

# Botryosphaeriaceae disease complex: a threat to baobab and marula in agroforestry systems in Kenya

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## Background

- Baobab (*A. digitata*) and Marula (*S. birrea*) are African indigenous fruit trees with key nutrients
- They are key African orphan crops. They have been identified for domestication, as well as for agroforestry promotion to boost nutrition, health and income security in Africa
- Domestication trials in Eastern Kenya have been affected by stem cankers and diffuse canopy dieback, but limited knowledge is available on the family, Botryosphaeriaceae, known to cause canker in woody plants
- We aim to characterize and undertake pathogenicity testing of Botryosphaeriaceae associated with stem cankers and dieback in *A. digitata* and *S. birrea* under domestication in Kenya

## Methodology

- We sampled leaves, twigs and tissues from cankers and branches showing dieback, from Kitui and Kibwezi field genebanks in Eastern Kenya
- Following isolation (MEA), we incubated plates at 25°C until growth was observed, and sub-cultured colonies to obtain pure cultures
- Morphological groupings of mycelia belonging to Botryosphaeriaceae were distinguished by their greyish-black pigmentation
- We characterized Botryosphaeriaceae isolates based on morphology and comparisons of DNA sequence data of ITS region and Tef 1-α gene region
- Statistical analysis was performed using analysis of variance (ANOVA), with GenStat v.19

