Sub-theme:

Pest Diagnostics in Phytosanitary Systems

Title:

EPIPHYTOLOGY AND GENOMIC RNA ANALYSIS OF GROUNDNUT ROSETTE ASSISTOR VIRUS CAUSING GROUNDNUT ROSETTE DISEASE IN WESTERN KENYA

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Introduction

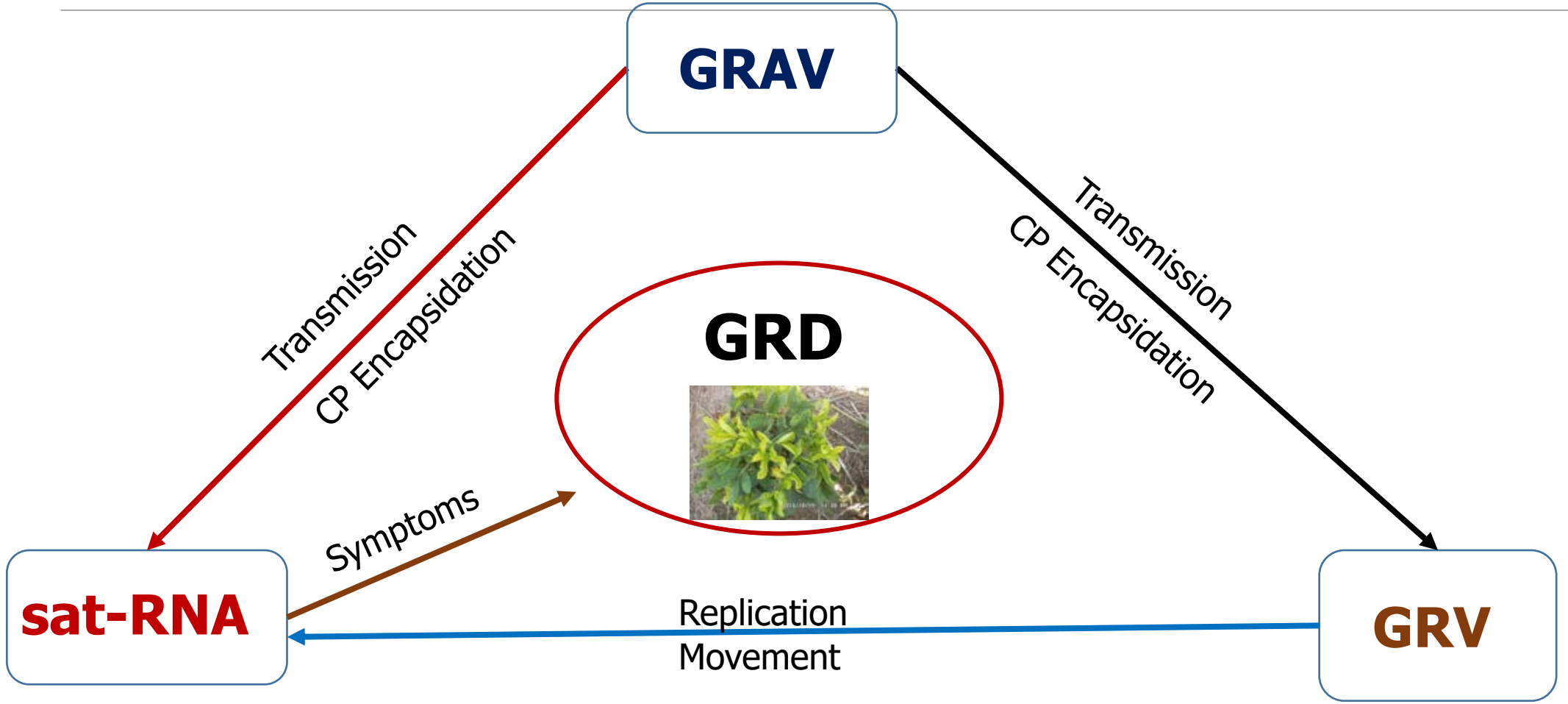
- Groundnut (*Arachis hypogaea,* L.*),* is an important annual oilseed, food legume crop, fixes N_2, animal feed, fuel, cardboard and source of income.

- However poor yields of 500-800kg/ha, as opposed to the potential yield of >2.5t/ha are obtained (Kidula *et al*., 2010).

- GRD is the major virus disease reported in SSA caused by two synergistic viruses; GRAV (*Luteovirus*) and GRV (*Umbravirus*) associated with a sat-RNA.

