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The influence of patch burning in the Thornbush savanna

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Introduction

- **Natural fires used to burn occasionally**
- **Such as after exceptionally good rains**
- **Human interference mostly suppresses fire**
- **The option exists to apply the occasional fire in a controlled way for different objectives**
- **Such as to control excessive bushes**
- **Or to enhance biodiversity and productivity, if only patches are burnt**
- **The occasional use of fire may maintain healthy and productive rangeland conditions.**
- **Fire may provide an inexpensive grazing re-distribution tool.**

Introduction continued

- This study falls under the Biodiversity Transect Analysis in Africa (BIOTA) program, to make use of opportunities provided by innovative farmers
- It measures fire effects on five patches of rangeland over 3 farms in Namibia's Thornbush savanna.

Treatments measured

Control

**Grazed firebreak,
only on Farm A**

Burnt



Plants closest to sample points were marked, measured & re-measured

- Perennial grass of $>5\text{cm}$ basal diameter (Greatest basal diameter & at right angles)
- Woody plant of $>0.5\text{m}$ height (Height, greatest canopy diameter & at right angles)
- Woody plant of $<0.5\text{m}$ height (")
- Seedling of woody plant (")



Coordinates of marked plants noted from uniform distances along permanent transects to assist re-finding them



Intercept lengths of cattle and game dung also measured



Laying hay that trains cattle to respect the electric fence,



the moveable electric fence is used later to graze the firebreak of 30 – 40m width, on Farm A



Head fires were applied in late dry season of 2007 ...

