Identification of Cowpea Genotypes Resistant to Ascochyta Blight

Presenter

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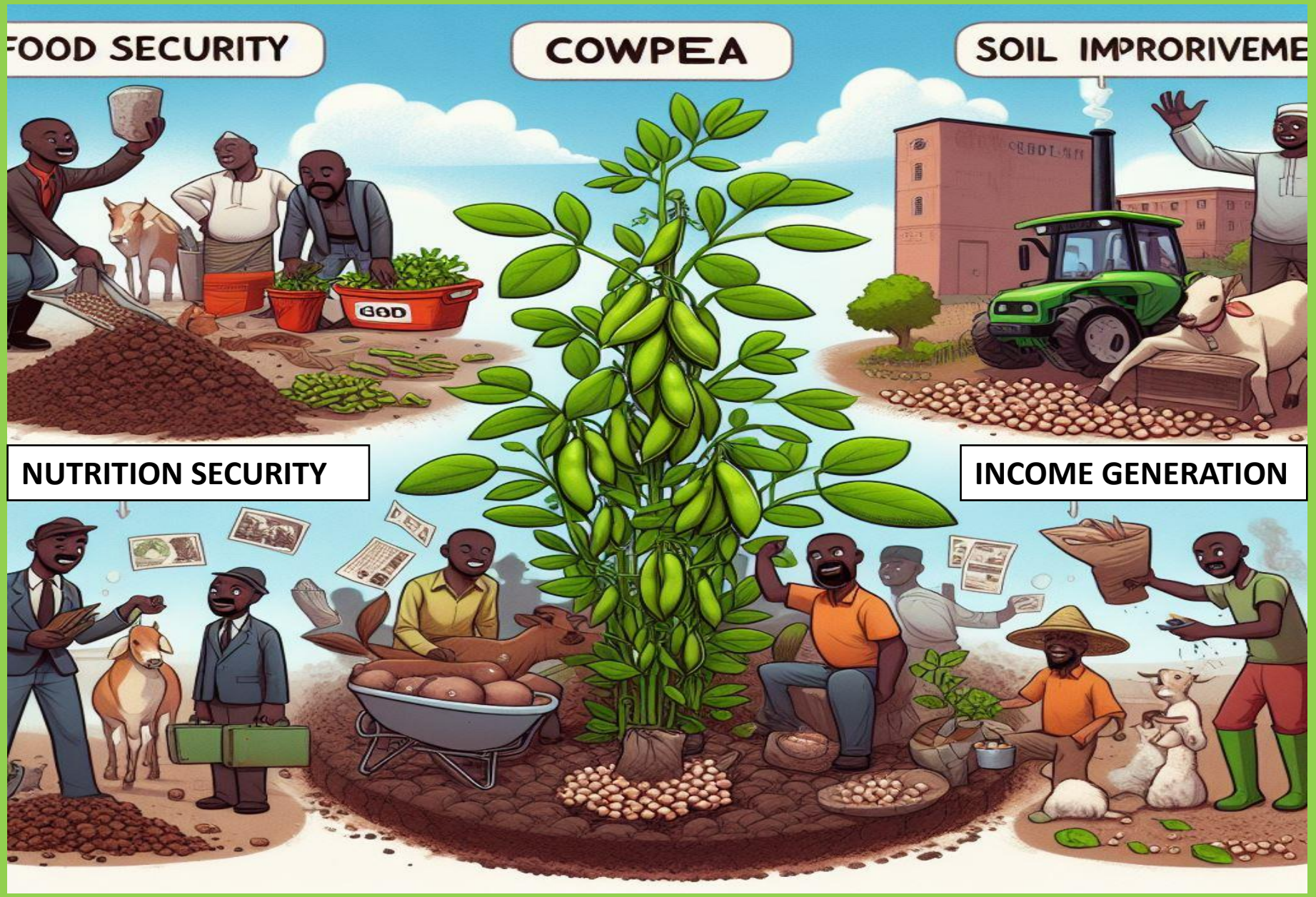
ARUSHA, TANZANIA

LAYOUT

- ❑ Background
- ❑ Objectives
- ❑ Approach
- ❑ Progress

Introduction

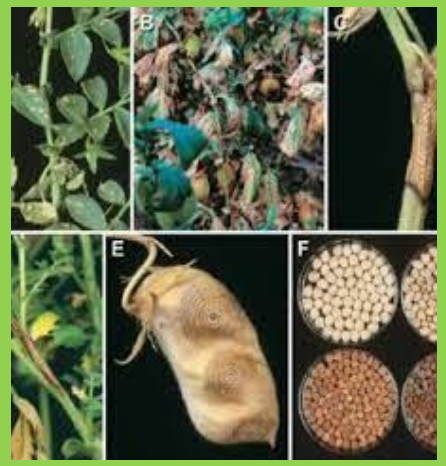


Introduction

CONT.