Introduction cont'

Etiology of GRAV



Problem Statement

- Groundnuts are important legume crops, but western Kenya farmers achieve less than 30-50% of the potential yield with an average yield of 600-700 kg/ha due to GRD.

- Among viral diseases of groundnuts, GRD is the most devastating causing upto 100% yield loss.

- Resistance to GRAV has not yet been identified (Chiyembekeza *et al*., 1997) and all known resistant genotypes are susceptible to GRAV (Subrahmanyam *et al*., 1998; Appiah *et al*., 2017).

Justification

- The demand for groundnuts in western Kenya has gone up while its production is not commensurate due to GRD.
- There is not sufficient and current information on epiphytology and genomic RNA analysis of GRAV in western Kenya.
- Documentation from this study will help understand the management of GRD ("Witches broom") restricted to SSA.

Objectives

- To determine the epiphytology and distribution of GRD in western Kenya.

- To determine the genomic RNA diversity of GRAV in western Kenya.

Methodology

- Survey done in 2 Counties: Bungoma and Kakamega.
- GPS of farms sampled recorded.
- GRD incidence and severity scored.
- The GRD symptom types observed were recorded.

Methodology cont'

- Leaf samples collected in RNA*later*® solution for RNA stabilization and kept at 4^{o}C until further analysis.
- Leaf samples collected were tested for GRAV causal agent by RT-PCR as described by Naidu *et al*., (1998) with some modifications.
- The primers used were designed using Primer3Plus Software.