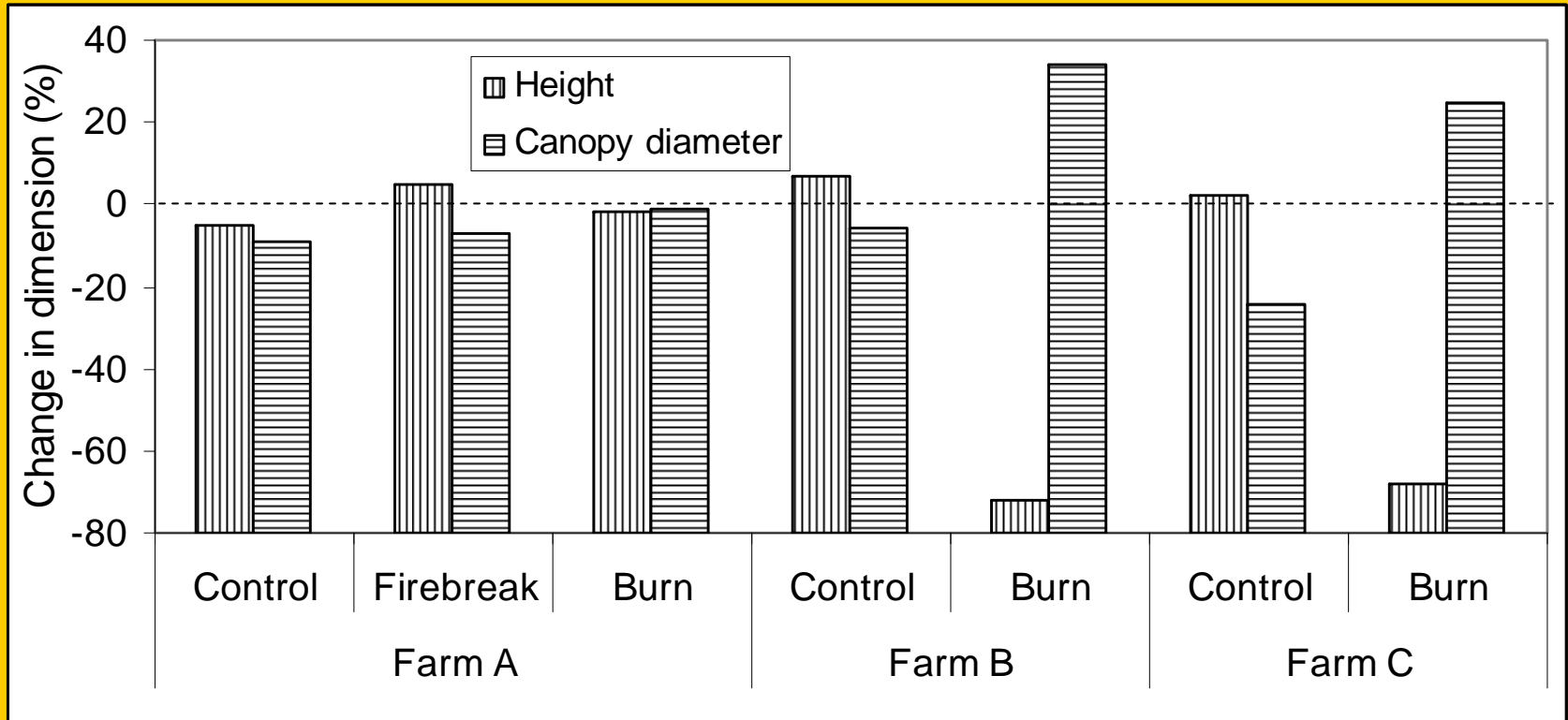


.. to a patch of about 10ha on farm A and about 130ha on farms, B and C

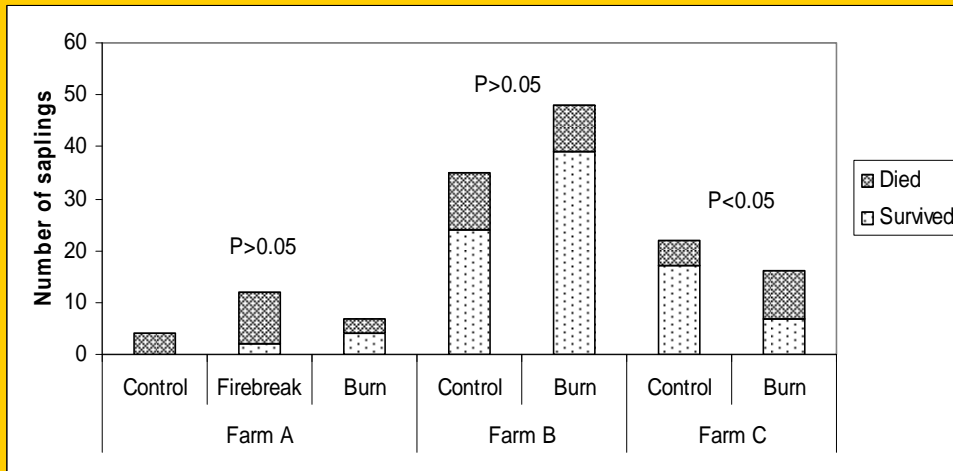
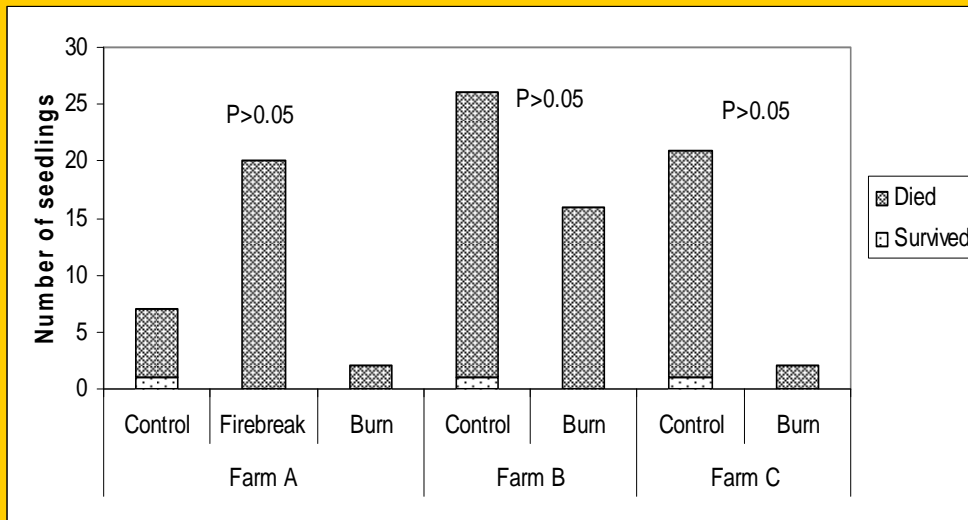
Results

- This is a 3 year study and some data analyses are still to be done such as for regrowth.
- There was almost no mortality of taller bushes.
- The fire only reduced their median height by 2% on farm A, 72% on farm B and 68% on farm C

Median change in height and canopy diameter of *A.mellifera*



- **A number of smaller plants died, even in the unburnt controls, probably due to the exceptionally long dry season in which the fires were applied**
- **In the case of *Acacia mellifera*, only one seedling (3%) survived in the unburnt zone, while 65% of saplings survived, with no clear pattern of difference between zones among the three farms**



Most *Acacia mellifera* seedlings died from drought, even on unburnt zones on all three farms





