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Objectives

• Development of disease resistant and improved varieties
• Genetic and genomic studies to identify resistance genes, or resistance loci
• Core collection
• Training
Presentations today

- **Tesfaye Mengiste**: Highlights

- **Chemed Berhanu**
  - National and regional breeding activities
  - Released and candidate varieties
  - Seed increases, popularization efforts demonstrations…
  - Characterization of Ethiopia core collection

- **Gezahegn Girma**: mapping of new resistance loci, and genomics of core
Trial sites

Pawe Research Center
Assosa Research Center
Jimma Research Center
Haramaya University
Area of Research

• Pathology
• Molecular biology
• Resistance breeding
• Genetics and genomics
### Resistance genes

- ARG1, published
- ARG2, manuscript submitted
- ARG3, fine mapping complete, validation
- ARG4 and ARG5: mapping complete, *Habte? Are you listening?*
- Additional mapping for new ARGs (ARG 6-9) underway.
“One gene closer to a superman sorghum”

“As climate change events shift or necessitate the production of dryland crops such as sorghum into higher rainfall or irrigated regions, leaf diseases become even more significant,” “It is precisely in those situations where powerful genes become so crucially important.”

(Gebisa Ejeta)
Gene specific molecular markers

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(bp)

200

100

400

300

200


InDel-4

InDel-5

InDel-6
Disease with strain using Cs29
Synteny between *S. bicolor* and *O. sativa* around ARG3 locus

Mapping using resistance to Cs29, Csgrg
Summary

- Identified **five** major genes, closing on **one**, additional **three** loci defined
- Tightly linked or gene specific markers for **six** genes
- Four NBs-LRR proteins
- **ARG3** is protein of unknown function

ARG1, ARG2, ARG4, ARG5

**R proteins**

NBS-LRR

Canonical R proteins have a *leucine-rich repeat*
PhD dissertation titles

Assefa Gidesa
Distribution, Pathogen Variability and Management of Sorghum Anthracnose (Colletotrichum sublineola) in South-Western Regions of Ethiopia

Chemed Berhanu
Genetic Diversity, Genotype by Environment Interaction and Genome Wide Association Mapping For Anthracnose (Colletotrichum Sublineola) Resistance in Ethiopian Sorghum Core Collection

Moges Mekonen
Genetic diversity and association mapping of virulence gene in Colletotrichum sublineola
Summary

• One variety released in 2020
• Multiple materials in pipeline for future release
  – Multiple lines at the variety verification stage
  – Possible release in 2022
• Introgression- materials at different levels in the national and regional programs
• Genomic and phenotypic characterization of the core
So little time so much to do

- Promote released varieties and materials in the pipeline
- Seed production ….
- Advance materials from crossing towards variety
- Finalize trial of the core, and replace with new population
- Open access publications for at least two ARGs, and team publication on the core
- Training workshop in Ethiopia (Summer/Fall 2022)
- Short term training- Chemeda at Purdue
- Start multi-location testing of new RILs in Ethiopia
  - Next phases- transfer ARGs into elite materials through a locally led effort
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