Results

GRD Symptoms

Decreasing Rosette Incidence

Chlorotic rosette

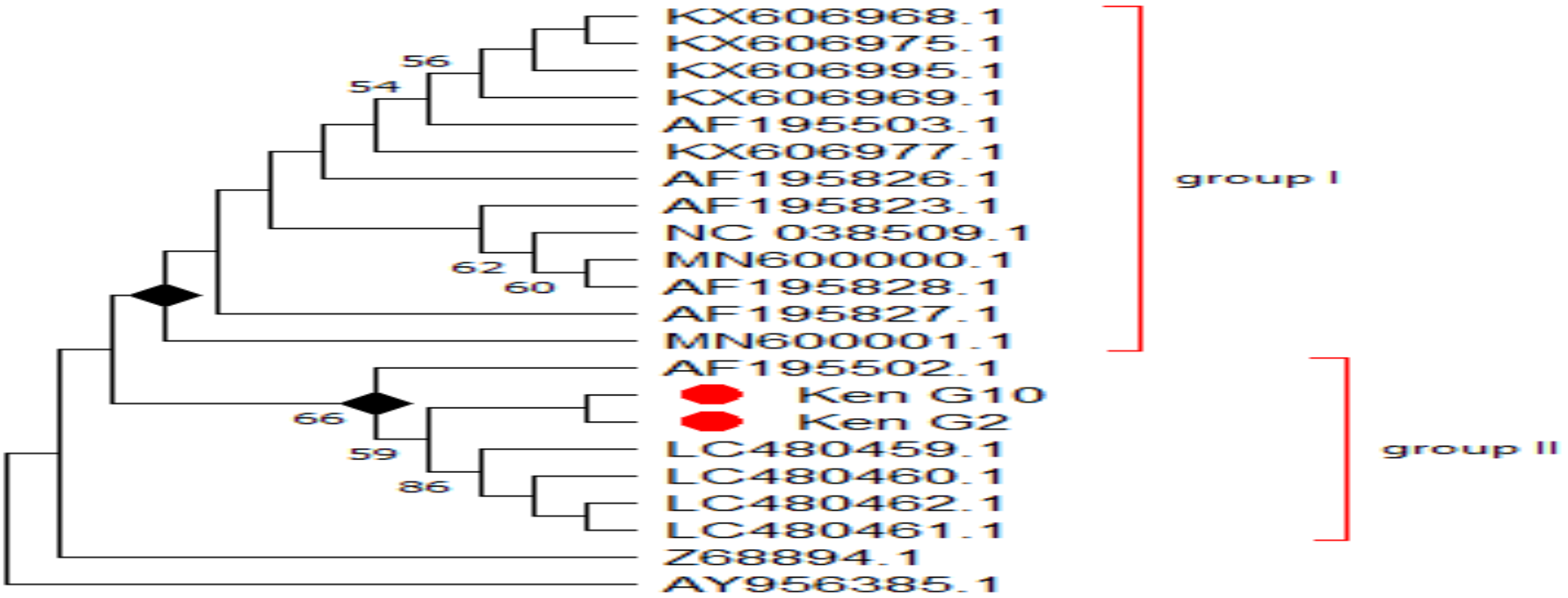
Green rosette

Mosaic rosette

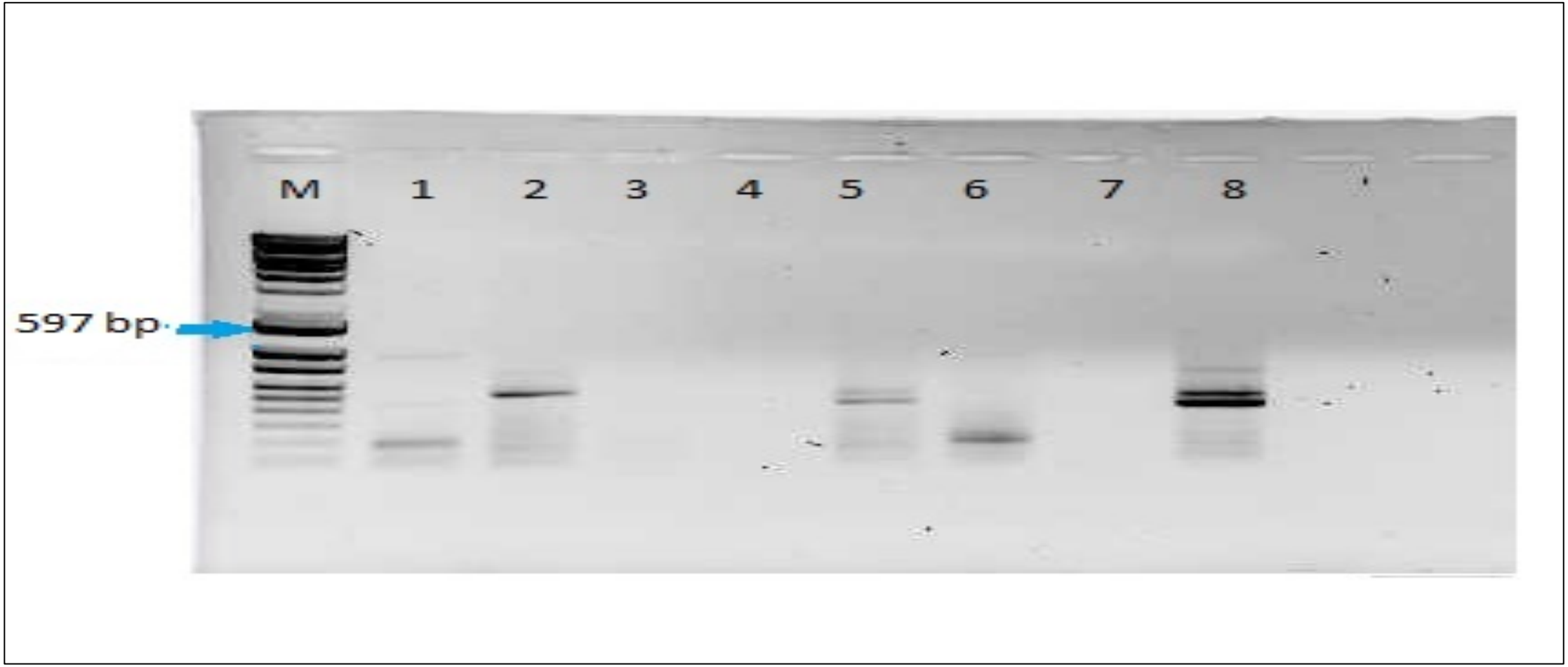
Results cont'

County	Season	N	Mean incidence (%)	Mean severity
Bungoma	Short rain	47	66.51	2.21
	Long rain	45	30.89	1.49
Kakamega	Short rain	22	47.73	2.14
	Long rain	30	43.47	1.53
Overall	Short rain	69	60.52	2.19
	Long rain	75	35.92	1.51

Results cont’



Results cont’



Conclusion

- GRD is a major disease of groundnuts occurring in western Kenya.
- GRAV epiphytology on incidence and severity was high during the short rains season than the long rains season.
- Western Kenya GRAV CP isolates exhibited closer sequence identity with Malawian isolates and genetically diverse with Nigerian and Ghanaian isolates.

Recommendations

- Outreach field days to educate farmers on GRD symptom type identification and management.
- Improve cropping practices to delay the onset, spread and epiphytology of both the vector biotypes and rogue ratoon, volunteer groundnut crops.
- GRAV CP gene is best candidate for breeding resistant/tolerant cultivars.

Acknowledgements

Theme: *"Enhancing Phytosanitary Systems for Healthy Plants, Safe & Sustainable Trade"*
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