

Studies on Vectors of Cacao Swollen Shoot Virus (CSSV)

Improving our understanding of the way that CSSV is transmitted

Cacao Swollen Shoot Virus is the causal agent of a disease that has caused substantial losses to cocoa production in Ghana, Togo and Nigeria and is of increasing concern in Côte d'Ivoire. Although it is known that CSSV is transmitted by several species of mealy bugs, control of the disease has been severely hampered by a lack of information about some of the basic features of the vector/plant relationship. This short project used the Electrical Penetration Graph (EPG) technique to study the feeding behaviour of vector and non-vector species of mealy bugs in order to gain a better understanding of the disease and the measures needed to control its spread.

The EPG technique has been used with success to study other plant virus/vector systems but this was the first time that it had been evaluated for its efficacy for the characterisation of mealybug feeding behaviour on cacao. The mealy bug and the cocoa plant were made to form part of an electrical circuit by inserting a wire into the soil of a potted plant and attaching a thin wire to the insect. As the insect's stylets penetrate the plant the circuit is completed and a fluctuating voltage, the 'EPG signal', occurs at the measuring point which is amplified and recorded. The voltage fluctuations appear in a number of distinct patterns or 'waveforms'. Based on reports from other mealy bug/plant systems, it was possible to distinguish and quantify feeding activities including cellular penetration by stylets, ingestion from xylem and phloem, and salivation.

Significant differences were observed in the time that vector and non-vector species spent on intra- and extracellular salivation. Since salivation events are the stylet activities predominantly associated with virus transmission by hemipteran insects, these results may be important in understanding the basis of differences in CSSV transmission efficiency by distinct mealybug species.



A multi-channel EPG arrangement allowing for the monitoring of up to eight separate mealybug/cacao feeding combinations simultaneously

A second objective of the project was to investigate whether the mistletoes commonly found parasitizing cocoa could also act as vectors for CSSV. Although it was shown that mistletoe (*Tapinanthus bangwensis*) germinated on CSSV infected seedlings does contain CSSV DNA, further work will be needed to determine whether CSSV is transmitted to the mistletoe seeds

For more information please contact:

Dr. Andrew Wetten, formerly of School of Biological Sciences, University of Reading, UK, and now at University of the West of England, UK
 ☎ andy.wetten@uwe.ac.uk