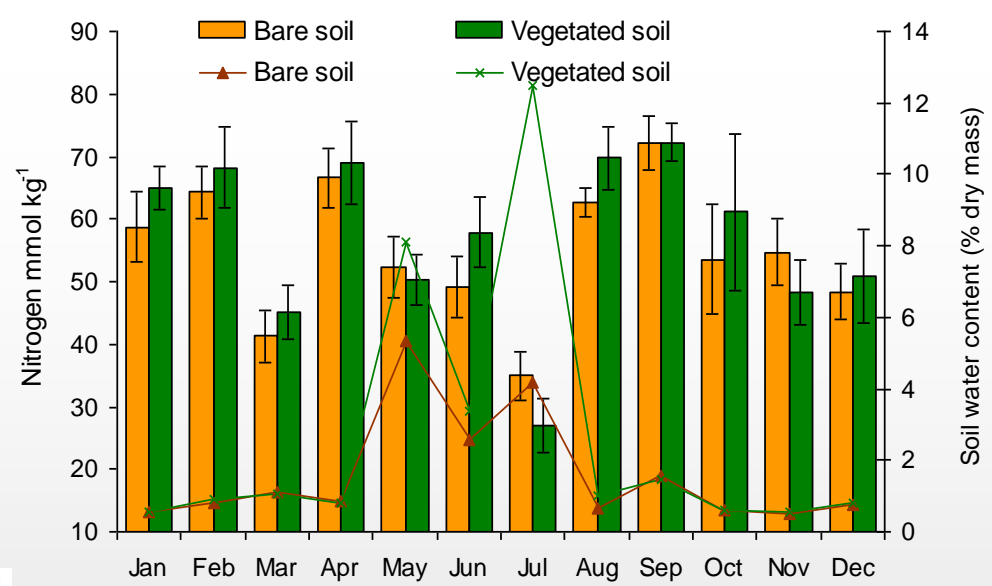




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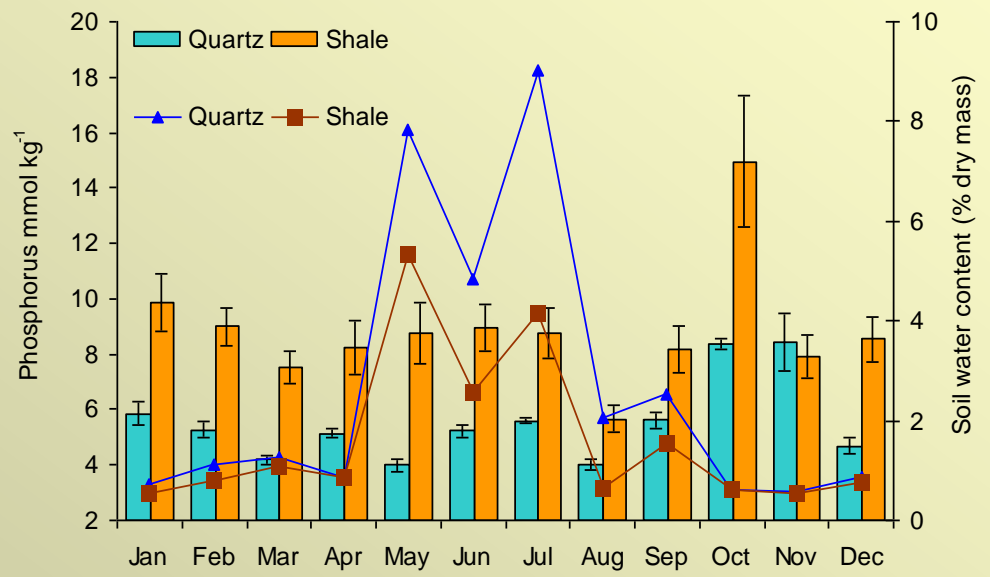
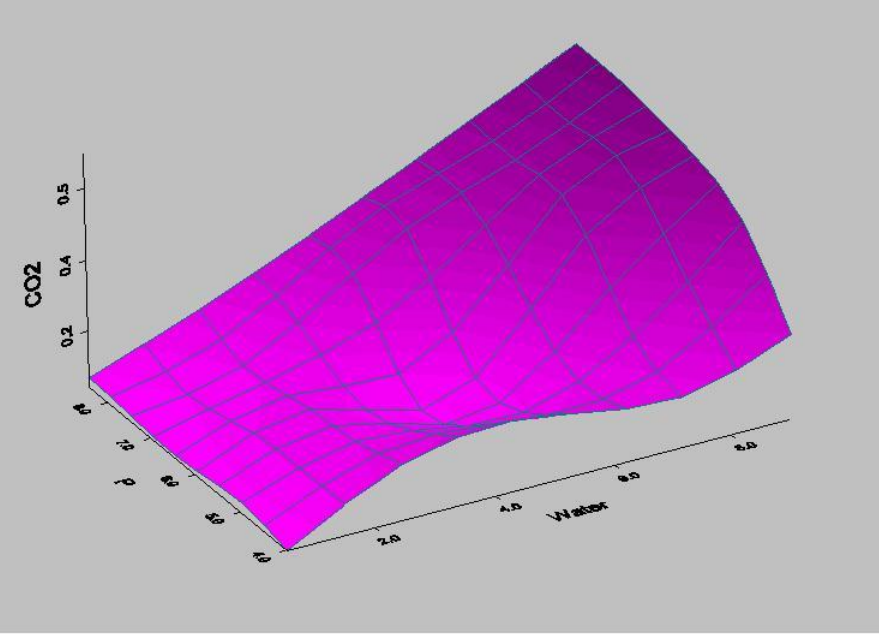
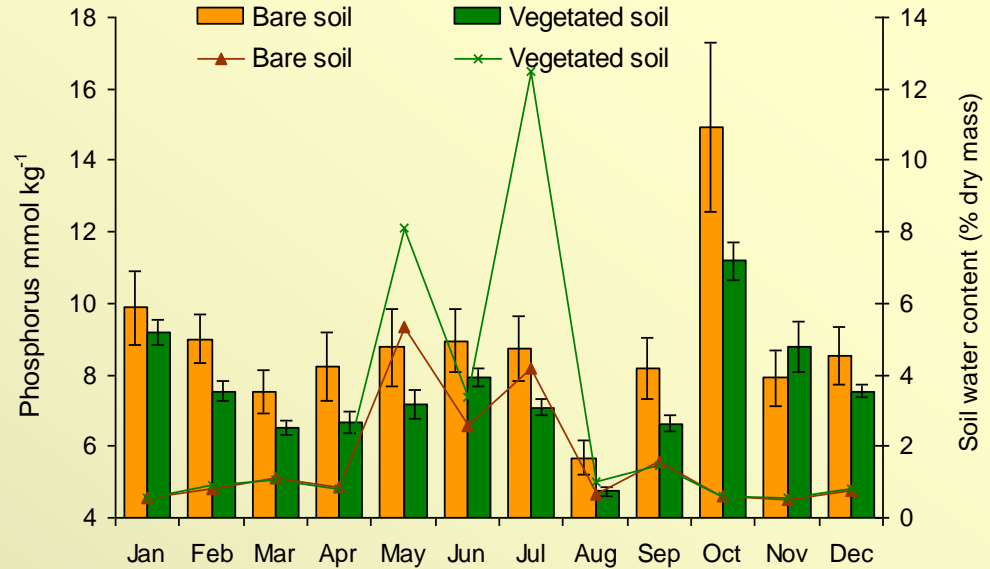
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*Thank you for your attention*



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