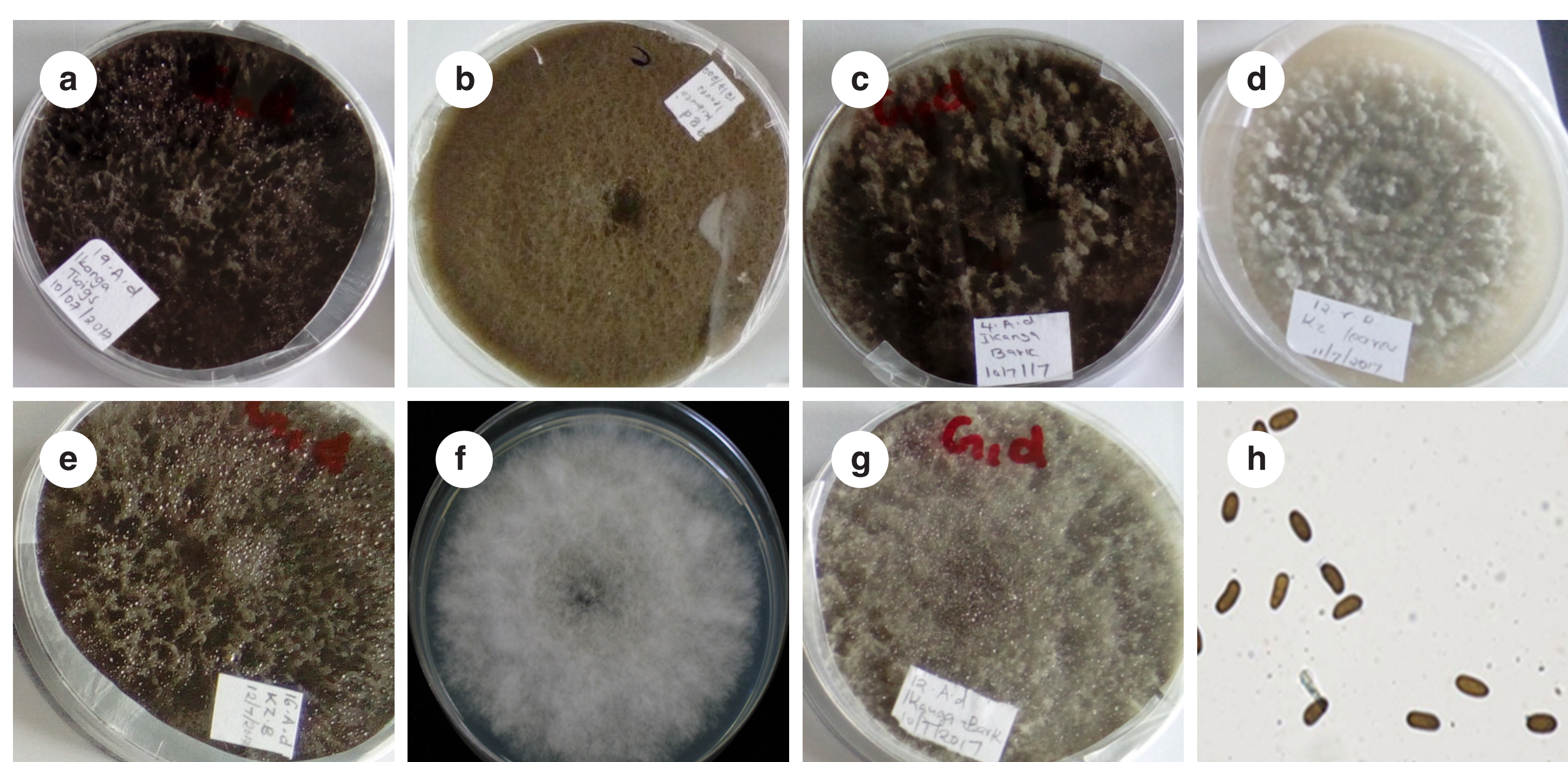


Figure 2. Cultural and conidial characteristics of Botryosphaeriaceae. *N. parvum* (a), *Lasiodiplodia* sp. (b), *L. theobromae* (c), *L. pseudotheobromae* (d), *L. crassipora* (e), *Dothiorella* sp. (f), *L. parva* (g) and spores of Botryosphaeriaceae (h)

## Conclusion and future directions

- Endophytic nature of fungal pathogens identified suggests potential seed-born pathogenicity
- Proper species site matching is an important management strategy to reduce losses by Botryosphaeriaceae pathogens
- Environmental stress triggered by climatic variability could increase susceptibility of potential hosts and possibly widen pathogens' host range
- Further studies should address host-pathogen dynamics and seed-borne nature of diseases
- Routine assessment of genebanks health status should be carried out to ensure suitability for production of high quality seeds

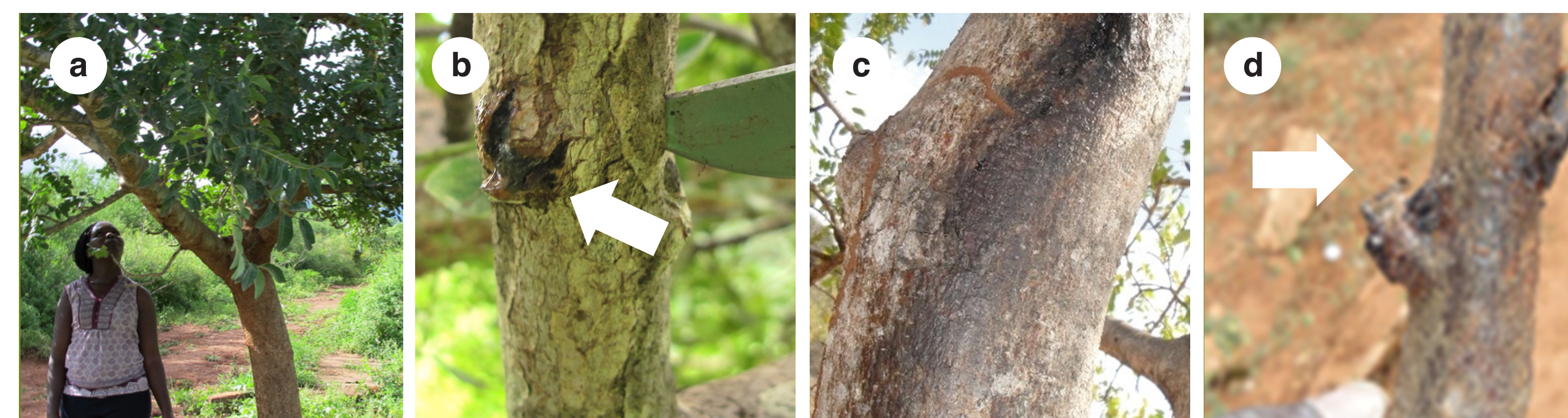


Figure 1. *Sclerocarya birrea* tree (a) and branch/stem cankers producing exudate (b and c), canker of *Adansonia digitata* (d).



Figure 3. Baobab, marula, acacia and *Calodendrum* seedlings inoculated with *L. theobromae*, *L. pseudotheobromae* and *N. parvum*

