Broad-based Root-knot Nematode Resistance in the Southeastern Africa Cowpea Gene Pool

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• RKN species have **wide** and **overlapping** host ranges;

• Often RKN species occur within the same **geographic area**;

• These RKN characteristics **limit** some **management options**;

• **Host-plant resistance** is the most **effective strategy** to manage RKN;

• **Resistance durability??**
Novel Sources of Resistance to RKN

Research Questions

1. Variability of Response?
2. Genetics of Response?
3. Genetic uniqueness?

Root-Knot Nematodes
*Meloidogyne incognita & M. javanica*

Huynh et al (2013)
RKN Resistance Genes in Cowpea

- \( Rk \) gene;
- \( Rk^2 \);
- \( rk^3 \);
- Galling resistance gene;
- Are there novel \( R \) genes?

Susceptible (no \( R \)-gene)

RK gene-based resistance

Novel \( R \)-gene?
Phenotyping Protocols for RKN Resistance

- Seedling growth pouch inoculation
- Greenhouse inoculation
- Infested field screening
The Majority of the Genotypes Carry the Gene Rk

VARIABILITY OF RESPONSE FOR ROOT GALLING - M. INCognita (AVIR)

LSD = 1.27; P < 0.05

GENOTYPES
Candidate Cowpeas for Breeding RKN Resistant Cultivars

VARIABILITY OF RESPONSE FOR ROOT GALLING - *M. JAVANICA*

LSD = 1.62; *P* < 0.05

**GALL INDEX**

**GENOTYPES**
Root Galling Reaction: *M. javanica*

- **Susceptible (no R-gene)**
- **RK gene-based resistance**
- **RK gene-based resistance**
- **Novel R-gene?**
Resistance Against *M. javanica* Works for *M. incognita*

Correlation: Response to *M. incognita* (Vir) - *M. javanica*

\[ R^2 = 0.967 \]
Genetic Analysis of Resistance

Seven F2 Populations (sizes 100 – 130) Segregating for Galling Response
RKN Resistance Genes & Broad-Based Resistance

M. javanica  M. Incognita (Vir)

Response

Galling  Reproduction

RKN Resistance genes  Novel Genes?

Rk  Rk2  rk3  Gg

7 Genotypes

Gene Pyramiding

Rk  Rk  Rk

Rk2  Rk2  Rk2

M. Incognita (Vir)
The UCR Cowpea Group

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