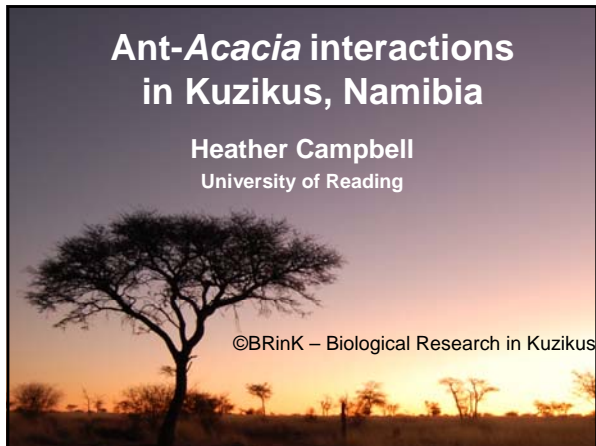
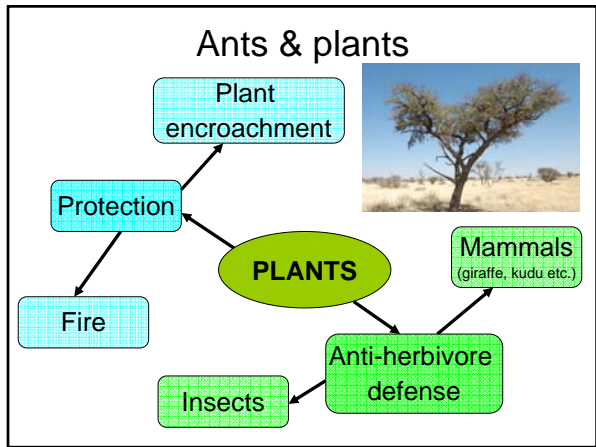
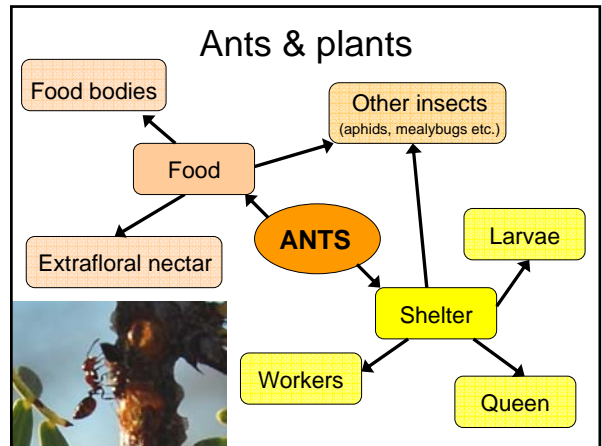


Ant-*Acacia* interactions in Kuzikus, Namibia

Heather Campbell
University of Reading

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Ants & Acacias

- Over 1200 species of ants worldwide
- Many get food and shelter from plants
- Live in colonies and grow to very large numbers
- Very important in ecosystem
- New species often found, not a well studied group

- Over 900 species of *Acacia* (all tropical)
- Many encourage ants to live on them
- All have thorns – except in Australia
- Very important economically and in ecosystem
- Well studied in central America and East Africa

Whistling thorn *Acacia* in Kenya

- * *Acacia drepanolobium* is only African *Acacia* to be studied in detail
- * Four different ant species live in trees of different ages
- * Some are good at defending the tree and others are not
- * Removal of large mammal herbivores for 10 years led to increase in numbers of non-defensive ants
- * Wood-boring beetles live with the non-defensive ants
- * Consequently trees show reduced growth and death

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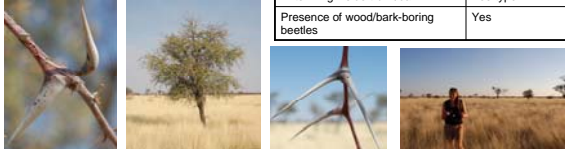
Experiments at Kuzikus