Stump of burnt *A. mellifera* seedling

Fixed-point photos on Farm C



August 2007

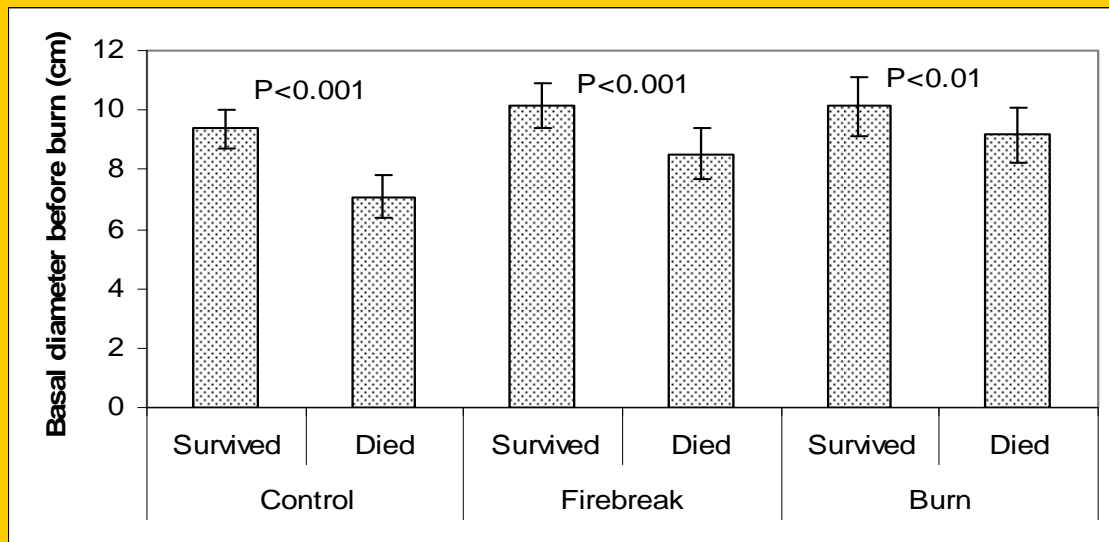
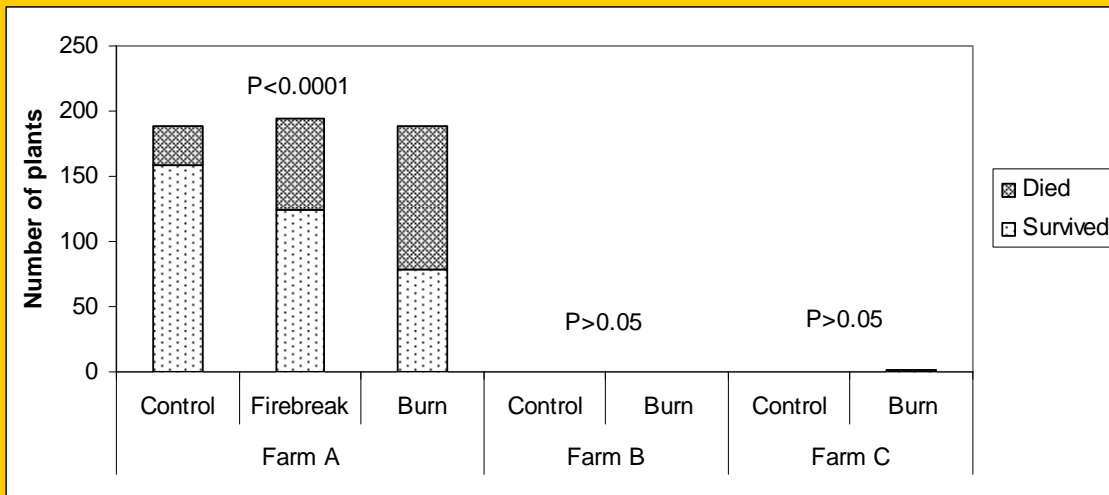


