

Feeding behavior of cassava and non-cassava colonizing genotypes of *Bemisia tabaci*



RESEARCH PROGRAM ON
Roots, Tubers
and Bananas

Milan Milenovic¹, Everlyne Wosula², Carmelo Rapisarda³, and James Legg²

¹ University of Copenhagen, Denmark and University of Catania, Italy

² International Institute of Tropical Agriculture (IITA), Tanzania

³ University of Catania, Italy

Introduction

The cassava-colonizing whitefly, *Bemisia tabaci*, is an economically important pest of cassava. It causes damage by feeding on plant vascular tissue and consequently spreading viruses that cause cassava mosaic disease (CMD) and cassava brown streak disease (CBSD). The feeding and whitefly-host interaction of cassava-colonizing whiteflies is not well understood. The electrical penetration graph (EPG) technique can be used to study these interactions in great detail.

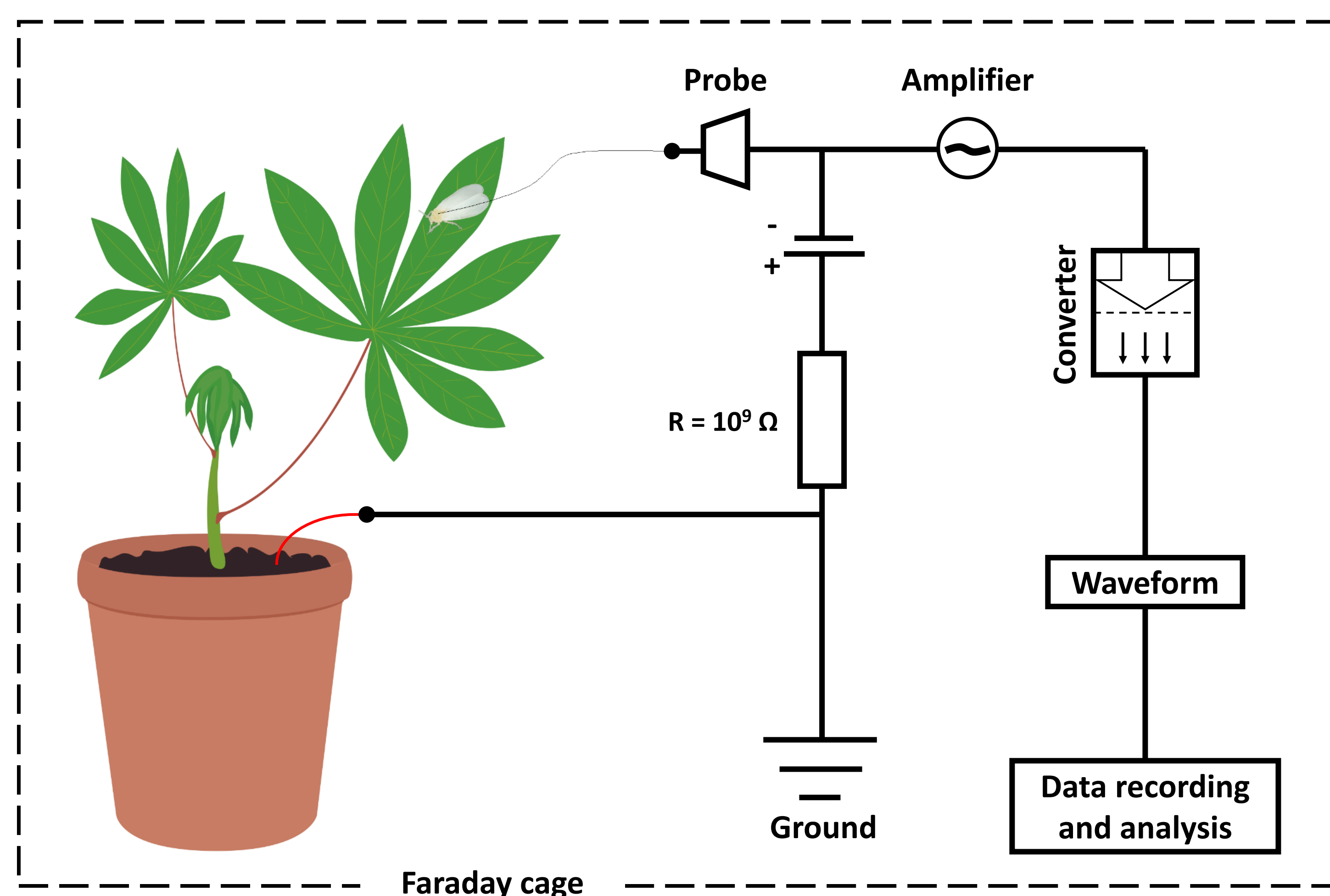


Fig. 1: Schematic diagram of DC-EPG.

Materials and Methods

To study the details of stylet penetration into the plant, a DC voltage is applied to the soil in which the plant grows, and the whitefly is connected to a thin (<2.5µm) platinum wire which is then connected to the probe (Fig. 1 and Fig. 2). When the insect feeds, it completes an electric circuit through the insect, plant and moist soil. The voltage fluctuation in the circuit is measured, producing a trace which describes the feeding behavior in great detail.



Fig. 2: Whitefly attached to a 12.5µm gold wire using water-based silver glue.

Objectives

Determine why sweet potato whitefly genotypes are unable to survive and colonize cassava. In addition, determine ability of cassava colonizing genotypes to feed on other hosts. It has been hypothesized that cyanogenic glycosides from cassava are lethal to non-cassava genotypes of whiteflies. This was however never experimentally tested before.

Results and discussion

The preliminary results show significant differences between sweet potato genotype feeding on sweet potato and cassava. However, the cassava-colonizing genotype does not show these differences suggesting the difference in host preference and suitability. When sweet potato genotype is feeding on cassava it has reduced number of phloem feeding events, and dramatically shorter mean and total phloem ingestion phase (Table 1).

Whitefly Genotype	Host plant	Number of phloem events	Mean duration of the event	Total duration of the events
Cassava type	Cassava	1.9	257.5 min	5 h 39 min
Cassava type	Sweet Potato	2.5	145 min	4 h 18 min
Sweet potato	Cassava	1.5*	9.3 min*	16 min*
Sweet potato	Sweet Potato	6.5	77.5 min	6h 36 min

Table 1: Selected phloem feeding parameters

*Significantly different (p<0.05)

Conclusion

Cassava colonizing whitefly can feed and survive on sweet potato when cassava is not available. This implies that controlling whiteflies only on cassava or applying rotation and isolation measures may not be very effective.

On the other hand, sweet potato whiteflies reject the cassava host. The exact mechanism is unclear at the moment, but is likely related to taste perception and/or activation of plant resistance. Studying this interaction holds the potential to developing new methods for controlling the whiteflies.