- Cowpea has many production challenges contributing to low yields (0.2-0.8t/ha vs 2-2.5 t/ha potential yield)

- Diseases (Ascochyta blight, bacterial blight, root rot, CAbMV)



- Insect pests (Pod borers, Aphids, Blister beetles, thrips)

CONT.

Introduction

- Ascochyta Blight (*Fungus Ascochyta phaseolorum*)
  - Severe defoliation and lesions on stems and pods.
  - Attacks all above ground parts of the plant, leading to necrosis, tissue collapse, and in severe cases eventual death of the whole plant (Foresto E., 2023)

- Transmission: Spores
  - Rain, wind and mechanical contact

Introduction

CONT.

- Development of Ascochyta blight is favoured by:
  - temperatures between 20 to 21 degree Celsius and
  - relatively high humidity (Skoglund G. L. et al, 2011).
- In Africa, Ascochyta blight is common in the high-altitude humid regions of Rwanda, Uganda, Kenya, D.R. Congo and Zambia (CIAT, 1997).
- In Zambia, the disease is most severe in wet seasons (Kannaiyan et al., 1987).
- The most effective control measures of Ascochyta blight is breeding for resistance (Ambuj B Jha et., 2019).
- Therefore, understanding pathogen aggressiveness and identification of sources of resistance to different pathotypes is important for decision making in breeding programs.

Objectives

CONT.

- **Overall objective of the project is to identify cowpea genotypes that are resistant to Ascochyta Blight.**

- To determine the spread of Ascochyta blight in major cowpea growing areas in Zambia.
- To assess relative virulence of Ascochyta blight .
- To identify cowpea cultivars that are resistant to Ascochyta blight.

Approach

CONT.

1. **Determine the spread of Ascochyta blight in Zambia**

- Focus Group Discussions (FGD) and field surveys
  - ✓ 3 major cowpea growing provinces (Southern, Eastern and Central provinces).
  - ✓ 60 farmers per province, giving a total of 180 farmers
  - ✓ focus mainly on Ascochyta blight, root rot, cowpea aphid borne mosaic, aphids and alectra.
    - ✓ other prevalent diseases and pests will also be recorded.

2. **Fungal Isolation:**

- Leaves collected from the field will be taken to the laboratory for fungal isolation

3. **Morphological characterization**

- 40 single-spore fungal isolates will be grown on pea agar medium for 10 to 12 days.
- The characteristics of the colony (colour, mycelial growth, orientation and abundance of the spores) will be assessed visually or with a stereo microscope, and the shape and
- size of conidia will be determined with a compound microscope with reference to CMI descriptions.

Approach

CONT.

4. DNA extraction and sequencing for pathogen identification

- Total genomic DNA will be extracted using FTA cards
- PCR products will then be sent for sequencing in the USA to determine strain type.
- The sequences will be deposited into National Center for Biotechnology Information (NCBI) databases for comparison and verification.

5. Pathogenicity Test

- Pathogenicity test will be conducted on ten days old healthy plants of cowpea in the greenhouse
- The plants will be inoculated with pre-cultures of Ascochyta Blight isolates and observed for 14 days for disease appearance.
- The pathogen will be re-isolated from lesions developed on the plants.
- Data on a daily basis will be collected and recorded including symptom development from all the treatments.

CONT.

Approach

6. Assessment of relative virulence

- ❑ Twenty-four purified isolates will be assessed for relative virulence on twelve cowpea genotypes.
- ❑ The cowpea genotypes will include two landraces, four common varieties, four lines from UCR mini core and two known Ascochyta resistant genotypes.
- ❑ The plants will be infested with Ascochyta strains by hand spraying them with spore suspension at two weeks after emergence.
- ❑ Disease severity on each of the genotype will be assessed two weeks after infestation using the qualitative 1 – 9 scale.
- ❑ The level of virulence will be measured based on the ability of the strain to incite symptoms on the genotype.

Approach

7. Identification of cowpea cultivars resistant to Ascochyta blight

- 150 cultivars will be screened in a glasshouse and field
- Plants will be infested with Ascochyta strains (previously collected from the field) by spraying them with spore suspension at two weeks after emergence.
- Disease severity will be assessed using a scale of 1–9 two weeks after inoculation.

Progress

- **The spread of Ascochyta blight in Zambia**
  - Southern and Eastern Provinces

CONT.

Progress

- **Seed acquisition**
  - Machakos 74 (KALRO GeRRI, Kenya)
  - TVu 11761 (IITA)
  - UCR minicore

- **Seed Multiplication**
  - Machakos 74
  - TVu 11761
  - Sp-1-4 & Sy -1-2
  - Namuseba, Msandile, Lutembwe & Bubebe

Progress

CONT.

- Fungal Isolation

Our Team

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THANK YOU

Asante sana