October 2007



February 2008

Effects on *Eragrostis rigidior*



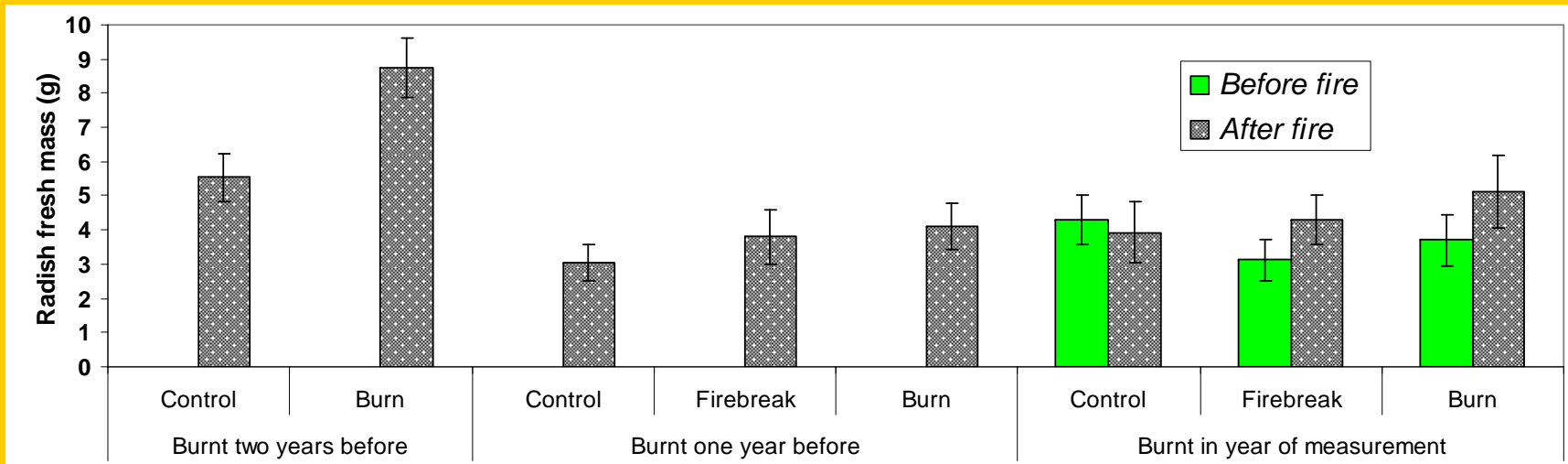
Soil sampling for bioassay



Nutrient hotspots from burns

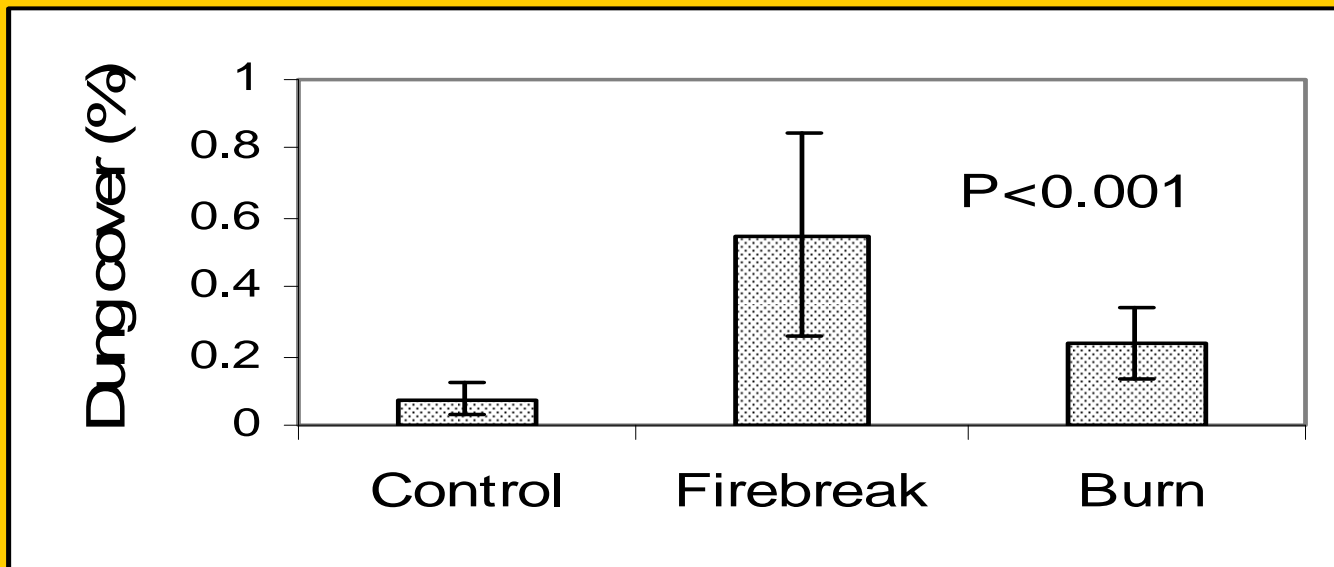


Radish bioassay



Dung cover one year after burn at farm A

- Dung cover was 7 times higher in the firebreak and 3 times higher in the burnt patch



Conclusions

- The fires appear to have increased mortality of smaller plants, many of which seemed to have died from drought
- The use of fire after a premature end to the rainy season may be inappropriate for most rangeland management objectives
- Effective fire management requires regular control to keep out wild fires ..
- .. and infrequent application of strategically timed burning, rather than regular application of fire

Benefits

- **Control of bush encroachment**
- **Invigoration of moribund grass**
- **Recruitment of perennial grasses**
- **Increase in biodiversity**
- **Restoring rangeland heterogeneity for better resilience**

Risks involved

- **Accidental spread of fire**
- **Possibility of insufficient rain after the fire for proper recovery of the burnt grass, as appears to have occurred on Farm A**
- **Fire also consumes organic matter**

Big thanks to:

- **The innovative farmers**
- **Polytechnic students who helped**
- **BIOTA for funding**
- **Polytechnic of Namibia**
- **Thank you for your attention**