Minimizing the Risk of Spreading Cocoa Swollen Shoot Virus Disease

Cocoa cultivation series

Vision for Change: Sustainable Cocoa Communities
Cocoa swollen shoot virus disease is transmitted by infectious mealybugs and infected budwood. The risk of spreading the disease is reduced if mealybugs and live plant material are not transported deliberately or accidentally from place to place.

Cocoa Swollen Shoot Virus Disease (CSSVD)

CSSVD is a serious constraint to the production of cocoa in West Africa, particularly in Ghana where the disease was first recognized in 1936. Several different strains of the virus exist and can cause defoliation, dieback of the plant and severe yield losses. In susceptible varieties such as West African Amelonado cocoa, the most severe strains of the virus can kill the plant within 2-3 years.

Symptoms

Cocoa swollen shoot virus can infect cocoa plants at any stage of development. The disease causes a wide range of symptoms depending on the strain of the virus, the stage of infection and the susceptibility of the cocoa variety. Amelonado cocoa varieties are particularly susceptible to infection and diseased plants show the following characteristic symptoms:

- Reddening of primary veins or ‘banding’ in young leaves
- Yellow banding along the main veins of leaves
- Vein clearing in leaves, sometimes producing a ‘fernlike’ pattern
- Chlorosis or flecking and mottling of mature leaves
- Stem and root swellings (some mild strains of the virus do not cause swellings in infected plants)
- Abnormally shaped pods, usually smaller and spherical

Distribution

The virus currently occurs mainly in West Africa: Benin, Côte d’Ivoire, Ghana, Liberia, Nigeria, Sierra Leone and Togo. The virus has also been reported in Sri Lanka.
Chlorosis or yellow clearing along the major veins of a leaf creating a ‘fern-like’ pattern

Clearing between the major veins in a mature leaf

Swelling on the stem of a cocoa seedling and vein clearing in the leaves

Dieback of cocoa caused by CSSV

Stem swelling of a chupon infected with CSSV

Adult mealybugs, typically measuring around 2 mm, transmit CSSVD
Spread of the Disease

Cocoa swollen shoot virus (CSSV) can be transmitted during feeding by several different species of mealybug that feed on the sap of cocoa plants. The infected young of both sexes and adult females can also spread the virus to adjacent healthy trees by crawling across interlocking branches. Mealybugs can also infect trees further afield, as they can be transported by wind or by animals, insects and humans.

CSSV is not thought to be transmitted through cocoa seeds, but the virus has been transmitted to other cocoa plants experimentally by grafting and mechanical inoculation. The virus has also been found to infect and cause disease in alternative host trees grown in and near cocoa farms.

Once a cocoa tree becomes infected with CSSV it cannot be cured. However, several methods for managing CSSVD have been used with varying degrees of success: the use of barrier crops, eradication or ‘cutting-out’ of diseased plants and the development of tolerant or less susceptible varieties of cocoa.

Recommendations for Associates and Visitors to Minimize the Risk of Spreading CSSVD while Visiting Cocoa Farms in West Africa

Cocoa is susceptible to many different pests and diseases of which CSSVD is of particular concern in western Africa. While visiting cocoa farms it is important that associates and visitors do not inadvertently spread diseases between farms and regions. The following safety guidelines should be adhered to during your visit to help to reduce the risk of spreading disease:
• Do not carry cocoa plant material such as pods, seeds, budwood or leaves to other farms or regions. It is important to note that once a cocoa plant becomes infected with CSSV it can take up to 2 years before any symptoms appear.
• Do not remove any diseased plant material, insects or soil samples from farms unless under the supervision of the relevant research authority. Other plant species can be infected by CSSV.
• After handling diseased cocoa material, wash hands or clean them using an alcohol-based sanitizer.
• Wear rubber boots so they can be cleaned using a 10% bleach solution before visiting another farm.
• Sanitize all pruning tools and knives with a 10% bleach solution before visiting another farm.
• Minimize items and the amount of equipment taken onto the farm during a visit to reduce the risk of contamination.
• Launder clothes and clean footwear thoroughly before travelling to another cocoa-producing country.
• CSSV is not thought to be a pathogen of plants in temperate regions such as Europe and North America. Nevertheless, cocoa plant material should not be taken to these countries unless under the supervision of the National Research Centre and/or the Cocoa Sustainability Team.
• There is a defined procedure already in place to safely move cocoa planting material from country to country that minimizes the risk of spreading cocoa diseases. Please consult the Cocoa Sustainability Team for advice.
References

- CABI Crop Protection Compendium (2011)  
  www.cabi.org/cpc

- Dzahini-Obiatey H, Domfeh, O & Amoah FM (2010)  


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