- Tree surveys
- Thorn collection & contents analysis
- Ant activity patterns
- Ant behaviour
- Pollinator identification & activity
- Insect diversity of trees

Methods & results


Tree surveys

- Only *Acacia* at Kuzikus with ants living inside thorns is *Acacia erioloba* (Camelthorn)
- Trees show lots of variation




Tree number	1
GPS location	S23 E018
Tree height (m)	3
Leaf condition	Average
Flowering class	1
Number of pods	5
Presence of treehoppers	Yes
Presence of scale insects	No
Ant patrol & species	Yes-type 1
Ants living inside trunk/bark	Yes-type 1
Presence of wood/bark-boring beetles	Yes

Methods & results




Thorn collection & contents analysis



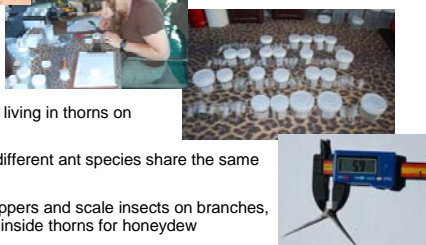
- Four thorns collected from each tree
- Recorded height, age & direction of branch as well as position of thorn on branch
- Thorns taken to "lab" for analysis

Methods & results

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Thorn collection & contents analysis




- Four ant species living in thorns on *A. erioloba*
- Sometimes two different ant species share the same tree!
- Ants tend treehoppers and scale insects on branches, plus mealy bugs inside thorns for honeydew

Methods & results

- Every 30 minutes recorded number of ants on 50cm section of branch on tree
- Obtained records for 7 trees over three days
- Data recorded from 6.30am to midnight

Ant activity patterns



- Activity showed some variation throughout the day, HOWEVER may be linked to numbers of treehoppers/scale insects
- Activity on some trees was only one or two ants per branch. On other trees was up to 80 ants.

Methods & results

Mutualists

Defend tree from herbivore attack
Get food & shelter as reward


Parasites

Do NOT defend tree from herbivores
Take food & shelter from plant

Ant behaviour


- Counted ant numbers and observed behaviour on tree for 10 minutes
- Performed "herbivory" for 2 minutes
- Repeated counts and behaviour recordings for another 10minutes
- Only one *Crematogaster* ants show aggressive/defensive response
- Appear to respond more strongly if tending scale insects or treehoppers
- May be self defense NOT tree defense – ants may be parasites

Methods & results



- Count visits to flowers throughout the day by insects
- Also identify the type of pollinator (bee, wasp, fly, beetles etc.)
- Very windy so results only counted a small number of insects
- Insects also visited nectaries on leaves as well as in flowers

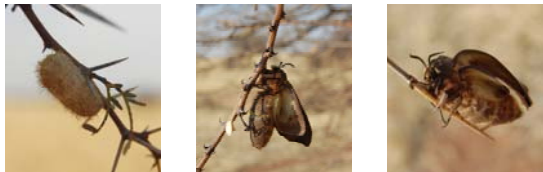
Pollinator identification & activity



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Methods & results

- Measured diversity of ground dwelling insects using pitfall traps
- Opportunistic sampling of insects of trees



- Collected 40 different species of insect in pitfall traps
- Another five types of ant using trees (but not living in thorns)

Insect diversity
of trees

Important results

- Many *Acacia erioloba* have swollen thorns with ants inside
- At least four different ant species found
- Some ant species share the same tree – very unexpected!
- Species are generally not aggressive and may be parasites
- Ants tend a wide variety of bugs for honeydew



Future work



In UK

- Lots of data analysis
- Morphology and DNA study of specimens – identify ants and look at colony structure

In Africa (new location with *A. erioloba*)

- More tree/thorn surveys
- Does interaction vary under different grazing regimes?

In Namibia (Kuzikus)

- More detailed surveys of insect and ant diversity
- Ant mark-recapture – to establish colony size
- Behaviour study – how can different ant species coexist on same tree?
- Pollinator study (again - when less windy!)
- Ant exclusions – what happens when the tree has no ants on it?



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Questions?

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