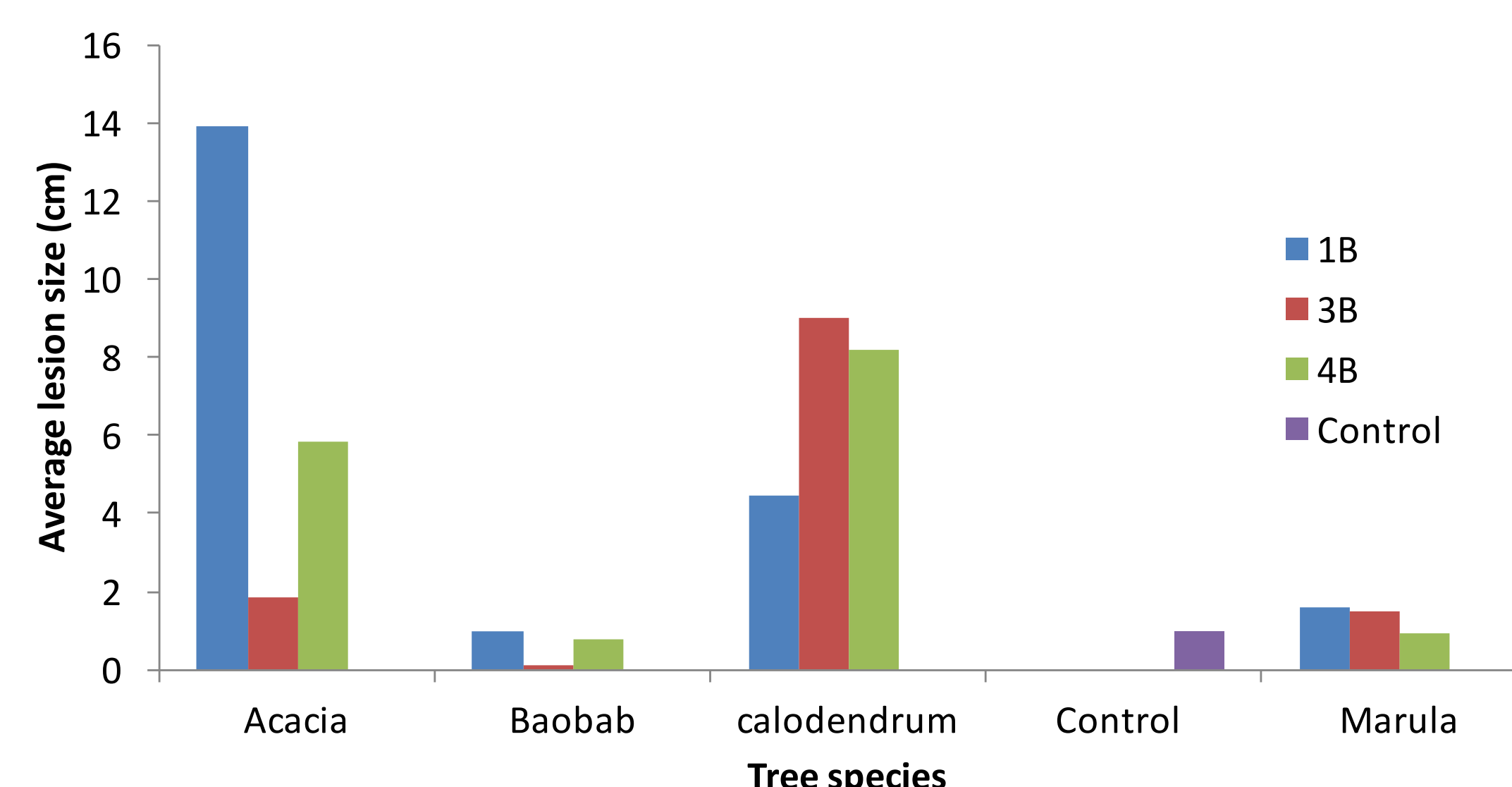


Figure 4. Mean internal lesion length (cm) in baobab, marula, Acacia and *Calodendrum* inoculated with *L. pseudotheobromae*, *L. theobromae* and *N. parvum*

Fungal species	Genera
<i>Lasiodiplodia mahajangana</i>	<i>Lasiodiplodia</i>
<i>Lasiodiplodia theobromae</i>	<i>Lasiodiplodia</i>
<i>Lasiodiplodia pseudotheobromae</i>	<i>Lasiodiplodia</i>
<i>Lasiodiplodia parva</i>	<i>Lasiodiplodia</i>
<i>Lasiodiplodia</i> sp.	<i>Lasiodiplodia</i>
<i>Neofusicoccum parvum</i>	<i>Neofusicoccum</i>
<i>Dothiorella sarmentorum</i>	<i>Dothiorella</i>
<i>Dothiorella longicollis</i>	<i>Neofusicoccum</i>

Figure 5. Fungal species isolated from baobab and marula in Eastern Kenya

## Results

- We identified 9 fungal taxa classified into genus: *Lasiodiplodia*, *Neofusicoccum* and *Dothiorella*
- The fungal species were present in both zones
- Analyses suggest that the 2 tree species shared pathogens with other plants, having a wide host range
- Inoculated seedlings displayed similar symptoms (indistinguishable) and it wasn't possible to isolate primary cause of the disease, hence regarded as a disease complex
- Fungal species showed variability in virulence
- Ranking analyses showed *L. theobromae* to be most virulent
- Baobab and marula revealed infection sensitivity, contradicting previous consideration as disease-free
- Acacia and Calodendrum were highly susceptible to infection

## Acknowledgment

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