SORGHUM TRUST: PROGRESS REPORT

MARCH 2025

Project:	Incidence, management, and producer perceptions of fungal diseases in sorghum cropping systems
Project Leader	Lisa Ann Rothmann (PhD: Plant Pathology)
Researcher	Thabiso Masisi (PhD)
Researcher	Nomvula Moloi (MSc. Agric.)
Institution	University of the Free State (UFS), Department of Plant Science
Current Position	Senior Lecturer/Researcher (Plant Pathology)
Funders	Sorghum Trust National Research Foundation (NRF) Thuthuka (TTK220323450)
Project Duration	2023 – December 2025
Collaborators	Dr Lindy Rose (Stellenbosch University; co-supervisor - mycotoxins) Dr Mariette Jackson (UFS; co-supervisor – phylogenetics) Dr Mpho Mafa (UFS; co-supervisor – biochemistry) Prof Brayan Cassone (Brandon University Canada; co-supervisor next generation sequencing) Prof Andre Pelser (UFS; sociologist) Dr Sethulego Matebesi (UFS; sociologist)
Coworkers	Elize Botha (Sorgho) Ruvarashe Mhuruyengwe (University of Cape Town, PhD candidate) Dr Lara Donaldson (International Centre for Genetic Engineering & Biotechnology, plant molecular biologist) Dr David Nsibo

PROJECT OUTLINE

The project investigates the incidence, management, and producer perceptions of fungal diseases in sorghum cropping systems across South Africa. It includes disease surveillance, pathogen identification, mycotoxin analysis, and farmer engagement to assess the impact of fungal diseases on sorghum production. The PhD candidate Thabiso Masisi focuses on disease and pathogen diversity, mycotoxins, and producer perceptions. The MSc candidate Nomvula Moloi examines pathogen identification and sorghum's biochemical defence responses to leaf blight. The research aims to inform disease management strategies, support breeding initiatives, and contribute to industry and policy discussions. Collaborations with Stellenbosch University, UFS, and industry partners strengthen the project's capacity for applied impact and knowledge transfer. Additionally, we are co-working with Dr Lara Donaldson (from the International Centre for Genetic Engineering and Biotechnology (ICGEB) on root rhizosphere microbiomes and Dr David Nsibo (from the University of Pretoria) on leaf blight populations.

ACTIONS TAKEN & PROGRESS

The NRF Thuthuka funds are still to be made available for 2025, this will be the last year of Thuthuka funding. These funds allow us to extend the research proposed to the Sorghum Trust to include traditional diagnostics for Nomvula Moloi's MSc Agric, which she registered in February 2024.

We will participate in the 2025 Farmers Day in March at Sorgo and the Farmers Day in Standerton in April. The funds provided by the Sorghum Trust will contribute towards attending those events.

Thabiso Masisi (PhD Research)

We are still busy with our contribution to the newest Sorghum Disease Compendium published by the American Phytopathological Society.

We had a video created to inform producers about the initiative and invite them to participate in the surveys. You can view the video here: A third season of disease

surveillance is underway, we will focus on assessing the accessions included in the Sorghum Cluster Initiative (SCI) Pre-Breeding Programme (with Dr Kwame Shamuyarira and Professor Markye Labuschagne), which the SCI funds. We will also survey farmers associated with Sorgho due to our relationship with the farmers over the past season.

The draft manuscripts for disease surveillance (Chapter 2) and farmer perceptions (Chapter 4) have been prepared by Thabiso and are under review by the PI to be ready for publication by July 2025. Full results in reporting will be provided in the format of peer-reviewed manuscripts.

We have found a more suitable collaborator for the bioinformatics. Thabiso secured a Mitacs Grant and a collaboration with Prof. Brandon Cassone (Brandon University, Canada), where he will travel in July-August 2025 to complete next-generation sequencing data analysis. For the next-generation sequencing approach in the PhD study, Mr Masisi has completed DNA extractions from grain and leaf samples. Sequence data has been received from MR DNA. A KIC grant application is underway to secure additional funding for this visit. We will continue with mycotoxins once the field season is complete.

