



## GREATER UNDERSTANDING OF WITCHES' BROOM DISEASE

*A laboratory based research into the causes of Witches' Broom Disease  
with implications for testing for Witches' Broom Disease.*

**Cocoa pathologists** and **breeders** could benefit from the laboratory and glasshouse based research into this potentially devastating disease.

*Witches' Broom Disease of cocoa is caused by the fungus *Moniliophthora perniciosa*. It is a serious disease of the crop with yield losses of up to 90 percent or more. The fungus is native to the Amazon and is now present in most of the cocoa growing regions in the Americas and the Caribbean.*

*Symptoms include the formation of multiple small shoots from flower clusters and branches (called "witches' brooms"). These cause the early death of cells and tissue. Pods can become infected up to about 12 weeks of age. They are often destroyed, or they ripen prematurely resulting in smaller or no beans.*

*Spore production occurs in small fruiting bodies developing on branches and pods during rainy periods. Spores are spread by wind, mechanical means, and with infected plant and other materials. Varieties with reduced Witches' Broom sensitivity are being used to reduce disease impact. Good farming practice also reduces loss.*

The project was made up of two elements:

- Proteomic studies were made to detect differences between the infectious organisms causing Witches' Broom.
- The amount of fungal infection in plants was investigated, as well as where it occurred.

*PROTEOMIC STUDY  
The study of proteins,  
particularly their  
structures and  
functions.*

The project resulted in:

- improved the understanding of the spread of Witches' Broom Disease,
- new insights into the variation of infection levels,
- a potential procedure to measure the presence of Witches' Broom Disease in quarantined material, (qPCR assay) thus preventing the spread of the disease,
- Collaboration with other scientists.



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Results are currently being prepared for publication. Information about the qPCR assay is freely available from Gareth Griffith.

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