Nomvula Moloi (MSc Agric)

In 2024, significant contamination of leaf samples prevented the use of DNA extractions for analysis. As a result, new leaf samples will be collected in 2025. Nomvula has completed 80% of the sequencing of her samples from 2024 using *ITS* gene region. Dr Jackson and Nomvula will continue with phylogenetic analyses once field season is complete. Nomvula Moloi will focus on collecting only newly observed diseases for pathogen identification. Additionally, 12 sorghum accessions have been selected for biochemical analyses as part of her MSc research, funded by the NRF, with future reporting directed exclusively to the NRF.

RESULTS & ANTICIPATED OUTPUTS

Thabiso Masisi (PhD Research)

Disease survey | Nothing new to report for 2025 yet, surveys just started on 10 March 2025 at the UKZN site. Thabiso has passed his driver's license and can drive himself to field trials with colleagues. This is significant progress for the project and his development as a confident and independent researcher.

Regarding the video, while the exact number of audience members cannot be fully quantified, LinkedIn analytics for the video post showed:

- 5,981 impressions
- 2,361 video views
- 142 reactions
- 4 comments
- 9 reposts

The audience included:

- 11% with research fellow job titles
- 10% from the Pretoria metro area
- 4% from the University of the Free State (UFS)

→ Anticipated outputs: One peer-reviewed publication will be submitted by July 2025.

→ Inclusion of results in a presentation at the National Grain Research Programme in Potchefstroom, which the PI will deliver between 18-20 March 2025.

Bioinformatics | Nothing to report yet.

→ Anticipated outputs: One peer-reviewed publication will be submitted by July 2025.

Farmer perceptions | We will not have new interviews for this specific study. However, I have been approached by Professor Sarah De Sagar () along with her co-workers at the University of Johannesburg, and we will have new questionnaires in collaboration with their team.

→ Anticipated outputs: One peer-reviewed publication will be submitted by October 2025.

Mycotoxins | Nothing to report yet.

Outputs | Thabiso presented a poster of his research at the NRF PHD Conference in October 2024. This was an all-expenses paid trip by the NRF, abstract provided in the September 2024 report.

Nomvula Moloi (MSc Agric)

Phylogenetics | Nothing to report yet.

→ Anticipated outputs: One peer-reviewed publication will be submitted towards the end of 2025.

Biochemistry | Nothing to report yet.

→ Anticipated outputs: One peer-reviewed publication for submission in early 2026.

CHALLENGES & MILESTONE MANAGEMENT

Thabiso and I have discussed with his co-supervisors that he will require an additional six to twelve months to complete his PhD with the submission of two papers (as required by UFS policy). Submission will now most likely be between December 2025 and July 2026. This is still within the UFS Master's and PhD Policy.

We will submit the disease survey manuscript to *Plant Pathology* (IF = 2.772, Q1) before July 2025.

Working with Sorgho has increased our reach to sorghum farmers, and I am grateful for their keen collaboration. Smallholder producers did not have any grain available for us, which is understandable.

Nomvula has again been declined by the NRF bursary for her MSc Agric research at the UFS. We must continue seeking an alternative arrangement for the year to support her accommodation and subsistence.

CONCLUSION

Thabiso has continued to take on key logistical and technical responsibilities, including coordinating fieldwork with producers and managing laboratory consumables. His PhD research is progressing well, with the third season of disease surveys underway. Although his work on mycotoxin protocols, supported by Dr Lindy Rose, is behind what we planned, we are looking forward to a successful visit to Canada for NGS analysis.

Nomvula has refined her MSc research focus, now exclusively collecting newly observed diseases for pathogen identification and expanding her work to include biochemical analyses of 12 sorghum accessions. This component, under the co-supervision of Dr Mpho Mafa, will enhance understanding of sorghum's biochemical responses to leaf blight, complementing her traditional diagnostic work.

As we have entered the 2025 planting season, the project is well-positioned with NRF funding supporting the next research phase. The research group continues strengthening collaborations, particularly with industry partners like Sorgho, while expanding knowledge transfer efforts through science communication, farmer engagement, and training initiatives.